Report to the Cabinet
Energy and Infrastructure
Overview and Scrutiny
Commission 11th November 2015
Cabinet 23rd November 2015

Wards: All

Unconventional Oil and Gas Extraction Policy

Report of the City Regeneration and Policy Manager

This is a key decision.
The matter is in the Forward Plan – 0003/15

1. Purpose of the Report and Summary

1.1 Following the decision of Full Council on the 20th November 2014, a Policy has been produced setting out the Councils position to oppose the extraction of unconventional oil and gas using extraction techniques generally referred to as "fracking".

1.2 The Policy sets out the parameters for the Council opposing proposals for the exploration and commercial operation of unconventional oil and gas extraction using fracking techniques.

1.3 The Report covers the potential implications of the Policy on land disposal.

2. Recommendations

2.1 The Cabinet approve the Policy at Appendix 1, for the reasons set out within Section 3 (below).

2.2 That the Council will monitor with appropriate agencies, such as the Environment Agency and Yorkshire Water, to ensure that if test drilling assessment or commercial operation is undertaken that all health and safety, operational permit requirements and planning conditions are complied with.

3. Reasons for Recommendations

3.1 The decision of Full Council on the 20th November 2014 (Minute 87) called for the Council to:

"develop a Council policy on shale gas and coal bed methane extraction by referring this motion for a full scrutiny inquiry into

the issue of 'fracking' including the evidence of ecological, geological and pollution associated with this method."

3.2 The proposed policy addresses the issues in relation to the use of fracking as an extraction technique and its potential impact upon existing water resources for the City which lie outside of the City in the East Riding, both from contamination of underground aquifers as well as the amount of water that will be required by any extraction process.

3.3 In addition the Policy addresses potential concerns related to seismic activity, road traffic numbers, fracked liquid transportation and disposal.

3.4 The policy also responds to the concern that fracking will increase the availability of carbon based fuel and therefore that available for consumption. Scientific evidence on climate change has drawn a direct link between increasing carbon emissions and changes to the climate[1]. Further, to achieve existing carbon reduction targets we will need to leave a significant amount of known carbon resources in the ground to avoid run away climate change and stay within the 2^0c target in the Kyoto Protocol and the basis of the Paris Summit in December 2015.

3.5 The Recommendations will enable the Council to adopt a position that provides clear grounds for the Council to make informed judgements in relation to fracking activity. It will enable the Council to take appropriate steps to protect the City, its residents and business from any potential adverse impacts of the fracking process.

4. Impact on other Executive Committees (including Area Committees)

4.1 Two Reports were produced for the Energy and Infrastructure Overview and Scrutiny Commission on the 1st April 2014 and 11th February 2015 setting out the fracking process, legislation, issues and impact on the City.

4.2 The process of fracking has the potential to affect the entire City equally and therefore the Policy provides a process where by the Council can take steps to object to any fracking proposals to reduce the impact on any particular Area Committee area or areas.

5. Background

Council Decisions

[1] http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf

5.1 Full Council agreed a Council Motion on the 20th November 2014 for the Council to:

"develop a Council policy on shale gas and coal bed methane extraction by referring this motion for a full scrutiny inquiry into the issue of 'fracking' including the evidence of ecological, geological and pollution associated with this method."
The Motion agreed that a paper be sent to Energy and Infrastructure Overview and Scrutiny Commission so that they could inform the development of the Policy.

5.2 The Scrutiny Commission in April agreed the following actions regarding an unconventional oil and gas policy.

- That consideration be given to how a Hull City Council Fracking Policy can be linked with Planning Policy to ensure that it is enforceable.

- That the Hull City Council Fracking Policy include within it a clause making clear that the Council is not responsible for the disposal of waste water resulting from the Fracking process, and that, following discussion with Yorkshire Water, the Fracking Policy makes clear the process for disposal of waste water resulting from fracking.

- That, after further investigation, the Fracking Policy includes details of the Council's rights to oppose fracking with regard to land owned by the Authority but located outside of the City.

- That investigation is carried out to establish the rights of Hull City Council to mineral seams below the City.

- That, after considering the evidence of ecological, geological and pollution issues associated with shale gas and coal bed methane extraction, the Energy and Infrastructure Overview and Scrutiny Commission recommends that a Hull City Council Fracking Policy be developed and include the concerns of the Commission and supports the Council debate of 20 November 2014.

5.3 Shale gas and oil are found in certain geological formations of highly permeable rock. It is trapped in tiny pore spaces or absorbed into clay particles. This differs from conventional gas which is found large pockets in impermeable rock.

5.4 Gas held within shale beds is accessed through a technique called "hydraulic fracturing, or "fracking" for short. Water, containing sand and chemicals, is pumped at high pressure into the rock. The sand keeps the small fractures in the rock open

while the chemicals react with the gas increasing the amount of gas extracted. Fracking for unconventional oil and gas has developed rapidly over the last five years in particular in the USA where it has had a significant impact in lowering energy prices and surpassing coal as the main source for energy generation. However, the technology requiring the extraction of oil and gas through fracking has had a significant number of health and social issues associated with it in the USA. Due to these concerns development of these fuels globally has been slow with many counties in Europe taking a cautious approach. France has banned fracking, Germany has a de facto ban through the current Government coalition document and the Netherlands has a moratorium.

5.5 Advances in technology as well as the rising price of oil and gas made the exploration and exploitation of shale gas and oil more viable.

5.6 The exploration of oil and gas on land is not new and there are several sites within the UK currently extracting conventional oil and gas. However, the techniques required to exploit unconventional deposits have raised concerns in communities, interest groups and in the press.

5.7 Unlike conventional oil and gas extraction which can extract all of the reserves from a single well head; unconventional gas and oil extraction requires the construction of tens, and even hundreds, of fracking wells for a deposit site.

5.8 Fracking is an old technology and has been used since the 1950's primarily using water and oil based gels however the rapid development of the industry in the USA and Canada has seen the use of other chemical combinations and a rapid expansion which has created pressure on water resources as well as contamination of aquifers and leaks from used water storage tanks[2].

5.9 The development process for unconventional shale gas and oil extraction involves three phases[3]:

- Phase 1: taking 2-6 months including exploratory drilling to establish if extraction is profitable including seismic surveys, test samples and flow testing.
- Phase 2: taking 6 months to 2 years is the pre-production and production phase when water, chemicals and

[2] http://www.ibtimes.com/fracking-safe-study-finds-hormone-system-disrupting-chemicals-water-near-drilling-dense-areas

[3] DECC Developing Onshore Shale gas and Oil- facts about "Fracking" 2013 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/265972/Developing_Onshore_Shale_Gas_and_Oil__Facts_about_Fracking_131213.pdf

equipment are brought to the site and waste water carried away. During this phase additional wells will be dug and could last for up to 20 years.

- Phase 3: is the decommissioning and site restoration period.

5.10 The process of fracturing rock or fracking for shale gas and oil involves the drilling of a large bore hole vertically and then horizontally, sometimes for many miles; encasing this in concrete; and then flushing water in at very high pressure to create fractures in the rock where the gas or oil is held. The water is combined with a sand and chemical mixture to ensure that the fractures remain open. The gas then flows to the surface to be captured at the well head.

5.11 Fracking has been most significantly exploited in the USA but there are unconventional gas and oil deposits on most continents.

5.12 There have been two widely reported explorations for unconventional gas and oil in the UK, both undertaken by Caudrilla. The most recent, in August 2013, at Balcombe in West Sussex which received significant protest by local residents and others opposed to fracking. No fracking took place at the site and Caudrilla have since decided that the oil can be extracted conventionally. The other exploration which included fracking was near Blackpool in 2011. In April and May of that year, two small earthquakes occurred close to the drilling site. An independent report commissioned by Cuadrilla confirmed that the fracking process was the cause of the earthquakes[4]. Following this and after an investigation, there was an 18 month ban on further exploration. This is not an unusual event in certain geological formations as found in studies in the USA[5].

5.13 Because of the geology of the UK the industry is expected to develop at a much slower rate than in the USA. Added to this, there is a requirement for planning consent and a tighter environmental regulation landscape. It is likely that it will be up to ten years before there is any significant production at scale and there will be at least a further two years of exploration.

5.14 It should be noted that fracking, or rather the technology of using high pressure water to extract oil, has been used at most oil and gas wells to obtain the last drops of energy.

[4] Geomechancial Study of Bowland Shale Seismicity, November 2011 http://www.cuadrillaresources.com/wp-content/uploads/2012/02/Geomechanical-Study-of-Bowland-Shale-Seismicity_02-11-11.pdf

[5] New Scientist August 2013 http://www.newscientist.com/article/dn24069-fracking-operations-triggered-100-quakes-in-a-year.html

5.15 National Context

The Government sees unconventional gas and oil exploitation as part of the wider energy mix with the ability to increase energy security. The Government has offered a number of financial incentives to companies wishing to undertake the exploration of unconventional gas and oil reserves. The 2013 Budget and Autumn Statement included:

- A new shale gas field allowance
- Extended ring-fence expenditure supplemented from six to ten years
- Establishment of the Office of Unconventional Gas and Oil
- The tax rate on a portion of company profits reduced
- A tax allowance equal to 75% of capital spent on projects

5.16 In January 2014, with concern over opposition to shale gas extraction by some local authorities and communities the Government announced that Councils' could keep 100% of the business rates collected from shale gas sites. This was estimated at £1.7m a year for a typical site. There is also a community benefits package of £100,000 when a test well is fracked and a further 1% of revenues if shale gas discovered. This could be worth between £5m-£10m for a typical site over its lifetime. This reflects the approach the Government has taken with onshore wind turbine development which requires a community benefit for communities next to sites.

5.17 In addition the Government confirmed in the Queen's Speech (2014), plans to streamline the underground access regime and make it easier for companies to drill for shale gas through a new Infrastructure Bill. Under the existing system license holders do not have automatic access rights to drill under landowners property and permission should be sought from the landowner before they can do this. If permission is refused then license holders can apply through the Secretary of State and courts to gain access. However, the Government believes this route to be too time consuming and is consulting on the following changes which would:

- Grant underground access rights to companies extracting petroleum resources (including shale gas and oil) and for geothermal energy in land at least 300 metres below the surface;
- A voluntary and community payment of £20,000 for each unique lateral (horizontal) well that extends by more than 200 metres laterally. Alongside this will be powers to make such payments compulsory if companies fail to volunteer;

- A public notification system, under which the company would set out drilling proposals along with details of the voluntary payment.

5.18 In January 2014 following a debate on the Infrastructure Bill the Coalition Government accepted 13 amendments to the Bill related to fracking including:

- No fracking to take place in National Parks, Areas of Outstanding Natural Beauty and Water Protection Zones (see Appendix 2)
- independent inspection of the integrity of wells,
- monitoring for leaks of methane
- informing residents individually of fracking in their area (but no right to object)
- 12 months background data collected of sites prior to drilling

In addition, the Coalition Government's proposal to allow "any substance" to be used in fracking wells was also overturned. Further the Government committed to cancelling shale gas licences if their official advisers, the Committee on Climate Change, concluded that shale gas would damage climate change goals or make a written statement to Parliament explaining the reasons for not doing so[6].

5.19 The current Government has yet to announce the details of how fracking will be undertaken in close proximity to National Parks, Areas of Outstanding Natural Beauty and Water Protection Zones

5.20 In addition in August 2015 the Government announced that they would streamline the planning approval process for fracking applications. This would include the ability of the Secretary of State to call in planning applications for him to decide on them if a local planning authority was deemed to be taking to long to reach a decision.

5.21 Licensing Process for Fracking

The exploration and development of shale gas can only be undertaken through a Petroleum and Exploration and Development License (PEDL) issued by the Department of Energy and Climate Change. In addition a company wishing to frack would also need to obtain approval under the National

[6] http://www.theguardian.com/environment/2015/jan/26/conservatives-u-turn-fracking-labour-cuadrilla-drilling-ban

Planning Policy Guidance[7] as follows:

- Department of Energy and Climate Change – issues Petroleum Licenses, gives consent to drill under the License once other permissions and approvals are in place, and have responsibility for assessing risk of and monitoring seismic activity, as well as granting consent to flaring or venting;
- Mineral Planning Authorities – grant permission for the location of any wells and well pads, and impose conditions to ensure that the impact on the use of the land is acceptable;
- Environment Agency – protect water resources (including groundwater aquifers), ensure appropriate treatment and disposal of mining waste, emissions to air, and suitable treatment and manage any naturally occurring radioactive materials; and
- Health and Safety Executive – regulates the safety aspects of all phases of extraction, in particular responsibility for ensuring the appropriate design and construction of a well casing for any borehole.

Other bodies which may be involved in the consenting of the process include:

- the Coal Authority, whose permission will be required should drilling go through a coal seam;
- Natural England, who may need to issue European Protected Species Licences in certain circumstances;
- the British Geological Survey, who need to be notified by licensees of their intention to undertake drilling and, upon completion of drilling, must also receive drilling records and cores; and
- Hazardous Substances Authorities, who may need to provide hazardous substance consents.

There may also be additional consents and orders, such as stopping up rights of way or temporary road orders, which must be obtained.

There are also a set of permitting conditions set out by the DECC Secretary of State (Appendix 3).

5.22 Shale Gas Deposits in the UK

The Department of Climate Change published a report into the potential for shale gas exploration in 2012[8] which showed the

[7] http://planningguidance.planningportal.gov.uk/blog/guidance/minerals/planning-for-hydrocarbon-extraction/how-mineral-planning-authorities-plan-for-hydrocarbon-extraction/

shale formations with most gas potential. This identified a formation running from the north east to the south and south west including the Weald Basin covering East and West Sussex, Kent, Hampshire and the Bowland Shale in the Pennine basin covering Lancashire and Yorkshire. The Weald and Pennine basins are thought to offer the most potential.

5.23 At present there is very little certainty about the total amount of extractable gas in the UK. In June 2013 a separate study of the Bowland Basin[9] estimated a gas in place assessment of 37.6 trillion cubic meters (tcm). Appendix 4 contains a map of the Bowland Basin. However, there is a caveat, because of the difficulties with how much is extractable based on USA recovery levels it is estimated that 1.8-13 tcm could be extracted. The current annual UK gas consumption figure is 77 billion cubic meters and we have approximately 1.5 tcm of conventional gas recoverable[10].

5.24 Because of this uncertainty over shale gas estimates the Government in response to an investigation by the Energy and Climate Change Committee has estimated that there would need to be 20 -40 wells drilled over the next two years to establish commercial viability. It also concluded that it was too early to say if it would result in cheaper gas prices and it would be wrong to assume that a national or global boom in shale gas would result in price decreases[11].

5.25 In August 2015 the Government annouinced the awarding of a further set of PEDL's for areas of the UK where unconventional and conventional oil and gas could be extracted and indicated that a further set of licences would also be available. The map in Appendix 5 shows the new licensed areas as well as those currently held and future license areas.

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[8] British Geological Survey Unconventional Hydrocarbon resources of Britain's Onshore Basins- Shale Gas 2012 https://www.og.decc.gov.uk/UKpromote/onshore_paper/UK_onshore_shalegas.pdf

[9] British Geological Survey The Carboniferous Bowland Shale Gas Study: geology and resource estimation 2013 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/226874/BGS_DECC_BowlandShaleGasReport_MAIN_REPORT.pdf

[10] Department of Energy and Climate Change Digest of UK Energy Statistics https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

[11] Department of Communities and Local Government Revised requirements relating to planning applications for onshore oil and gas: proposals paper https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/274955/Revised_requirements_relating_to_planning_applications_for_onshore_oil_and_gas_-_proposals_paper_-_Summary_of_responses_and_government_response.pdf

5.26 The City of Hull and surrounding area is already covered by an existing PEDL No 183 held by Rathlin Energy which gives them exclusive rights to explore for oil and gas using conventional or unconventional extraction technology subject to land owner approval for the well head and appropriate planning permissions and licenses as detailed above.

6. Issues for Consideration

Environmental Impacts

6.1 Unconventional gas is an intensive industry with a larger environmental footprint than conventional gas extraction. More wells need to be drilled, there are significant traffic movements of 14-51 vehicles a day, impacts on local communities, land use and water resources. Aligned to this there are potential hazards with surface contamination as well as ground water contamination which have been highlighted in certain fracking operations in the USA. In addition there is the release of methane from the process which has a larger climate change impact than carbon dioxide.

6.2 A Report by the Tyndall Centre[12] in 2011 highlighted the concerns around the potential for ground water contamination affecting drinking water and wetland habitats. The research identified that this was a possibility because although the fracturing process takes place below the level at which aquifers are found the drilling is likely to pass through existing aquifers (see Appendix 2 for Hull and East Riding aquifers). Another potential issue raised in the Report was that the process of creating the fractures would enable contaminated waters to find aquifers through natural pathways. A key issue then is the quality of the casing in the bore hole to protect the surrounding ground. The issues in the USA of water contamination have been linked to potentially poor bore hole casing.

6.3 The concerns over earth tremors noted at Blackpool are not unusual. In the UK, earth tremors were not infrequent as a result of the mining industry. However, the Government has introduced a requirement for seismic monitoring at fracking sites with a traffic light system. There is also a requirement to monitor the growth of the height of fractures to ensure that aquifers are not contaminated.

6.4 The use of water is a further significant concern. A report by

[12] Tyndall Centre Shale gas: an updated assessment of environmental and climate change impacts http://www.tyndall.ac.uk/sites/default/files/coop_shale_gas_report_update_v3.10.pdf

AMEC[13] indicated that up to 18% of current annual mains water supply for the energy, water and waste industries would be needed for a developed fracking industry. While the abstraction of water requires a licence from the Environment Agency, this would still present a significant increase in water demand.

6.5 Additionally, the process generates a significant amount of waste water. Each well could generate between 3,000m^3 to 18,750m^3 and it is estimated at a high activity scenario it could reach108 million m^3. This would require treatment and present a significant pressure on existing water treatment facilities which is likely to require new or upgraded facilities.

6.6 The study also identified that traffic to the site could result in between 14 and 51 vehicle movements a day during the exploration and site preparation phase over a 32 to145 week period.

6.7 It is also not fully understood the amount of methane that escapes to the air from the fracking process both from oil and gas deposits. Methane has a significantly greater impact on climate change than carbon dioxide.

6.8 The use of unconventional gas has been seen as a tool to reduce carbon emissions as it will replace the use of coal in power stations for the production of electricity. This has been part of the reason for the drop in fuel prices in the US as fracked gas has replaced coal. However, the use of fracked gas in the US domestic market has seen coal exports increase as new markets for the US coal industry have had to be found. So while there may be a local carbon reduction the overall carbon emissions have increased[14]. It has further been argued that the emissions of carbon dioxide form

[13] Amec The Environmental Effects of Onshore oil and gas Licensing 2013

[14] Platts.com US Coal Market –Export Potential http://www.platts.com/news-feature/2012/coaltransport/index and The Diplomat US Companies Benefit from China coal Addition http://thediplomat.com/2013/11/how-us-companies-benefit-from-chinas-coal-addiction/

fracked gas are lower than those give off by coal and therefore reduces emissions. However some studies[15] have indicated that because of the methane that leaks from well heads its emissions are at least as large as those from burning coal.

6.9 It has been argued that in order to address climate change through reducing carbon emissions that an approach should be adopted of leaving carbon based fuel in the ground to hasten the transition to a low carbon economy[16]. The relative cheapness of fracked gas and depression of global coal prices though US surplus capacity works against a low carbon transition and investment in renewables and low carbon technologies and their adoption on a global basis. The Governments view is that the carbon emission of fracked gas is broadly similar to that of conventional gas and that shale gas is a "bridge" fuel source in the low carbon transition[17].

6.10 A literature review undertaken by Public Health England[18] in June 2014 into the potential chemical and radioactive pollutants from shale gas extraction found that the process of extraction is undertaken in a safe manner then the risks to public health are low. Where problems did occur these emanated from operational failure and poor legislative framework

Opportunities for Unconventional oil and gas near Hull and economic impacts

6.11 The available data from the Bowland Basin Report indicates there is unlikely to be shale gas extraction within close proximity to Hull. While there are oil and gas exploration licences covering the City and the East Riding, these are longstanding and have primarily been to enable conventional oil and gas exploration.

6.12 The current Petroleum Exploration and Development Licenses in Hull and surrounding areas are shown in the Table below. The licenses do not make a distinction between shale gas and other

[15] Methane and the greenhouse-gas footprint of natural gas from shale formations paper by Dr Robert Howarth Cornell University 2011 http://www.theengineer.co.uk/opinion/viewpoint/frackings-methane-risk-cannot-be-ignored/1019835.article#ixzz3l3yFY2yr

[16] Speech by Christiana Figueres Executive Secretary UN Framework Convention on Climate Change to the World Coals Association 2013 https://unfccc.int/files/press/statements/application/pdf/20131811_cop19_coalassociation.pdf; Naomi Klein This Changes Everything Capitalism vs the Climate Allen Lane 2014; Duncan Clark and Mike Berners-Lee The Burning Question Profile Books 2013

[17] DECC Potential Greenhouse Gas Emissions Associated with Shale Gas Extraction and Use 2013 http://www.tyndall.ac.uk/sites/default/files/coop_shale_gas_report_update_v3.10.pdf

[18] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/328298/PHE-CRCE-009_cover_note.pdf

forms of hydrocarbons.[19]

Parliamentary Constituency	% of constituency covered by licence block	Licence Operator	Round awarded under	License AS
Kingston upon Hull East	88.5%	RATHLIN	13	PEDL 183
Kingston upon Hull North	100%	RATHLIN	13	PEDL 183
Kingston upon Hull West & Hessle	78.5%	RATHLIN	13	PEDL 183
Beverley & Holderness	0.2%	DART	13	PEDL 176
Beverley & Holderness	85.8%	RATHLIN	13	PEDL 183
Haltemprice & Howden	12.3%	DART	13	PEDL 179
Haltemprice & Howden	18.4%	DART	13	PEDL 176
Haltemprice & Howden	32.9%	RATHLIN	13	PEDL 183

6.13 Rathlin Energy has established a well at Crawberry Hill near Walkington East Yorkshire. This well has penetrated the Bowland Shale but to date no test fracking has taken place. The Minutes of a Community Liaison meeting in Bishop Burton held in November 2014 includes a statement from Rathlin that they do not intend to undertake any fracking (large scale or mini) activity at the Crawberry Hill site[20].

6.14 There is some potential for local businesses currently involved in the conventional oil and gas exploration and extraction industry to obtain contracts with fracking companies. Because the industry is at such an early stage that the impact on the local economy cannot be properly assessed. Because of the potential for significant vehicle movements local freight companies may be in a position to obtain contracts depending on the location of fracking sites.

6.15 <u>Government Energy policy and Legislation</u>

The Government has been very supportive of the fracking industry seeing the technology and fuel obtained as an opportunity to provide energy security to the UK as well as support growth. Alongside this it is seen as part of the bridging fuels as the UK transitions to a low carbon economy. It has acknowledge the impact that fracking has had in the USA with a significant reduction in energy costs but acknowledges that this is unlikely to happen in the UK because the amount of frackable energy is significantly less and geography and geology of the UK are notably different.

[19] Shale Gas and Fracking, House of Commons Standard Note, 04 December 2014.
[20] http://www.rathlin-energy.co.uk/yorkshire/

6.16 The use of unconventional oil and gas is part of the UK energy policy[21] and the industry benefits from additional financial support announced in the Autumn Statement 2014[22] to increase public understanding of the fracking process create a sub-surface test centre and set up a long term sovereign wealth fund for the North of England so that income generated in the North is reinvested in infrastructure projects there.

6.17 The current legislative framework, set out in the Infrastructure Act 2015, supports the exploitation of unconventional oil and gas reserves and the use of fracking technology. The Government has also established a college for the development of onshore oil and gas extraction, based in Blackpool, to develop skills within the industry.

6.18 As a result of a letter from the Leader to the former Minister of State at the (DECC), the Council has received information setting out national policy and councils responsibilities under the National Planning Policy Framework, emphasizing the Councils responsibility not to create a situation of pre-determination for any applications received for fracking as well as the requirements to identify land where minerals extraction can take place and to create appropriate policies in line with the Framework and the principle of sustainable development.

6.19 The Joint East Riding and Hull Minerals Plan, which will be consulted on later this year, sets out the draft Policies for shale gas extraction. This conforms to the requirements in the National Planning Policy Framework and the information contained in communication with DECC and Department of Communities and Local Government.

6.20 Potential Local Impacts of Fracking

The arguments against fracking have centred upon:

- the environmental threats to water from contamination of underground aquifers;
- the amount of water required for the fracking process and its treatment/disposal;
- the increased traffic associated with the process of fracking and removing the water and oil/gas extracted;
- the number of wells required within a fracking area and its visual impact as well as impact on land levels if significant

[21] https://www.gov.uk/government/policies/uk-energy-security
[22] Page 38 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/382327/44695_Accessible.pdf

gas/oil removed; and

- the climate change impacts and the need to leave carbon based fuel in the ground to enable the planet to not exceed a 2^0c temperature increase from pre-industrial times.

6.21 As detailed above, two of the main concerns with the process of fracking are water related. While fracking would generally take place at depths below aquifers the drilling process is expected to take place close to existing aquifers and until the Government defines the areas where fracking cannot take place around water source protection zones, then fracking still remains a potential threat to aquifers. Further, the nature of fracking can create underground pathways that over time could lead to damage to aquifers. Once an aquifer is contaminated it will be very difficult to address due to its inaccessibility with the potential for significant adverse impacts on local communities and industry.

6.22 There are also concerns about the amount of water that will be required for the fracking. Amec[23], a leading engineering company, has raised this as a key issue and how demands for water between other aspects of industry, farmers (alongside other similar land uses) and domestic use will be balanced particularly in areas of water stress. They have estimated that up to 18% of current annual mains water supply for the energy, water and waste industries would be needed by a mature fracking industry.

6.23 The impact of climate change and expected increase in heat waves and periods of prolonged drought as the century develops will increase this water stress. Additionally, the extraction of increased amounts of fracked carbon fuel, alongside existing conventional carbon sources, will further impact on climate change and further exacerbate the water shortage problems.

6.24 Hull depends on the aquifer to the west of the City (Appendix 2) for much of its water for both domestic and industrial use. The City also has a number of industries that have a high water use for processing which may be affected by increased water abstraction and future climate related droughts. The potential for fracking within the City or close proximity has the potential to impact the City's water resources.

[23] Amec The Environmental Effects of Onshore Oil and Gas Licensing 2013

6.25 The fracking process also generates a significant amount of waste water with each well generating anywhere between 3,000m^3 and 18,750m^3. This would require appropriate purification and environmental treatment and present a significant pressure on existing water treatment facilities which is likely to require new or upgraded facilities.

6.26 After discussion with Yorkshire Water concerning their approach to fracking and the disposal of waste water they have confirmed that any developer would need to put in place plans for the disposal of any waste water. Yorkshire Water would consider any request to dispose of waste water under their usual processes for accepting new industrial waste. If this was accepted as new waste then it would be taken to the most appropriate treatment works for treatment.

6.27 There is a significant water treatment works on the eastern edge of the City which currently provides treatment for Hull and parts of the East Riding. There is the potential, depending on fracking development and the suitability of the plant to process fracked water following a request to Yorkshire Water, that the City could experience increased lorry movements in the City as well as the water itself posing a potential hazard if there was a spill due to an insecure load or road traffic accident.

6.28 The report by Amec also estimated that a fracked well could generate traffic to the site that could result in between 14 and 51 lorry movements a day during the exploration and site preparation phase over a 32 to145 week period. The process of fracking requires the development of multiple wells within a small geographical area significantly increasing the number of vehicle movements within a local area. The sites currently being developed are primarily located in rural areas and therefore will have a significant impact on local road networks. There is therefore the high probability that the City could see an increase in lorry movements through or within the City related to the construction and extraction processes in addition to water treatment traffic.

6.29 In the context of climate change fracking has two significant impacts. The development of fracked gas may divert investment from more expensive (up-front) alternatives such as renewables and nuclear, weakening the case for reducing reliance on fossil fuels[24]. The Government sees the exploitation of unconventional oil and gas as a way of increasing the UK's energy security and as a transition fuel to a low carbon future. However, the exploitation of all available oil and gas reserves weakens the development of a renewable energy and energy storage market. Further the use of

[24] Schrag, D.P., "Is shale gas good for climate change?" *Daedalus*, 141(2), 72-80, 2012

fracked oil and gas does not "offset" the use of conventional oil and gas and coal but rather drives those markets to other countries.

6.30 This therefore leads to the most significant argument against the development of a fracking industry. Climate Change is now acknowledged as the greatest threat to humanity as indicated in the latest UN Intergovernmental Panel on Climate Change Fifth Assessment Reports in 2014[25]. The former Director of the Tyndall Centre for Climate Change Research, Professor Kevin Anderson, has said that "From a climate-change perspective this stuff [fracked gas and oil] simply has to stay in the ground."[26] A Tyndall Centre report published in November 2011 concluded:

> "... emissions from a fully developed UK shale gas industry would likely be very substantial in their own right. If the UK Government is to respect its obligations under both the Copenhagen Accord and Low Carbon Transition Plan, shale gas offers no meaningful potential as even a transition fuel."[27]

6.31 Books published by Duncan Clark & Mike Berners-Lee[28] and Naomi Klein[29] all present the evidence that the world is unable to extract and burn the known reserves of carbon based fuel without leading the planet to a 5^0c temperature rise above pre-industrial levels. This is 3^0c above the internationally accepted "safe" temperature of 2^0c above pre-industrial levels stated in the Kyoto protocol. Fracking for gas and oil therefore creates a significant issue with both the Kyoto Protocol and the national targets contained in the Climate Change Act. The Paris Conference in December 2015 is seeking to reinforce the principles in the Kyoto Protocol in a new agreement limiting the world to a 2^0c rise in temperatures.

[25] IPCC Fifth Assessment Reports 2014 http://www.ipcc.ch/

[26] "What the Frack?" *The Economist*, 1 October 2011 p.34 and "Natural Gas: Should fracking stop?" *Nature* Volume 477, pp 271–275 15 September 2011

[27] Tyndall Centre for Climate Change Research, *Shale gas: an updated assessment of environmental and climate change impacts*, Executive summary, November 2011, p7

[28] Duncan Clark and Mike Berners-Lee The Burning Question Profile Books 2013

[29] Naomi Klein This Changes Everything Capitalism vs the Climate Allen Lane 2014;

6.32 A report in October 2013 by Friends of the Earth[30] based on analysis by Carbon Tracker[31] demonstrated that if the UK is to meet its contributes under the Climate Change Act and enable the UN climate change agreements to reduce global temperature rises to at the most 2^0c above pre-industrial levels then we need to leave the gas and oil that can be obtain from fracking in the ground. The argument of gas as a transitioning energy source to a renewable energy future would require the rapid reduction in the use of oil and coal which we currently are not resolving. Further the Government's current energy policy is to maximise the recovery of all known and possible oil, coal and gas reserves whether onshore or offshore[32] and the Infrastructure Act 2015enshrine this policy in law.

6.33 Research published in Nature in 2014 by Christophe McGlade and Paul Ekins[33] reinforces the implications for fossil fuel extraction if the planet is to have 50% chance of meeting the target of a 2^0c increase in temperatures above pre-industrial levels. The table below shows the implications for extraction of unconventional oil and gas. The research indicates that 100% of the oil and 82% of the gas must be left in the ground:

	Conven oil		Unconven oil		Conven Gas		Unconven Gas		Hard Coal		Lignite	
Country or region	Gb	%	Gb	%	tcm	%	tcm	%	Gt	%	Gt	%
Africa	141	50%	70	100%	28	81%	35	100%	42	94%	2.8	56%
Canada	43	72%	503	99%	3.6	73%	16	71%	34	99%	39	97%
China and India	54	60%	110	100%	8.0	80%	35	88%	1 003	93%	106	88%
FSU	301	54%	360	100%	85	87%	27	89%	578	99%	480	98%
CSA	190	56%	447	99%	23	70%	51	92%	21	95%	8.3	83%
Europe	84	58%	30	100%	16	72%	16	78%	80	90%	142	80%
Middle East	564	53%	10	100%	72	88%	20	100%	10	100%	5.0	99%
OECD Pacific	23	77%	130	100%	9.0	90%	10	74%	116	97%	198	99%
ODA	38	51%	5.0	100%	14	55%	12	78%	34	84%	142	92%
United States	99	52%	660	100%	19	75%	20	50%	508	99%	317	95%
Global	1 417	54%	2 445	100%	257	80%	247	82%	2 462	96%	1 438	95%

34

[30] http://www.foe.co.uk/sites/default/files/downloads/uk-shale-gas-unburnable-carbon-18099.pdf

[31] CarbonTracker, 2013. Unburnable carbon.

[32] Ed Davey, 2013a. Green Growth, Green Jobs: The success of renewables in Scotland. 18th March.

[33] Christophe McGlade and Paul Ekins The Geographical distribution of fossil fuels unused when limiting global warming to 2^0c Nature 517 January 2015

[34] Extended Data Table 3: Regional distribution of resources unburnable before 2050 in absolute terms and as a percentage of current resources under the 2 °C scenario that allows CCS. (Christophe McGlade and Paul Ekins The Geographical distribution of fossil fuels unused when limiting global warming to 2^0c Nature 517 January 2015)

6.34 Hull as a low lying City on the coast is particularly vulnerable to climate change from rising sea levels and extreme weather events. Major floods in the City in 2007 and 2013 as well as other extreme weather events over the last decade have shown the significant impact a changing climate is having on the City its residents and businesses. Actions to reduce carbon dioxide are an integral part of the Council's carbon reduction plans and it's Environmental Policy Statement[35]. The Council has a target to reduce its carbon emissions by 34-45% by 2020/21 which it is on track to achieve. Hull is also seeking to enshrine its position as a low carbon energy city and projects in the City are paving the way for a low carbon future.

6.35 The extraction of significant amounts of unconventional oil and gas therefore increases the amount of carbon dioxide in the atmosphere and contributes to climate change. It also potentially diverts investment away from low and zero carbon energy generation and energy storage solutions. Unconventional oil and gas extraction therefore increases the threat to the city form extreme weather events as well as potential investment in new and emerging low and zero carbon industries and technology.

7. Options and Risk Assessment

7.1 The Report has two options:

- Option 1: do nothing and use any income generated from fracking to develop renewable energy in the City
- Option 2: to adopt the position of opposing the development of unconventional oil and gas extraction and use any income generated from fracking to develop renewable energy in the City

7.2 There is a general risk that the Council may not be able to stop fracking on land it owns if under the terms of the sale of the land to the Council the previous owner reserved the right to re-enter and extract mined resources.

7.3 It is also not possible to ascertain the financial benefit to the Council of unconventional oil and gas development as this will be dependant on the future value of a well once it becomes operational.

[35] http://www.hullcc.gov.uk/portal/page?_pageid=221,710564&_dad=portal&_schema=PORTAL

7.4 Option 1

This option would mean that the Council would take a position of being indifferent to fracking within the City and would consider any applications for fracking on land owned by the Council either inside or outside of the City boundary on a case by case basis assessing the impact on the City of each application or request. While initially this is unlikely to have any significant risk to the Council in the event of a request or application for fracking the Council is likely to come under considerable pressure from those opposing fracking to either not allow fracking on its own land or set out evidence to challenge any planning application. It would be seen by the media, anti-fracking organisations and the unconventional oil and gas industry as being supportive of the fracking process.

7.5 The Council would seek if appropriate through the planning process to lodge objections to planning applications for such development. Any income generated from fracking that the Council would receive would be used to develop renewable energy projects in the City.

7.6 Option 2

The Council would adopt a position of not supporting the investigation and development of unconventional oil and gas wells that are deemed to have the potential for or undertake mini-fracking or fracking. This would send a clear message to the industry that the Council would not support well investigation or development using or potentially using fracking on land that it owns inside and outside the City and land owned by others that may present a threat to the City.

7.7 Putting the policy into effect may restrict the value of Council land where there is potential for such land to be used for fracking. This could potentially create a conflict with the duty upon the Council under s123 of the Local Government Act 1972 that provides;

> "Except with the consent of the Secretary of State, a council shall not dispose of land under this section, otherwise than by way of a short tenancy, for a consideration less than the best that can reasonably be obtained".

7.8 Accordingly consideration will need to be given to this issue where it arises.

8. <u>Risk Assessment</u>

8.1 The recommendations carries with them three possible risks:

- That it is seen as a planning policy and therefore predetermination of a planning application

- That a position of opposing fracking applications has a detrimental impact on inward investment by oil and gas companies and supply chain companies that are part of the fracking industry.

- High profile media coverage including the possibility of the Council being viewed as contradictory in the way it uses the income from fracking.

8.2 There is a risk that the position of the Council may be viewed as "pre-determination" by planning applicants. To minimise this risk the wording of the Policy makes clear that the policy is not a planning policy and therefore cannot be used in the consideration of any planning application.

8.3 The City currently accommodates a number of companies involved in the conventional oil and gas industry supply chain. It is possible that the development of a local fracking industry may present opportunities for local companies directly involved in oil and gas supply chain as well as civil engineering and logistics. The position of the Council may be seen by these companies as a risk to investment, although the Council would have no direct ability to stop unconventional oil and gas exploration. To reduce the risk to the City, the Council would continue to support the development of the business and encourage their investment in the City focused around the opportunities in the renewable energy and low carbon agenda, in particular the offshore wind industry.

8.4 The adoption of a policy has a potential to draw national coverage because of the contentious nature of the subject. To counter this the policy has been prepared in balanced terms. While it may impact on inward investment by organisations with a link to the oil and gas industry, it is not possible though to ascertain any long term impact on investment decisions or how it might affect the City's relationship with the Department of Energy and Climate Change, Department for Communities and Local Government and other Government Departments.

9. Consultation

9.1 Consultation has taken place with the Energy and Infrastructure Overview and Scrutiny Commission on April 2015 and February 2015 which has emphasised the need to ensure the Policy covers land held by the Council in the East Riding and an emphasis on the protection of water sources for the City.

9.2 The City Planning Manager and Town Clerk have been consulted on the role of the Policy in the context of the Local Plan. The Policy will sit outside of the Local Plan and Joint Minerals Plan. The Policy is not a determining document in terms of the consideration of an application

made to the Planning Authority which will consider an application on purely planning grounds as set out in the Local Plan and Joint Minerals Plan and the National Planning Policy Framework. We have not consulted with the East Riding in the development of the Policy.

10. Comments of the Town Clerk (Monitoring Officer)

10.1 Approval of the proposed Unconventional Oil and Gas Extraction Policy will set out the Council's position on unconventional oil and gas extraction, but will not be binding on the Council as the Local Planning Authority. Any planning application for unconventional hydrocarbon extraction within the city must be determined by the Planning Committee on its own merits in accordance with the Council's emerging Joint Minerals Local Plan and the National Planning Policy Framework. Therefore, the proposed policy will not constitute predetermination of any such planning application and is unlikely to be subject to any legal challenge.

11. Comments of the Section 151 Officer

11.1 The City Treasurer notes the proposed policy of the Council.

12. Comments of HR City Manager and compliance with the Equality Duty

12.1 Other than the publicity mentioned above there are no impacts on staffing or equalities for the Council.

13. Comments of Overview and Scrutiny

13.1 Although the Energy and Infrastructure Overview and Scrutiny Commission at its meeting of 11 February 2015 fed into the initial stages of this policy, the Forward Plan sheet relating to this decision is due to be considered by the Overview and Scrutiny Management Committee on Monday, 7 September, 2015. The Committee will decide if the report should be subject to pre-decision scrutiny, and if so, which Commission should undertake the work. As a result the report author will need to ensure the scrutiny comments are updated before the final report is submitted to Cabinet. (Ref.Sc4492)

14. Comments of the Portfolio Holder: Energy City

14.1 I support the recommendations which appear to fully address the formal decision taken by the Council in November 2014.

Mark Jones
City Regeneration and Policy Manager

Contact Officer: Martin Budd, Environment and Climate Change Strategic Advisor

Telephone No: 01482 613098

Officer Interests: None

Background Documents: -

Report to Energy and Infrastructure Overview and Scrutiny Commission 1st April 2014 Unconventional Gas Extraction - Fracking

Report to Energy and Infrastructure Overview and Scrutiny Commission 11th February 2015 Fracking and Coal Bed Methane Policy Discussion Paper

Email from the Department of Energy and Climate Change Office of Unconventional Gas and Oil 1st June 2015

Implications Matrix

This section must be completed and you must ensure that you have fully considered all potential implications

This matrix provides a simple check list for the things you need to have considered within your report

If there are no implications please state

I have informed and sought advice from HR, Legal, Finance, Overview and Scrutiny and the Climate Change Advisor and any other key stakeholders i.e. Portfolio Holder, relevant Ward Members etc prior to submitting this report for official comments	Yes
I have considered whether this report requests a decision that is outside the Budget and Policy Framework approved by Council	Yes
Value for money considerations have been accounted for within the report	N/A
The report is approved by the relevant City Manager	Yes
I have included any procurement/commercial issues/implications within the report	Yes
I have considered the potential media interest in this report and liaised with the Media Team to ensure that they are briefed to respond to media interest.	Yes
I have included any equalities and diversity implications within the report and where necessary I have completed an Equalities Impact Assessment and the outcomes are included within the report	N/A
Any Health and Safety implications are included within the report	Yes
Any human rights implications are included within the report	N/A
I have included any community safety implications and paid regard to Section 17 of the Crime and Disorder Act within the report	N/A
I have liaised with the Climate Change Advisor and any environmental and climate change issues/sustainability implications are included within the report	Yes
I have included information about how this report contributes to the City Plan/ Area priorities within the report	Yes

UNCONVENTIONAL OIL AND GAS EXPLORATION AND EXTRACTION POLICY

1. INTRODUCTION

Hull City Council recognises the need to take steps to reduce carbon emissions to combat climate change and to take steps to support and develop the transition to a low carbon economy and ensure energy security.

The Council accepts the Governments commitment to the exploration and extraction of unconventional oil and gas as contained in the Infrastructure Act 2015 and the National Planning Policy Framework.

The Council approaches requests for the use of Council assets to further fracking activity on the basis that fracking represents a credible threat to the City based on its assessment of the potential environmental impacts to water, transport and geology and the impacts of extracting unconventional oil and gas in increasing the threat of climate change. Where required the Council will act to prevent fracking activity having an adverse impact on the City, its residents and business and the natural resources it is dependent upon.

2. SCOPE

The Council will not encourage applications by holders of the appropriate Petroleum Exploration and Development License to gain access to land owned by the Council inside or outside the City for the purposes of exploring, developing or extracting for unconventional oil and gas using fracking or mini fracking technology.

In addition where impacts of any proposed unconventional oil or gas development, by an appropriate License holder, is considered to have an adverse impact on the City by for example by;

- pose a threat to the City's water resources
- adversely affect traffic movements in the City and,
- require the movement of hazardous waste through the City resulting from the process

or any other impacts resulting from exploration or extraction that may be judged to adversely impact the City, the Council will take such action as may be necessary to protect the Community's interests.

This policy will not be a consideration when the Council is exercising its functions as the Local Planning Authority. The Policy will also not be directly implemented when preparing Local Plans or determining planning applications.

3. POLICY OBJECTIVES

To ensure, that the Council, City, its residents and business are protected from the impacts of the process of fracking undertaken in the exploration and extraction unconventional oil and gas.

To ensure that all statutory bodies and non statutory bodies involved in the licensing and operation of fracking operations are undertaking their duties fully and ensuring the protection of the City from the fracking process including but not exclusively water use and disposal, transportation of oil/ gas and development waste, construction and remedial operations, on site monitoring before, during and after development.

The Council to assess the impact of planning applications inside and outside the City where unconventional oil and gas activity may affect the City and its resources.

To submit written and where appropriate oral evidence to relevant planning committees and licensing bodies, following assessment of the impacts, to prevent such activity from negatively impacting the City of Hull and its environs.

4. MONITORING AND REVIEW

The unconventional oil and gas exploration and extraction policy will be monitored and reviewed to ensure they that it is clear, consistently applied and takes account of changes in relevant legislation and consenting requirements, scientific evidence and future Council policies.

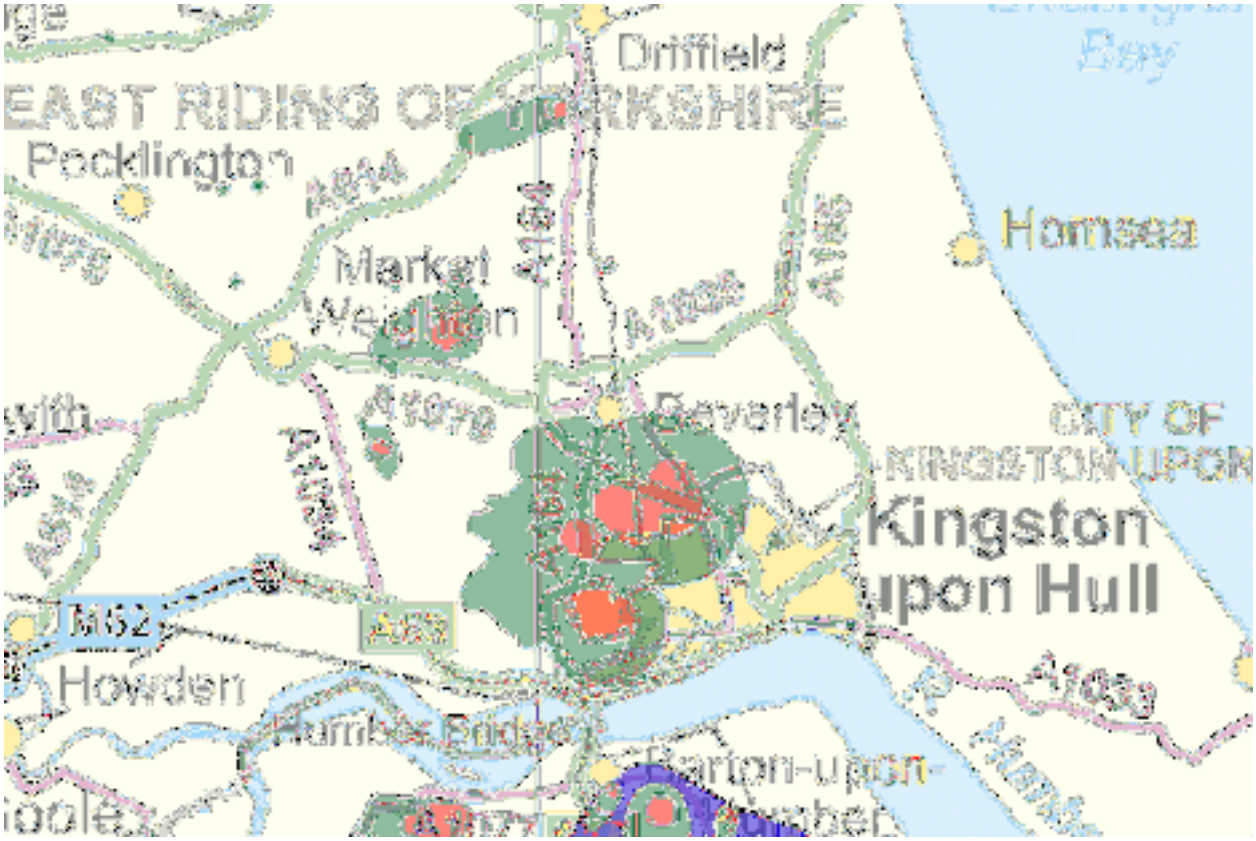
Policy History:

Implementation: November 2015

Appendix 2

Ground Water Source Protection Map Zones[36]

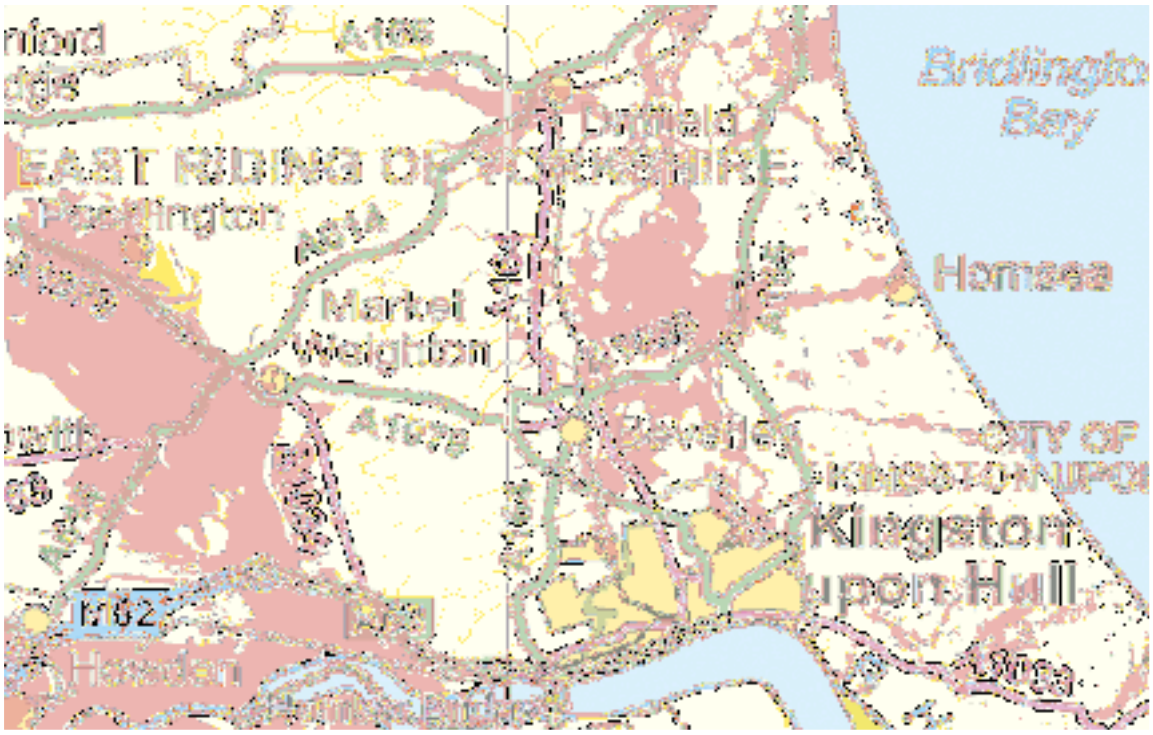
Ground Water Source Protection Zones



- Inner zone (Zone 1)
- Inner zone - subsurface activity only (Zone 1c)
- Outer zone (Zone 2)
- Outer zone - subsurface activity only (Zone 2c)
- Total catchment (Zone 3

[36] Source Environment Agency web site http://maps.environment-agency.gov.uk/wiyby/wiybyController?value=hu1+2aa&lang=_e&ep=map&topic=groundwater&layerGroups=default&scale=9&textonly=off#x=504552&y=438625&lg=1,&scale=5

Aquifer Maps Superficial Deposits Designation



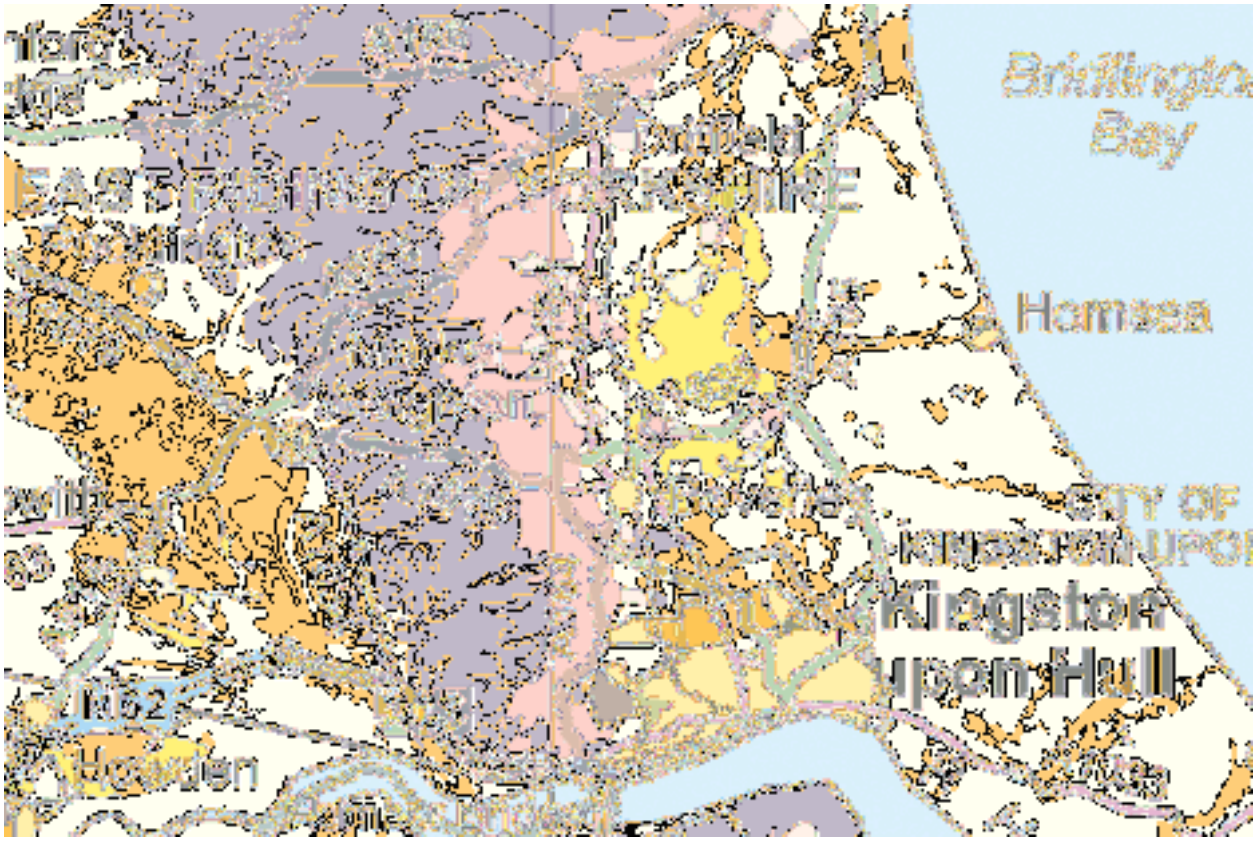
Pink areas on map show permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

Aquifer Maps - Bedrock Designation

Purple: These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer

Orange: Secondary B - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers

Ground Water Vulnerable Zones



- Major Aquifer High
- Major Aquifer Intermediate
- Major Aquifer Low
- Minor Aquifer High
- Minor Aquifer Intermediate
- Minor Aquifer Low

Appendix 3

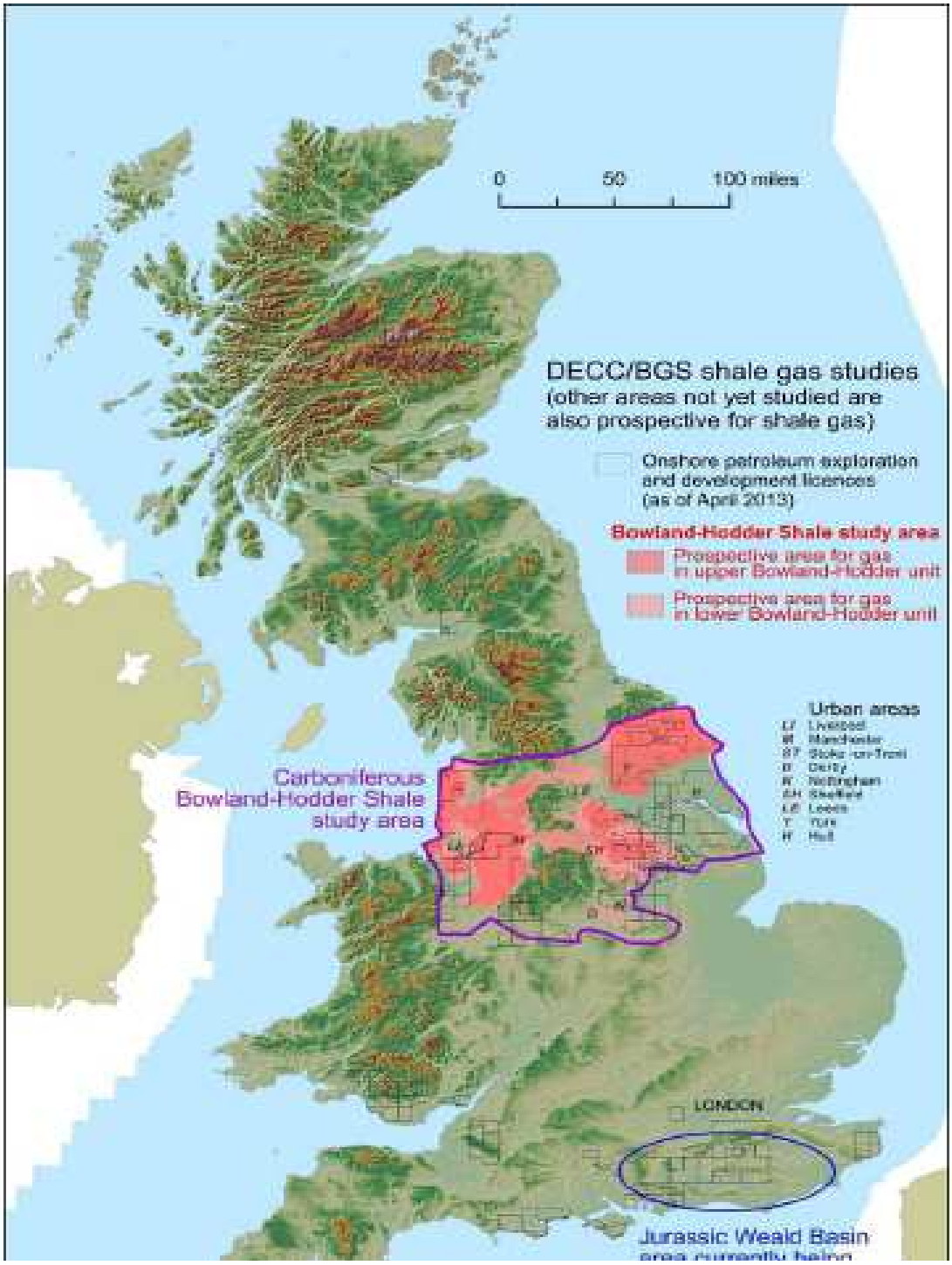
Department of Energy and Climate Change Secretary of State Permitting Conditions

Column 1: conditions	*Column 2: documents*
1 The environmental impact of the development which includes the relevant well has been taken into account by the local planning authority	A notice given by the local planning authority that the environmental information was taken into account in deciding to grant the relevant planning permission
2 Appropriate arrangements have been made for the independent inspection of the integrity of the relevant well	A certificate given by the Health and Safety Executive that it— (a) has received a well notification under regulation 6 of the Borehole Sites and Operations Regulations 1995, (b) has received the information required by regulation 19 of the Offshore Installations and Wells (Design and Construction, etc.) Regulations 1996, and (c) has visited the site of the relevant well
3 The level of methane in groundwater has, or will have, been monitored in the period of 12 months before the associated hydraulic fracturing begins	An environmental permit has been given by the relevant environmental regulator which contains a condition that requires compliance with a waste management plan which provides for monitoring of the level of methane in groundwater in the period of 12 months before the associated hydraulic fracturing begins
4 Appropriate arrangements have been made for the monitoring of emissions of methane into the air	An environmental permit which contains a condition requiring compliance with a waste management plan which provides for the monitoring of emissions of methane into the air for the period of the permit
5 The associated hydraulic fracturing will not take place within protected groundwater source areas	A decision document given by the relevant environmental regulator (in connection with an environmental permit) which indicates that the associated hydraulic fracturing will not take place within protected groundwater source areas
6 The associated hydraulic fracturing will not take place within other protected areas	A notice given by the local planning authority that the area in respect of which the relevant planning permission has been granted does not include any land which is within any other protected areas
7 In considering an application for the relevant planning permission, the local planning authority has (where material) taken into account the cumulative effects of— (a) that application, and (b) other applications relating to exploitation of onshore	A notice given by the local planning authority that it has taken into account those cumulative effects

petroleum obtainable by hydraulic fracturing	
8 The substances used, or expected to be used, in associated hydraulic fracturing— (a) are approved, or (b) are subject to approval, by the relevant environmental regulator	An environmental permit has been given by the relevant environmental regulator which contains a condition that requires substances used in associated hydraulic fracturing to be approved by that regulator
9 In considering an application for the relevant planning permission, the local planning authority has considered whether to impose a restoration condition in relation to that development	A notice given by the local planning authority that it has considered whether to impose such a condition
10 The relevant undertaker has been consulted before grant of the relevant planning permission	A notice given by the local planning authority that the relevant undertaker has been consulted
11 The public was given notice of the application for the relevant planning permission	A notice given by the local planning authority which confirms that the applicant for the relevant planning permission has certified that public notification requirements, as set out in a development order, have been met.

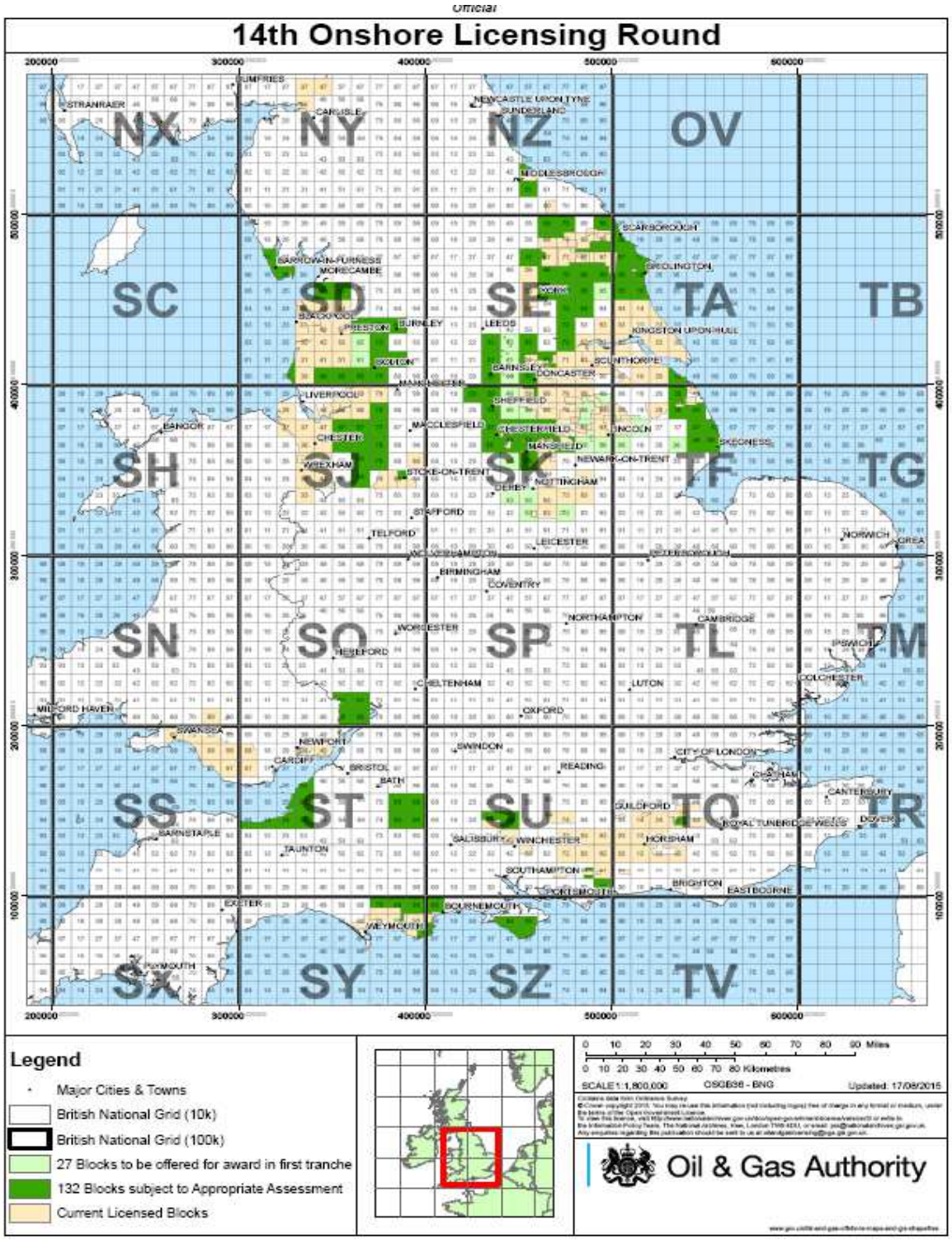
Appendix 4

DECC/British Geological Survey Shale Gas Study potential Fracking Sites[37]



[37] Page 2 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/226874/BGS_DECC_BowlandShaleGasReport_MAIN_REPORT.pdf

2015 Onshore Oil and Gas Licenses[38]



38 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/454361/14th_Round_Map_First_Tranche.pdf