

From: [helen.savage](#)
To: [PL Planning Applications](#)
Subject: Planning Application WSCC/045/20
Date: 28 September 2020 16:43:31
Attachments: [My objection 2020.docx](#)

I wish to register my **objection** to the proposals by Angus Energy to remove drilling fluids and conduct an extended well test at lower stumble Balcombe.

Please find attached my reasons.

Helen Savage

3 Troymede

Balcombe

West Sussex

RH16LU

Objection by Helen Savage to application WSCC/045/20 Sep 2020

Location: Lower Stumble Exploration Site, off London Road, Balcombe, RH17 6JH

Proposal: Remove drilling fluids and carry out an extended well test.

This application should be refused because it flies in the face of world-wide ‘climate emergency’.

WSCC Joint Minerals plan was developed pre-climate crisis recognition on a global scale.

WSCC has also recognised the climate emergency.

This application should still be refused based on many of the policies laid out in the WSCC joint minerals plan and in various planning guidances

Links to planning

West Sussex Joint Minerals Local Plan (July 2018);

2.2 Vision

Will ensure minerals have been produced in a manner that protects and enhances the historic and natural environment, delivers net gains to natural capital, and contributes to a low carbon, circular economy.

Flow-testing more wells is not helping create a low carbon circular economy. It is exacerbating climate change while flow-testing goes on, by releasing methane into the environment (some through fugitive emissions) which is a much more potent green house gas than carbon dioxide. Not only that but the process of getting fossil fuels out of the ground which are later to be burnt will increase the levels of carbon dioxide in the environment generally. Additionally, the eventual burning of the oil itself, if recovered of course contributes also to climate catastrophe and makes it harder to hit our CO2 reduction targets and hopes of achieving net zero carbon emissions 2050. We should be investing in cleaner more renewable sources of energy that can also contribute to sustained economic environmental and social development, i.e. wind and solar electricity generation. Use our land assets a different way, leaving the minerals in the ground.

The Strategic objective and vision states “minerals resources will be safeguarded and exploited in a manner which only sees minerals development take place in exceptional circumstances and where it is in the public interest.”

It is not in the public interest to flow test this well. The majority of Balcombe residents when polled (in 3 separate surveys) were against this. The majority of the public are also against this type of onshore fossil fuel extraction. This site is mostly expecting oil, which is not gas and certainly not part of any temporary transition to a low carbon then

zero carbon emission future. The volume of oil projected would also not provide any significant security of energy supply compared to the nation's current usage. Last year's flow test produced an equivalent of 1600 barrels / day, which is more likely to settle at 500 – 700 barrels a day during production 1st phase then reduce to more like 200 barrel of oil per day after the 1st year because production rates never sustain the initial burst. Angus expect the site to produce just 0.005% of the amount of Wytch farm, so this is 'not a game changer' as Lord Lucan said at the CLG because it is just not significant in supply volume. Angus stated in a community liaison meeting this October 2019 that the production at Balcombe would be comparable with Lidsey and Brockham, Brockham produces only 0.00064997 mb/d, which is a tiny compared the UK's main onshore site at Wytch farm that pumps out 13.748 md/d. As Angus energy stated at the CLG this is a 'cottage industry'. The negative local and global environmental effects far outweigh the miniscule positive contribution of energy supply capacity or other oil industry economy.

Policy M7a (Hydrocarbon development not involving hydraulic fracturing) states that proposals for exploration and appraisal for oil and gas, not involving hydraulic fracturing including extensions to existing sites will be permitted provided that:

- I. *With regard to development proposals deemed to be major, the site is located outside the South Downs National Park, High Weald AONB or Chichester Harbour AONB unless it has been demonstrated that there are exceptional circumstances and that it is in the public interest, and in accordance with Policy M13;*
- II. *the site selected represents an acceptable environmental option in comparison to other deliverable alternative sites from which the target reservoir can be accessed, taking into account impacts from on-site activities and off-site activities including HGV movements;*
- III. *Any unacceptable impacts including (but not limited to) noise, dust, visual intrusion, transport, and lighting, on both the natural, historic and built environment and local community, including air quality and the water environment, can be minimised, and/or mitigated, to an acceptable level;"*

The public generally are very much concerned about climate emergency. WSCC has stated its own climate emergency, this is not aligned with a council that is concerned about climate emergency. Alternative site not needed because this and other small oil exploration works like it will not make any contribution of significance to national energy security or oil supply for other uses. When you take into account HGV movements this is not an acceptable site.

Policy M12 (Character) states that proposals for mineral development will be permitted provided that they would not have an unacceptable impact on the character distinctiveness, sense of place of the different areas of the County, the special qualities of the South Downs National Park, and the setting and character of the Chichester Harbour and High Weald AONB and the setting of protected landscapes

This would change the peaceful character and distinctiveness of the village as these huge vehicles come past on the road. It will change the nature of the road.

Part (c) of Policy M13 sets out that proposals for major mineral development within protected landscapes will not be permitted unless there are exceptional circumstances and where it is in the public interest as informed by an assessment of:

Not exceptional circumstances, not in the public interest

- I. *the need for the development, including in terms of any national considerations, and the impact of permitting it, or refusing it, upon the local economy;*

Makes no difference to local economy, 10 jobs on site, brought in not local, plus security. No-one from the oil company eats drinks or shops in the village. We watched them all drive straight in and straight off again.

- II. *the cost of, and scope for, developing elsewhere outside the designated area, or meeting the need for the mineral in some other way;*

There is no NEED for this mineral except to share-holders. This will make little difference to anything but Angus share price

- III. *and any potential detrimental impact on the environment, landscape, and recreational opportunities, and the extent to which identified impacts can be satisfactorily mitigated.*

There will be great detrimental impact to children's learning and health and negative impacts from traffic and related heavy diesel pollution on the road. There will also be air pollution drifting across the village from the site. There are risks to geology and local gill streams which link hydraulically to the reservoir on certain occasions. There is also seismic risk. The impact a and risks DO NOT outweigh the benefits.

National Planning Policy Framework Feb 2019

Section 17 Paragraph 205

Paragraph 205 states that when determining planning applications, great weight should be given to the benefits of mineral extraction, including to the economy. In considering proposals for mineral extraction, minerals planning authorities should:

Again no benefit to the economy outside of Angus Shareholders who are minimal in number

- *Ensure that there are no unacceptable adverse impacts on the natural and historic environment, human health or aviation safety, and take into account the cumulative effect of multiple impacts from individual sites and/or from a number of sites in a locality; and..*

As outlined above there will be unacceptable and adverse impacts, including to human health.

9.3.13

In relation to paragraph 209, on the 6th of March 2019, Mr Justice Dove handed down his judgment in the case of Stephenson vs SoS MHCLG [2019] EWHC 519 (Admin). In accordance with

the terms of the Court Order, paragraph 209(a) of the National Planning Policy Framework has been quashed.

Paragraph 209 a read as follows:

“Minerals planning authorities should: recognise the benefits of on-shore oil and gas development, including unconventional hydrocarbons, for the security of energy supplies and supporting the transition to a low-carbon economy; and put in place policies to facilitate their exploration and extraction.”

This ruling means that planning applications for oil and gas must be assessed based on current scientific evidence about climate change, and there is no longer any pressure from national policy to put ‘great weight’ on oil and gas extraction.

This is oil extraction, will produce methane, a highly destructive greenhouse gas (more so than carbon) it will not help a transition to a low carbon economy in any way.

9.3.28 The Planning Practice Guidance is a material consideration in the determination of planning applications.

The PPG for Minerals sets out the Government’s approach for mineral extraction in the decision making and planning application process.

Paragraph 124 Of Planning Practice Guidance states that Mineral Planning Authorities should take account of Government energy policy ‘which makes it clear that energy supplies should come from a variety of sources’ including onshore oil and gas. It also refers to the Annual Energy Statement 2013 which notes, among other things, that the UK needs to make the transition to low carbon in order to meet legally-binding carbon emission reduction targets (paragraph 1.2) and that levels of production from the UK continental shelf are declining so the UK will become increasingly reliant on imported energy (paragraph 1.3). The three stated priorities in delivering the UK’s energy policies in the near term are:

This development will make no difference to keeping energy bills down and will put more greenhouse gases into the atmosphere.

- “helping households and businesses take control of their energy bills and keep their costs down;*
- unlocking investment in the UK’s energy infrastructure that will support economic growth; and*
- playing a leading role in efforts to secure international action to reduce greenhouse gas emissions and tackle climate change.” (paragraph 1.6).*

In allowing this to go through WSCC is actively flying in the face of this last point. It will NOT be taking a leading role or action to reduce greenhouse emissions and tackle climate change, it will be exacerbating those problems.

Planning Practice Guidance (PPG)

Planning PPG: Air Quality notes that when deciding whether air quality is relevant to a planning application, considerations could include whether the development would (in summary): significantly affect traffic (through congestion, volumes, speed, or traffic composition on local roads); introducing

new point sources of air pollution; give rise to potentially unacceptable impact (such as dust) during construction; or affect biodiversity (paragraph 5).

This application will significantly affect traffic congestion within the very busy and parked up London road. Cars often have to wait at either end. It will significantly affect traffic composition on local roads introducing new point sources of pollution. On certain days and weeks when we will see between 20% and 33% increase of HGV traffic on that road, which is huge. Angus energy at the CLG pointed out that they thought the tankers they are talking about would fall into 'BIN 9' by FHWA vehicle classifications. The average for these 5 axle vehicles with draw bars is 1 per day on that road.

This will produce new point sources of air pollution. The road itself has not been considered a 'receptor' of air pollution and yet I had to wind my window up on sometimes because of the smell passing. Both locals working on the estate and horse riders use that area that will be affected by the pollution levels. Given that this site always has, and will continue to attract protest it has now become a place where people and police will go with areas where they are able to park. This road, therefore should be considered as a point for air pollution as it is a place where people congregate.

Traffic watch members frequently complained of feeling nauseous and headachy near the site. This was

It will give rise to an unacceptable impact on children in the school yard and residents on The London road

WSSC Joint Minerals plan. Policy M12 (Character) states that: proposals for mineral development will be permitted provided that they would not have an unacceptable impact on the character distinctiveness, sense of place of the different areas of the County, the special qualities of the South Downs National Park, and the setting and character of the Chichester Harbour and High Weald AONB and the setting of protected landscapes.

By changing the composition of the traffic on the road as discussed above, it will change the quiet nature of this AONB. The smell along this road is also very strong when flow-testing.

The grounds for objecting below back up many of my comments made above in relation to planning policies.

Seismicity:

Several geologists (Stuart Hazeldene of Edinburgh University among them) suspect that the local swarm of more than 20 earthquakes in Surrey (where none have been recorded since BGS records began) is linked to the oil and gas development sites going on in the region, Horse Hill, Brockham) and the linking/intersecting of geological faults around Newdigate. These earthquakes are also at shallower depths than normal, similar to drilling depths, that would again suggest a link. Of course geologists working for the OGA and Angus energy would argue that is not the case because they have an INTEREST in it not being the case!

See this quote from Surrey Live 'Get Surrey' 5th March 2019

Stuart Haszeldine, Professor of Carbon Capture and Storage at Edinburgh University said his team have concluded UKOG does something to vary the gas pressure in the borehole. It makes the rock spring back and release stored stress, producing a minor earthquake.

Having a cluster of shallow tremors – the experts agree they are up to 2km below the surface – is unprecedented in the region, they say.

“My job as a scientist is to try and understand what the truth is, what is happening with the earth, and what I am trying to do is point out that it looks, very strongly to us here in Edinburgh, that there is a very strong causal link and effect between activity at Horse Hill and this sequence of small earthquakes which are developing,” Prof Haszeldine told us.

“Two or three days before they want to start flow-testing, we get a set of earthquakes and then they start flow-testing,” said Prof Haszeldine.

“Is that an accident? That is what the BGS, the OGA and the operators say – this is just coincidence.

“To happen once would be a coincidence; to happen twice is a novelty but to happen three times, it really does look like a pattern.”

Professor David Smythe Emeritus Professor of Geophysics from the University of Glasgow states:

In conclusion, the extreme shallowness of the Newdigate events mean that we have a lot to learn about shallow pore pressure, shallow stresses, and shallow faults. The complex tectonic problem to be resolved here lies in the depth zone of the hydrocarbon activity. In view of the clear temporal and spatial relationship to the current exploration and production activity at the two sites in question, I support the call for a moratorium on further hydrocarbon activity made by four expert earth scientists.

He is supported by British Geological Survey (BGS) Dr Steve Hicks Southampton University and by Stuart Haszeldine and Dr Gilfillan from Edinburgh University.

I choose to believe the Professors and Scientists who DO NOT hold an interest in oil and gas!

Angus energy have already told us they don't really know much about these hybrid wells and that Balcombe compares in Geology to Brockham and Horse Hill. This certainly gives me reason to be concerned about seismicity. The well is extremely close to the railway (25m or so?) which again is a section very close to the Victorian viaduct, which is built to stand downward pressure, but not horizontal shaking. Who would be to blame if the viaduct were to move due to a seismic event? How many people could suffer on this busy London to Brighton trainline? We should take the precautionary principle. We have already seen earthquakes at Newdigate co-incide with oil exploration, who's to say that it won't happen here? The oil company that would like to make money from it. We know where induced seismicity has got us up North.

Air Pollution

According to Sussex resident Professor Lawrence Dunne (an expert in chemical physics):

'No long-term study has been done anywhere in the world on the health effects of chronic exposure of human populations to the emissions from gas/oil extraction. Hence, the long-term risk is not known. However, it is known that extended exposure to the radioactive and chemical emissions typically associated with gas/oil operations poses a serious mortality and morbidity risk. The risk to residents living within a few hundred metres of a well pad may be very significant.'

I have concerns that the company are not checking for or putting into the air studies ALL gases and VOC's that are likely to be present. PHE in 2014 note that Cuadrilla state various gases relate to proposed works at the site... 'Hydrogen sulphide, methane, Volatile Organic Compound (VOC's) Benzene, Toluene, Ethylbenzene and xylenes (BTEX).' Angus energy play down the risks. Polyaromatic hydrocarbons and particulate matter are also to be produced and a concern. All these are very toxic cancer causing chemicals and often only small amounts are needed to cause harm. Research around oil and gas facilities in other countries indicates that it is associated with health risks. Particularly living within 2k.

The people doing the traffic watch often complained at nasty smells around the site. Several sat in cars with windows up, some could not stay for more than half an hour because it made them feel sick and headachy. This is partly because of diesel generators on site, I had become used to always smelling the diesel fumes down there. However, there was occasionally a more acrid smell which people described as sticking in the back of the throat.

I went down to the site on the night when quite a few residents heard humming and had mentioned it on one of the local facebook pages. I think it was Wednesday 27th September, possibly Thurs 28th. I went down with a friend at 11.30 because we could hear the hum from the site. I could hear it well into the village where I live (with the door/window open). When I went to the site there was a horrible smell hanging in the air that I had not smelled before. It was acrid and heavy and can best be described as being a combination of oil/tar/bitumen/creosote and varnish. ON this same evening someone in Foxwells in the line of the wind had also complained of a smell that 'caught in the back of the throat.' This smell had the same effect on me and I eventually started to feel headachy and a bit queasy, despite enjoying a chat with my friend. I have not forgotten the pungence and heaviness of that smell. We later found out at the CLG that that was one of the hours of active flow-testing. The wind had mostly been away from us during the work, but that night, as we could tell by the weather reports it was in our direction. Indeed, when it switched direction FFBRA received complaints from neighbouring Slagham/Staplefield direction.

Something must be causing that smell and it was not diesel fumes. I suspect that there is an element of cold-venting going on or the tanks storing the oil have open vents. Something is being released from the facility that is certainly toxic. I smelled the air clear as I went away from the site. If this is the sort of smell and gas we can expect in the

air every time they flow-test it is extremely worrying, particularly for the people who live to the south of the village and in the direction of the prevailing wind.

I am concerned that Angus states that ‘the hourly mean concentration of NO₂ will be 4 times the background in certain conditions.’ And is deemed to be ‘moderate to adverse’ which is one of the more polluting levels adverse’. That could be enough to affect someone across a few nights, particularly if they are sensitive to breathing problems. The long-term effects are harder to see but still a risk.

The only fail safe air monitoring system should be by continuous reading of pollution levels to check for ‘spikes’ and stop work when they appear. I believe the use of the tubes intended to be a cheap and far less accurate alternative.

Noise is a concern.

I have been negatively affected by the noise each time work has been done in the village and I don’t expect this will be any better.

Mr Lucan has already told ‘Drill or Drop’ that if successful he will consider putting down 2 more wells. This again would be unacceptable.

Not Conventional

Angus Energy told us repeatedly at the CLG, as mentioned in the ‘Drill or Drop’ article by Mr Lucan, this is UNCONVENTIONAL geology. WSCC has labelled the weald as ‘conventional’ which is simply not the case. So many health studies link to adverse effects of living near unconventional hydrocarbon sites.

Not Temporary

Angus told us they didn’t know what to expect and it will need longer than the average flow-test. 3 Years for a flow-test is unacceptable, this is not temporary. 3 years is a long time, it is disingenuous to call work temporary just because it can be removed again. 3 years is not temporary. More than 90 days is too long for an extended well test, even the OGA guidelines state 90 days is the norm. Angus will be selling the oil they get from this flow-test as Mr Lucan mentions in the article referenced. They will also be producing and should label it as such. They are just trying to get it though planning by not admitting this will be the case too.

Not Healthy

Concerned Health Professionals of New York have produced a huge study of the negative effects of living near Fracking and unconventional oil and gas development sites. Many of the chemicals produced at this site also appear in these studies as causing harm to those living nearby. WSCC should take the precautionary principle and not allow this work so near residents and a school. They should also consider Murphy’s law, if something can go wrong it will go wrong. Wells do blow-out, leak and cold-vent or have sudden releases of pressure, that can be very harmful to nearby locals.

Risk to Water and Hydrology

It is of note that in the 2010 application, the plan for the well test was to acidise up to just below fracturing pressure using a 15% solution of hydrochloric acid. By 2012, the solution was down to 10% because the Environment Agency considered hydrochloric acid over 10% toxic. Now it is back to 15%. Higher concentrations are to Angus' advantage. As noted in section 4.6 of the hydrology report, highlighted below, this increase in acid will further risk the geology as it will further damage already 'moderate/poor' cement seals around the well.

I am assuming you have received a copy of the independent hydrology assessment, It does back up FFBRA's investigations into the well log data we bought which shows that the cement seal on the well is not good, particularly through critical sections which 'increases the risk to ground water quality'. It also suggests that previous work there has already caused raised levels of methane in the area. This backs up our theory that the 'green stream' incident was caused by an industrial tracer dye. Companies would use this to check for leaks, and it was coming out from a culvert in the ground (rather than appearing to have been 'thrown in' by protestors). A lab concurred that it was a tracer dye.

Tapajos point out the lack of ample baseline monitoring and general understanding of the hydrological complexities on the part of RSK. I'm amazed that the EA has not objected to the recent application considering this damning report of Angus Energy's competence. It accuses them of 'poor science' and suggests their 'understanding of risk to groundwater quality....is wholly inadequate'

It bothers me that the land on top of the drill spur is on the top of a ridge or fault line. Streams and ditches run from here all the way down the Ouse at the bottom, sometimes underground and chased by drains, sometimes open water over the top. Livestock graze on these fields and are very likely to drink from the ditches. Some of the farms may likely use ground water along here and not realise the contamination risk. As this report points out, you can't assume that water in the area will *not* be used for anything else (as RSK does), so contamination of it *would* matter. RSK suggest that local water is not used for domestic use and '*dismiss the present and future value of the natural groundwater beneath the proposed exploration site.*' If the ground water here is contaminated it could have an appalling effect of on the farming going on above it, the livestock grazing and on the Ouse itself. See the statements in the hydrology report highlighted in blue. The report goes on to add '*As a consequence, the proposed mitigation measures to protect the natural resource are not sufficiently considered*'

Angus/Cuadrilla are not good neighbours.

This has been proved time and time again. Why has there been no CLG prior to this consultation? That speaks volumes about how they value the community. They don't listen to our requests and don't care about the impact on us.

References

Hydrology assessment of RSK by Tapajos Feb 2020

I have highlighted some very telling points in the assessment.

3.29

Furthermore and in contrast, later in Section 3.3.2, RSK (2019) HRA refer to “short lived” peaks in dissolved zinc and dissolved iron in October 2016 and a “short lived” peak in Aluminium in April 2018. This infers an active and mobile groundwater system may be present in the Ashdown Beds locally and contradicts the earlier assertion that there is a “lack of local connection to surface recharge mechanisms.” However, with fairly infrequent groundwater monitoring (such as only one sample round taken in 2016), it would be inappropriate to dismiss such observed concentrations as “short lived” peaks. A more frequent and, therefore, more thorough sampling programme would be required to draw any robust assertions about the groundwater quality, its variability, trends, seasonality and connectivity between deep groundwater units, perched groundwater systems and the surface and near surface recharge and aquatic environments. Without this substantive baseline detail and informed understanding of site-specific and local hydrogeology, a thorough and robust appraisal of the hydrogeology and, therefore, hydrogeological risks cannot be completed

3.30 RSK (2019) HRA also highlight the presence of dissolved carbon dioxide, methane and ethane in the GGS samples; and then set out to compare with the methane and ethane results in the Ashdown Beds as reported by Conoco (1986).

3.31 For the record, the concentration of methane as reported by Conoco (1987) slightly differ from that presented by RSK (2019) HRA – such that Conoco (1987, p 2.2) reported precisely 54,910 ppm CH₄ (Methane) and 1,335 ppm C₂H₆ (ethane); whereas RSK (2019) HRA appear to approximate the methane (CH₄) to 54,000 ppm. Nevertheless, it is not of dispute that these concentrations were encountered by Conoco (1986, 1987)

3.32 RSK (2019) HRA infer that Conoco (1986, 1987) reported that the whole of the aquifer has the same level of gas as the pocket found at 54.3 metres (178 ft) (expresses as 280 units of gas). Whereas Conoco (1986) report for Section 2 in the Lower Cretaceous Ashdown Beds from 47.2 metres (154 ft) to 259 metres (850 ft) the “Background gas averaged 1.25 units and consisted of C1 and C2 down to 540 ft below where only C1 was present. At [54.3 metres] 178 ft the well flowed 150 bbls of formation water and associated with this was a gas peak of 280 units consisting of 54910 ppm C1 and 1335 ppm C2”. That is, average for the aquifer was 1.25 units; whereas RSK (2019) HRA report appears to infer that Conoco Well Report (1986) found whole of the aquifer has 54,000 ppm of methane (C1) and 1,335 ppm of ethane (C2). In this respect, there appears to be a contradiction between the findings of Conoco (1986, 1987) that stated that these gas concentrations referred to a short peak of gas at 54.3 metres (178 ft) and the inference of RSK (2019) HRA on the gas concentrations within the Ashdown Beds aquifer as a whole. The background gas concentrations as reported by Conoco (1986) in the groundwater in the Ashdown Beds aquifer were on average 224 times less than stated in the RSK Risk Assessment. Furthermore, from 164.6 metres (540 ft) to 253 metres (830 ft) the concentration of ethane (C2) was reported as zero. RSK (2019) HRA misrepresentation or misreporting of these gas concentrations within the Ashdown Beds aquifer as a whole as applied within the hydrogeological risk assessment is of notable concern and may, therefore, undermine the understanding of the hydrogeology and thereby the stated appreciation of hydrogeological risk

3.33 However, there is a concern about the inference made in the RSK (2019) HRA that as occasional outliers of methane and ethane were found at depth within the Ashdown Beds when drilled – including that reported by Conoco (1986, 1987). Nonetheless, the substantive record of the Ashdown Beds aquifer is not one of elevated methane and ethane; and such gases are not commonly encountered where the Ashdown Beds aquifer is developed for water supply purposes, for instance. Therefore, to suppose that the outlier concentrations as observed by Conoco (1986, 1987) are representative of the baseline groundwater conditions

would be inappropriate. Using very limited data set, the RSK (2019) HRA sets out to compare observed dissolved carbon dioxide, methane and ethane concentrations in the Ashdown Beds monitoring wells with the Conoco outlier data. Furthermore, the baseline monitoring of the aquifer set up from 2015 to 2019 only analysed samples for these dissolved gases at two sample rounds – one in April 2019 and the other in July 2019. With only two samples for each dissolved gas, there is insufficient data to draw conclusions from the 'range' of concentrations and insufficient to effectively describe the baseline conditions. This review considers it important that a much longer data set is obtained and then assessed before drawing conclusions about the baseline conditions. To help determine effect of seasonality and range of piezometric conditions on these concentrations, a minimum of 1 years sampling is required and highly recommended that the monitoring period exceeds at least two years of monthly (or at least 6 weekly) sampling to help determine baseline conditions. Sampling should be from a minimum of three groundwater monitoring points within the Ashdown Beds aquifer to help determine hydraulic and concentration gradients and direction of movement through triangulation of the data observed. 3.34 It is the view of this review that the limited groundwater quality monitoring data and analysis and the poor assertions drawn from a very limited data set unduly shape the evaluation of risks as presented by RSK (2019) in their HRA. Substantially more data is required to confidently assess baseline conditions.

4.13 To suggest that the Ashdown Beds aquifer "may be saline" without baseline groundwater quality evidence to substantiate this can be considered as poor science, not evidence based and contrary to an general understanding the Ashdown Beds aquifer in the High Weald part of Sussex (where groundwater is abstracted from the Ashdown Beds elsewhere for public water supply). The groundwater yields may be low in terms of suitability for sizeable groundwater purposes. However, this should not preclude local scale resource development for potential agricultural use and should not devalue the groundwater where it is known to supply natural perennial and/or ephemeral groundwater fed springs (locally known as chalybeates) that may support natural aquatic ecosystems in the area.

4.14 RSK (2019) HRA in Section 4.2.1 state that "Groundwater within the vicinity of the site is not used for domestic or industrial water supplies and according to the EA the shallow soils are not considered sensitive to surface contamination." This statement would appear to dismiss the present and future value of the natural groundwater beneath the proposed exploration site. Furthermore, this construct in this statement seeks to devalue the groundwater that flows to the natural aquatic environments that are spring fed and rely on groundwater for their baseflow. As a consequence, the proposed mitigation measures to protect the natural resource are not sufficiently considered and as such, both the understanding of risk to the groundwater systems and the proposed mitigation to protect these perched and deeper groundwater systems is wholly inadequate

4.17 RSK (2019) HRA stated that "The quality of the cement in the well has been verified by a CBL (Cement Bond Log) tool to ensure that all casing strings are cemented properly and provide sufficient isolation to the surrounding formations." 4.18 The interpretation of the cement bond log report by Weatherford (dated 31 August 2013) described much of the cement bonding along the length of the well as "moderate to poor". This indicated that there are possible breaches in the cement seal and cavities along part of the outside of the casing and as such some of the potentially connected conduits are also not fully sealed. This poses a concern and increases risk to groundwater quality should there be any leak within the well column. 4.19 Notably, the drilling logs show that the Ashdown Beds aquifer lies between 46.6 metres (135 ft) and 253 metres (830 ft). Page 9 of Weatherford (2013) Cement Bond Log report finds that the cement bond through the depths corresponding with the depth of the Ashdown Beds aquifer is rated as mostly "moderate to poor casing to cement bond and cement to formation"; and furthermore, through the section between 182.9 metres (600 ft) and 215.8 m (708 ft) depth, the cement bond is rated in the Weatherford (2013) as "poor casing

to cement bond and cement to formation.”^{4.20}To support their conclusion that “risks to groundwater from failed well integrity are considered to be very low,” and that “all casing strings are cemented properly and provide sufficient isolation to the surrounding formations,” RSK (2019) HRA refer to the findings of the Cement Bond Logs (CBL) as reported by Weatherford in Summer 2013. However, as stated above, Weatherford (2013) established that the cement bonding along the length of the well was “moderate to poor” in 2013. Therefore, for RSK (2019) HRA to state “due to the mitigation from the well design (steel casing and cement sheaths), which have been proven to have good integrity from the results of CBL testing” is considered misleading and grossly inadequate as RSK (2019) HRA ignores the principal finding from Weatherford (2013) notably through the Ashdown Beds aquifer section. Consequently, it is the view of this review that the RSK (2019) HRA is subjective and selective in this respect and, therefore, cannot be considered wholly objective and robust in their representation of the observed data

4.22 However, it is noted that the RSK (2019) HRA Section 2.1 reports that the “once” the Well Balcombe 2 “died”, it filled in water. This was established some five years after the CBL was undertaken during a short flow test of the well in 2018 which had to be stopped unexpectedly due to water ingress. According to RSK (2019) HRA, it was the view of Angus Energy that water present in the well was “not formation water but drilling fluid that had remained in the well”. This review of the HRA does not set out to evaluate this, although it would be reasonable to assert that Angus Energy should be able to provide mass balance, water quality and borehole survey information to substantiate this view and confirm that the water present in the well is drilling fluids and not water from the formation at depth or groundwater or surface water drainage from the near-surface aquifers or drainage entering the static fluid column in the well. The method to demonstrate this would need to be proposed by the developer with the intention to confirm the integrity of the well and confirm or otherwise that there is no breach with the near surface aquifer units – notably the artesian groundwater head within the Ashdown Formation aquifer. Robust and thorough evidence-based evaluation of this possible risk is considered as fundamental to protecting the aquifer ahead of progressing any planned pumping trials of the well, particularly with regards to introduction of hydrochloric acid (HCl) or movement of hydrocarbons or other fluids under pressure through the well column. Any doubts about the integrity of the well should be fully addressed, evaluated and evidenced ahead of any plans to pump the well in order to protect the groundwater in the deep and perched aquifer units beneath the site and along the length of the exploration well.

4.6. Review of Chemical Fluids Mitigation Measures

4.23 The use of maximum dilution of up to 15% hydrochloric acid (HCl) should only proceed once there is confidence that there is no risk of breach to the casing and cement bond. Use of HCl if there is a weakness in the casing and breach in the cement bond, there is a heightened risk that the HCl might exacerbate such a weakness. Hence, the significance and importance of undertaking robust tests to confirm that there are no breaches to the well construction and, therefore, no risks from fluids within the well column to the natural groundwater in deep and perched aquifer units along the well column length.

4.24 It is not appropriate to state that HCl is a non-hazardous substance to groundwater. It may be helpful at depth when diluted with groundwater. However, should the HCl enter a transmissive aquifer unit that are connected with a spring or baseflow in a stream, it can cause environmental damage including affecting ecology and inducing elevated turbidity. Furthermore, HCl has been used to clean encrustation and iron bacterial sludge from water well screens in the Ashdown Beds in the High Weald region. Should the HCl enter the iron-rich Ashdown Beds aquifer, it is reasonable to expect discoloration and release of iron precipitates. This may affect flow paths within the groundwater system and where springs

emit from these aquifer units, may result in elevated iron concentrations, elevated turbidity and discolouration within groundwater fed springs and streams. Other metals –such as aluminium, manganese and zinc –may also be released into the groundwater from the formation with the addition of HCl

4.28 Good site practices are essential as sometimes the method and equipment are not necessarily the weakest link, rather an understanding of the methods and specific site-based risks by all working on site. This human interaction with this risk can be the most pertinent mitigation yet this is not explicitly stated in the RSK (2019) HRA.

4.29 Good communication in the event of a spill, leak or incident is considered one of the most effective forms of mitigation. This is not presented as a mitigation measure by RSK (2019) HRA

5.6 RSK (2019) HRA view on the groundwater quality is based on a fairly limited and infrequent groundwater monitoring and sampling from the Ashdown Beds aquifer. The limited sampling is considered insufficient to robustly assess the seasonal variation and consider trends in the water quality data. Furthermore, by solely comparing with drinking water standards (DWS) and environmental quality standards (EQS), RSK (2019) HRA dismisses the value of the groundwater held in the Ashdown Beds as poor quality. However, this is not entirely consistent with the application of the Water Framework Directive and does not seem to acknowledge the value of the naturally elevated metals -such as iron, zinc and aluminium– in the groundwater of the Ashdown Beds aquifer. Such that, the springs and base flow of local streams are reliant on the natural groundwater emitting from these iron rich geologies and the ecosystems of the aquatic environments of these ephemeral springs (such as chalybeates) and perennial springs and stream flows are dependent on the natural water chemistry. It is, therefore, inappropriate to dismiss the value of the groundwater beneath Balcombe and infer the risks to groundwater are low and therefore less rigorous mitigation measures can be applied

4.34 The importance of seasonal monitoring in the context of the multiple perched groundwater systems and perennial and ephemeral springs and groundwater fed baseflow streams cannot be understated when evaluating the impact on the deep and perched groundwater systems and dependent aquatic habitats in the Balcombe area.

5.4 RSK (2019) HRA also presents a somewhat dismissive view about the value of the groundwater within the Ashdown Beds aquifer. This is broadly on the basis that the aquifer is not presently developed locally for licenced abstractions for water supply and has elevated dissolved metals and other water quality parameters. 5.5 However, RSK (2019) HRA does not include an assessment as to whether there might be smaller unlicensed abstraction (for instance abstractions less than 20m³ per day that do not require an abstraction licence) and should these be present, what purpose these unlicensed smaller abstractions are used for (such as whether there are any private water supplies, abstraction for irrigation or other purposes). A statement regarding the presence of such abstraction is expected within an HRA for this area. Furthermore, the current use of the aquifer should not preclude or exclude the potential future use of the groundwater resources. The RSK (2019) HRA makes no reference to potential future development of groundwater resources. A reference to future resource development or view to the contrary should be included as part of the HRA

Further References:

<https://concernedhealthny.org/>

<https://drillordrop.com/2019/10/11/interview-angus-oil-man-backs-gas-for-the-future/>

<http://www.davidsmythe.org/frackland/?p=498>

<https://www.getsurrey.co.uk/news/surrey-news/surrey-earthquakes-argument-really-happening-15918463>

Several geologists (Stuart Hazeldene of Edinburgh University among them) suspect that the local swarm of more than 20 earthquakes in Surrey (where none have been recorded since BGS records began) is linked to the oil and gas development sites going on in the region, (Horse Hill, Brockham) and the linking/intersecting of geological faults around Newdigate. These earthquakes are also at shallower depths than normal, that would again suggest a link.

Stuart Hazeldene, Professor of carbon capture and storage at Edinburgh University says: "My job as a scientist is to try and understand what the truth is, what is happening with the earth, and what I am trying to do is point out that it looks, very strongly to us here in Edinburgh, that there is a very strong causal link and effect between activity at Horse Hill and this sequence of small earthquakes which are developing,".

Professor David Smythe Emeritus Professor of Geophysics from the University of Glasgow states: "In conclusion, the extreme shallowness of the Newdigate events mean that we have a lot to learn about shallow pore pressure, shallow stresses, and shallow faults. The complex tectonic problem to be resolved here lies in the depth zone of the hydrocarbon activity. In view of the clear temporal and spatial relationship to the current exploration and production activity at the two sites in question, I support the call for a moratorium on further hydrocarbon activity made by four expert earth scientists."

He is supported by British Geological Survey (BGS) Dr Steve Hicks Southampton University and by Prof Stuart Haszeldene and Dr Gilfillan from Edinburgh University.

Based on this evidence alone I think a moratorium on oil exploration in the Weald (an unconventional oil play as described by the industry), is very sensible. I feel more drawn to believe these geophysicists who neither work for the OGA or Angus energy, because they have no financial interest in the industry