From: Tony Grant [redacted]
Sent: 27 April 2016 11:01
To: Glyn Rhonwy Pumped Storage Scheme
Subject: Submission for today's deadline

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The following points arise from reading the submissions from SPH to previous queries from several interested parties. Firstly, I shall address those in their document SPH_GREX_FWQD2_01.

Following question 7.3 they say:
'Professional judgement has been used to derive magnitude of construction noise effects…….The smallest change in noise that is perceivable to the average human ear is 3 dB.'
This is nonsense. Decibels (dB's) are measurements of loudness on a logarithmic scale, and 3dB represents a **doubling** of loudness. The lowest limit of human hearing is taken to be 0dB at 1000 Hz, but of course, individual human's thresholds vary considerably (see University of Salford report after 7.22) and so, in and of itself, it is a somewhat arbitrary figure. Also, unless a reference figure is given, 3dB by itself is meaningless, i.e. 3dB greater or less than what?
Similarly, the phrase 'professional judgement' features throughout the documentation, without either naming the professionals, nor how their judgement was sought, or arrived at, and is thus meaningless.

Following question 7.4 they say:
'At lower frequencies, people are less sensitive to vibration.'
This is not true, and I will quote from the reference SPH make to the University of Salford's research into LFN later in this submission, following 7.22.
Table 13-2 refers to 'Un-reinforced or light framed structures Residential or light commercial type buildings' but fails to address the affects of vibration on old stone-walled properties without foundations.

Following question 7.9 they say:
'(Construction traffic vibration) confirmed that effects at NSRs fronting the road will be temporary adverse. Roads should be kept in good condition as most vibration effects occur from irregularities of road surfaces.'
This is only true for traffic travelling at 'normal' road speeds on main highways/thoroughfares.

'A speed limit for HGVs should also be applied to this road given the short distance to NSRs.'
This will actually exacerbate the problems stemming from vehicle vibration, see my remarks following 7.18 below.

'Based on research related to this issue, it is not considered that vibration effects will cause cosmetic or structural damage to the properties. Vibration effects have not been quantified at this stage.'

Again this is contrary to SPH's assertion that sound and vibration monitoring was undertaken during a survey on the Cefn Du green lane in 2015, supposedly monitoring the construction traffic for the preliminary drilling. As stated in my remarks for the previous deadline, the equipment was installed several days **after** the arrival of the heavy machinery, and removed the **day before** the work ceased.

Following question 7.10 they say:
'However please note once the construction methods are confirmed the principal contractor will undertake an updated construction noise assessment, therefore the spatial extend of the impacts may vary.'
From which SPH appear to be saying that current figures for sound and vibration within their documentation may be disregarded as fictitious for future actual construction traffic.

Following question 7.13 they say:

a. Given the close proximity of NSRs to the Q1 access route, groundborne vibration at NSR locations has been identified as a potential issue. Research has shown that there is no recognised reliable method for making quantified predictions of construction traffic vibration. Based on guidance in (Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 7 HD 213/11 (revision 1) 'Noise and Vibration' threshold levels at which adverse effects are predicted to occur have been quantified at 0.3 mm/s. Measurements of vibration at the foundations of buildings considered to be at high risk should be taken to establish whether construction traffic vibration levels would be likely to exceed the threshold values or increase PPV levels to more than 0.3 mm/s. Vibration measurements of existing traffic along these particular routes should also be undertaken to determine the existing vibration levels.

Which again begs the question of the validity of any supposedly previously recorded data from 2015. And subsequently -
Following question 7.18 they say:
The length of Ffordd Cefn Du up to Q1 will be resurfaced and as such the road surface should not vary by 20mm and will be a brand new surface; The road surface will be monitored throughout construction, with any damage repaired. This will be governed by the Section 278 agreement.'
The problem with the green lane is that the road surface is superficial, there is no underlying road bed. And 20mm variation does not account for the vagaries of the weather, with problems arising from the severity of winter conditions and snow, drifts, and ice on the road surface grossly overriding the 20mm variation, together with the effects of irregular gritting.
HGV's stopping and starting lead to low frequency/high amplitude vibration from the superstructure of the vehicles themselves, which is more of a problem if vehicles are not well-maintained. Thus sub-surface pressure waves build up and worst case scenario result in the increasing amplitude of resonant frequency initiating widespread structural damage. A smooth road surface in no way modifies these vibrations, but the substrate here is such that it actually moves with the passage of heavy vehicles over it, which is obvious from the damage to the lane following previous incursions of heavy traffic.

Following questions 7.20 & 22 they say:
'An updated draft NMP will be provided at Deadline 3'.

‘The noise limits will be confirmed in the noise management plan.’
How much time will we then have to thoroughly read this NMP, and comment on it before final decisions are made by P.I.?

Further to 7.22 they say:
‘Specifically with regard to low frequency noise (LFN), BS4142:2014 makes reference to the University of Salford ‘Procedure for the assessment of low frequency noise complaints - NANR45’ (2005) for the assessment of LFN.’
Now, looking at this reference, some of the germane points relating to this development are as follows:
‘A sound level meter kit is required consisting of:
a sound level meter
a field calibrator or pistonphone.
Both the meter and calibrator should have a UKAS calibration certificate, preferably issued within the two years preceding the measurements.
LFN is often at the extreme of the usable frequency range of the instrumentation, and so special care is required to ensure the reliability of the results. If the meter has a UKAS calibration certificate this usually means that it underwent the “verification” procedure for sound level meters according to BS7580 Part 1 (1997) on the date of the certificate. In the verification test the lowest frequency for a full acoustic check is 125Hz: third octaves down to 31.5Hz are checked electrically but not acoustically. This is sufficient for the majority of sound measurements, and is also probably satisfactory for LFN in most cases. However, there is no guarantee of accuracy without an acoustic check at the frequency being measured, which in the case of LFN is often around 40Hz, and could extend down to 10Hz. An acoustic check at lower frequencies than is normally carried out during verification is therefore advisable if possible. This could be achieved for example using a calibrator such as a multi-frequency calibrator which itself has a traceable calibration at low frequency, or by making a special request to a calibration laboratory.
Field calibration should be carried out before and after each test and the results recorded.
A suitable calibration signal should be recorded on tape recordings (if used) at the beginning and end of each recording.
The Leq,T, should be recorded in the third octave bands between 10Hz and 160Hz for comparison with the criterion curve. An averaging time, T, of 5 minutes is usually appropriate, although there may be good reasons to use a different value in other situations. It is also advisable to record L10 and L90 in the same bands since these provide information about the character of the sound and how it fluctuates which can be useful in analysis. Many modern meters allow continuous logging of short term Leq, in which case a sample time of 1 second will be sufficient to allow the variation of sound with time to be examined. If a short term Leq facility is not available then a longer averaging time may be used provided it allows 5 minute values to be derived. In order to listen to recordings an appropriate low frequency loudspeaker, such as a subwoofer is required. The lower limiting frequency needed will depend on the sound being investigated. Recordings can be played back at elevated level to assist identification.
If the 80, 100, 125, or 160Hz bands exceed the curve, this may be due to traffic (occasionally this may apply to the 63Hz band). Traffic noise may be recognised by listening to audio recordings. Also, traffic noise levels tend to show time patterns that

are recognisable with peaks at rush hour and a "trough" in the small hours of the morning between 2 and 4am.
The criterion curve below 31.5Hz is based on average threshold of audibility for steady sounds. ***However, individual thresholds vary considerably****. Also, unsteady sounds with an Leq lower than the threshold curve may be audible. Therefore, if a sound is recorded as up to say 5dB below the criterion curve this does not necessarily mean it is inaudible to the complainant.*
Fluctuating sounds are known to be more disturbing than steady sounds by an equivalent of about 5dB. The criterion curve should be relaxed by 5dB for steady sounds to take account of this.
It should be borne in mind that low frequency noise only slightly above threshold of audibility can cause considerable disturbance and appears to be more difficult to shut out or get used to than other types of noise. This may be counter intuitive when compared with the annoyance caused in other (not low frequency) situations where the level needs to be significantly higher than threshold before the noise could be considered a nuisance.'

There does not appear to be any adherence to these principles within any of the documentation supplied by SPH. The reference given to tape recording indicates the time elapsed since this research was carried out at Salford, and would now be initially recorded digitally on data cards/sticks. Further to my previous written submission on how I would have proceeded with ascertaining accurate noise levels, following a link from the University site I came across the following which reinforces the points I made, and is part of a report on LFN from an international acoustic conference:
'A case study is used in the paper and includes measurement data for locations at varying distances (kilometres) from major industrial facilities to show where LFN impacts are expected according to the application of various guidelines. The focus of the case study is on rural environments with relatively low ambient noise and sparsely populated land.'
'Noise surveys were undertaken using Brüel & Kjær 2250 Type 1 sound analysers, with microphones fitted with seven inch wind shields. All acoustic instrumentation employed throughout the monitoring programme had current National Association of Testing Authorities (NATA) or manufacturer calibration certificates. Instrument calibration was checked before and after each measurement survey, with the variation in calibrated levels being nil or negligible (i.e. not exceeding ±0.5 dB).'
'Mobile weather stations were installed immediately adjacent to the noise monitors……..for the purpose of noise data exclusion (e.g. rainfall and/or wind speeds above 5 m/s as per AS1055.1). The measured parameters include wind speed, wind direction, temperature, humidity and rainfall at microphone height.'

FYI: Acoustic Glossary:
'the A-weighting filter covers the full audio range - 20 Hz to 20 kHz and the shape is similar to the response of the human ear at the lower levels

A-weighted measurements only correlate well with the perceived loudness at low sound levels, as originally intended, so many people object to the general use, often supported by regulations, for most noise measurements.'

Which, of course, are the measurements referred to throughout the SPH literature. Moreover, in a reply to my original objections to this development SPH wrote the following:

‘The potential issue of low frequency noise (LFN) has been considered within the noise assessment contained with the ES – specifically Section 13.8.12 which provides information on methods and procedures for noise complaints and 13.8.13 which outlines how known component interactions have been recognised and can be mitigated. Therefore LFN will be considered throughout the detailed design for the Development and mitigated through design. Since the construction of Dinorwig, technology has improved and the regulation of low frequency noise has been implemented. Careful selection of equipment, use of mitigation measures such as vibration isolation, mufflers, attenuators, etc. will be considered during the design phases including building design of both the underground turbine hall and above ground power house. The turbines themselves are located approximately70m beneath ground level. DCO Requirement 7 requires an operational noise management plan which includes the undertaking of noise assessments once fully commissioned. If LFN effects are present at NSRs and Gwynedd Council receives complaints, an appropriately scoped ‘Procedure for the assessment of low frequency noise complaints NANR45’ (NANR45) assessment will be carried out with plant in situ to quantify the LFN effects from pumping and other operational processes. Further mitigation measures will be designed as necessary following this assessment.

However, this fails to address the main problem of the transmission of LFN, and what is needed if it is to be eliminated as far as is practical is acoustic decoupling, of which there is no mention in any of the SPH literature. Use of a system such as the RoGlider (initially developed to protect buildings against earthquake damage) which essentially mounts a building/structure on flexible lead rubber bearings, would be a viable means of achieving this.

Following the rest of the replies in the SPH document, the first appendix table 1 includes the following:
‘Confirmed likely traffic numbers’
‘Confirmed likely durations for construction methods’
Confirming something ‘likely’ seems to me the same as saying that this is a definite maybe. And by who and how was the likelihood confirmed?

From 7.17:
‘A local liaison group, including local councillors, residents and representatives of the developers, will be set up to discuss matters relating to public protection. Communication with the local community during the construction period will be used to notify residents of the work schedule, give advance notice of when higher levels of noise are expected due to specific operations and provide channels through which to provide comments and complaints. The logistics of such a group should be agreed between the local council, representatives of the developers and residents.’

Under whose auspices will this group be established, and what will be the initial method of communication be to ensure that ALL interested parties have their input/say/involvement from its inception?

In An Emergency…...
An exceptionally serious point which has been overlooked to date (although it was pointed out originally before Gwynedd Council passed the 49.9MW scheme) is that the green lane up to Cefn Du is the ONLY emergency access route to the properties

along this lane. There are several elderly and disabled residents who have medical problems, and have recently needed emergency treatment, necessitating immediate transfer to hospital via the emergency ambulance service. The proposed increase in traffic on this route puts their lives at risk.

Moreover, should a queueing system for HGVs be established above the cattle grid, then there is another serious risk to residents which comprises of the likelihood of several vehicles sitting there waiting to descend, but whilst waiting they will almost certainly leave their engines running, especially in cold weather. This will result in noxious diesel fumes descending into properties downhill, and cause breathing difficulties or worse for many residents, especially when a temperature inversion occurs in the valley, a frequent phenomena in the winter months.

Aside from these concerns, another point which has been overlooked is the main local use of the green lane by farmers for their livestock. As well as their vehicular traffic of slow moving tractors, the sheep, horses, dogs and cats simply jump, leap, scurry, wander up, down and across the lane completely disregarding any vehicular traffic.

At the risk of repeating myself, these points alone relating to the risk to life, health of humans and animals should render the route completely unfit for purpose, irrespective of road surface, traffic management, etc.

In conclusion:
Reading through the various documents submitted by SPH since the meetings in Llanberis in early March has been a daunting task, and I can only cover a few of the points that have struck me as erroneous. Sorting fact from fallacy has proved difficult and time consuming, and commenting on the areas I know to be incorrect, leads me to cast doubt on virtually all of SPH's assertions regarding this development. Throughout their replies to concerns raised are peppered with responses such as:
'no adverse effects'
'not significant/no significant effect'
'no real impact'
'negligible'
'no permanent significant impact'
and I would now seriously question every statement containing one or more of these assertions.

Finally, I apologise that due to the time constraints imposed by everyday life, I may not have made myself entirely coherent in my attempt to enumerate all the errors and omissions which I have discovered in the documents. I look forward to being able to elaborate on the above submission at the hearing on 17th May.
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