From:	POCOCK Michael
To:	Wylfa Newydd
Cc:	GRANT Beth
Subject:	Wylfa Newydd DCO
Date:	14 March 2019 14:46:08
Attachments:	L&L DL7 Submissions Noise note.PDF L&L DL7 Submissions post hearing note.PDF

Dear Sirs

Please find attached the Deadline 7 submissions on behalf of Land and Lakes (Anglesey) Limited which comprise:

1. Post-hearing note of submissions; and
2. Noise note prepared by Waterman

Kind regards

Mike

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Wylfa Newydd Project

Post Hearing Note

Date: 14th March 2019

Client Name: Land & Lakes Limited

Document Reference: WIE15454-101-TN-3.1.2

This document has been prepared and checked in accordance with Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS OHSAS 18001:2007)

Issue	Prepared by	Checked and Approved by
	Mark Maclagan Technical Director [redacted]	Innes Urbanski Associate Director [redacted]

1. Introduction

1.1. This document sets out a response to Horizon Nuclear Power (HNP) comments made at the recent Development Consent Order (DCO) Issue Specific Hearing (ISH).

1.2. With regards to noise there are four main points of difference between HNP and Land & Lakes (L&L) in relation to noise as listed below:

- The correct assessment of the baseline approach to the 'hum' from existing transformers;
- Whether the correct methodology has been used by HNP in the ES and the consequential under assessment of noise effects on Site Campus residents;
- Whether it is possible to sufficiently mitigate adverse noise effects through construction amendments to the site campus;
- The assessment of vibration effects and the threshold of significance used within the ES.

1.3. Full details of L&L concerns were provided in the DL6 submission to which no written response has been provided. However, HNP did provide an oral response to comments raised by Waterman Infrastructure & Environment Limited (hereafter Waterman) at the ISH.

1.4. This document has been prepared by Mark Maclagan a Technical Director with Waterman. Waterman is a major multi-disciplinary consultancy with a strong track record of helping to deliver large scale projects throughout the United Kingdom (UK).

1.5. Mark's academic qualifications include a BSc (hons) in Environmental Science from Nottingham Trent University and a Post Graduate Diploma in Acoustics and Noise Control. Mark is a member of the Institute of Acoustics and has over 14 years' experience in the measurement, analysis and assessment of noise and vibration in relation to large scale regeneration projects throughout the UK.

Baseline Noise Environment

1.6. Within L&L Deadline 6 (DL6) submission concerns were re-iterated with regards to the potential impacts of the Existing National Grid Transformers. This concern was raised as it is understood that complaints have been received from residents as a result of noise associated with the Existing Power Station Transformers. The residents in question are located some 1.25 km from the Existing Power Station Transformers compared to *circa* 150m for the proposed Site Campus.

1.7. In their oral response at the ISH, HNP re-enforced their belief that transformer noise would be inaudible due to masking noise from other sources of construction noise, primarily concrete pouring, which would take place 24 hours a day 7 days a week suggesting that there would be no periods when construction noise was not dominant in the soundscape of the Site Campus.

1.8. It is agreed that should construction noise levels be sufficiently high, such noise would mask that generated by the existing transformers. However, it is considered that despite the assertions made by HNP, it is unlikely that construction noise would be continuous. Instead, it is likely that there would be periods where construction noise levels are quieter, and noise associated with the transformers could become dominant. This is supported by information provided in EN10007-6.4.23 App D6-1-Noise model inputs and outputs (APP-142) which indicates a 60 to 80% “on time” for all plant. Assuming 24 hour operations this would equate to 4.8 hours when plant would not be operational and the transformer noise would become the dominant noise source experienced by residents of the Site Campus.

1.9. We would also note that although construction noise levels may be higher than those generated by the National Grid transformer, such noise in itself is also likely to be both tonal and intermittent and as such could give rise to adverse comment by future occupants of the Site Campus.

1.10. HNP quote a noise level from the existing National Grid transformers of 25dB(A) at a location approximately 1.25km from the transformers and a level of *circa* 35dB(A) at the Site Campus located some 150m from the National Grid Transformers. General acoustic convention is that for a standard noise source a reduction in noise levels of 6dB for every doubling of distance could be expected. Applying these principles to the quoted 25dB noise level would suggest noise levels from the existing National Grid transformers of 43dB at the Site Campus.

1.11. In response to the above, HNP stated at the ISH that their calculations were based upon noise modelling using monitored spectral data with the existing transformer in operation and allowing for “directivity”. This is not clearly set out in the Environmental Statement and the data if not available for verification. Notwithstanding the above, given the relatively short intervening distance between the transformers and the Site Campus and the fact that low frequency noise is dominant, the effects of directivity in particular at low frequencies are likely to be minimal. As such, we would reiterate that further justification of the stated noise levels from the National Grid transformers is required.

1.12. During their oral response it is also noted that HNP indicated that the proposed façade construction would provide an acoustic performance of 19dB. Such a performance, although typical of a modular construction, is very low and is unlikely to be adequate to control not just transformer noise but the much higher construction noise levels that HNP state would be present 24/7 during the construction period. As such, although it would theoretically be possible to control noise ingress from both construction noise and the Existing Power Station Transformers into the Site Campus buildings through careful design of the building façade and Mechanical Ventilation with Heat Recovery, where noise is particularly tonal in nature, in particular in the low frequency range, this becomes very difficult and would require very high performing glazing and an acoustically robust façade system.

1.13. Further, the proposals for the façade construction naturally do not provide any protection to any outdoor amenity areas provided for use of occupants of the Site Campus during periods when they are off-shift.

1.14. Additionally, it is important to note that HNP now propose that the Site Campus would remain occupied beyond the initially envisaged construction period and into the operational period of the power station. In light of this, a full assessment of noise impacts associated with the operation of the Wylfa Newydd Power Station, including both existing and proposed transformers should be completed.

1.15. With regards to the new transformers Paragraph 6.4.88 of the ES notes that:

"The combined noise levels from transformers of the Power Station, including generator transformers, auxiliary transformers and associated cooling systems (hereafter referred to as transformer noise') are considered to have significant potential to cause noise effects at local receptors"

1.16. The ES goes on to list a number of reasons why transformer noise may be significant which include high intrinsic noise levels, potential for tonality, characteristic noise signature, the location of the transformers to the east of the main plant and finally the local history of transformer noise issues stating that:

"the National Grid transformers adjacent to the Existing Power Station have been the cause of some adverse community response in the past"

1.17. To control noise associated with transformer noise HNP suggest the following noise limits should be applied at the nearest noise sensitive receptors.

- $\leq$ 25dB $L_{Aeq,T}$
- $\leq$ 38dB $L_{eq,125Hz}$

1.18. The Site Campus is not treated as a sensitive receptor within either the construction or operational assessments presented within the ES. Nonetheless, given the residential nature of the development, it is considered all mitigation measures proposed within the ES for the protection of existing sensitive receptors should also apply to the Site Campus given that it is residential in nature and would be occupied during both the construction and operational phases.

ASSESSMENT METHODOLOGY

1.19. As set out at the ISH and within our report submitted at DL6, it is accepted that the assessment methodologies adopted to assess impacts from construction noise and those adopted to assess the suitability of the site for residential development do differ. However, this does not alter the fact that during the construction works the Site Campus will be occupied and as such for the purpose of the ES should be treated as a noise sensitive receptor for assessment purposes.

1.20. With regards to the suitability of the site for residential development, HNP has assessed the suitability of the site in line with the guidance provided in Technical Advice Note 11 'Noise' (TAN 11). This approach is wholly inappropriate. The guidance provided in this document is designed to address sources of anonymous noise only although it does state that where industrial noise is present but not dominant the TAN methodology can be adopted.

1.21. Given the tonal and intermittent nature of noise associated with construction activities, it is considered to be closer in nature to industrial noise than anonymous transportation noise. The above statement is considered applicable to construction noise as well as industrial noise. When considering industrial noise TAN 11 states that:

"NEC noise levels should not be used to assess the impact of industrial noise on proposed residential development because of the nature of this type of noise"

1.22. Even if HNP are correct to use TAN11 (which is not accepted), even on HNP's assessment the site falls into NEC C. The guidance provided in TAN 11 states that where a site falls into NEC C:

Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.

1.23. In this instance, quieter alternative sites are available and as such, consent for the Site Campus should not be granted.

1.24. Further to the above consideration is also required to both the tonality and intermittency of the noise sources present in setting internal noise limits. HNP have stated that the Site Campus would be designed to achieve the internal noise criteria set out in BS8233:2014. The design criteria set out in this document relate to anonymous, that is, non-tonal steady noise only. In light of this and as set out at the ISH it is considered that the internal noise levels proposed by HNP are inadequate and even if they are achieved the potential for disturbance to future residents of the Site Campus would remain.

FUTURE NOISE LEVELS AND SITE CAMPUS NOISE INSULATION

1.25. In the ES HNP suggest that noise levels across the Site Campus would be between 54 and 70dB L_{Aeq} during the daytime and 43 and 54dB L_{Aeq} during the night-time, which as previously stated is considered to be an underestimate of future noise levels given that at its closest the Site Campus is just 12m from the construction works. It is also noted that within Paragraph 6.4.7 HNP states that for calculation purposes construction plant has been "spatially distributed at random" as such the exact location of heavy construction plant within the closest construction zone to the Site Campus cannot be determined. However, with reference to EN10007-6.4.23 App D6-1-Noise model inputs and outputs (APP-142), it can be seen that for the majority of construction phases an activity sound power level (L_{wA}) of between 111 and 114dB would be expected. Where such works are taking place within 50m of the Site Campus maximum noise levels in excess of those quoted by HNP would be expected. Notwithstanding this it is recognised that HNP have completed a detailed modelling exercise which Waterman have insufficient data to replicate. To fully appreciate the potential impacts of both the construction and operational phases of the development a noise contour plot clearly showing noise levels at each building façade would be required.

1.26. During their oral representations at the ISH, HNP in response to questions from the ExA stated that noise levels at the Site Campus would be better than those experienced by the majority of residents located in city centre developments surrounded by construction sites. The justification behind this statement was that a high performing acoustic façade coupled with mechanical ventilation is to be provided.

1.27. Waterman are not in agreement with this statement. Where construction noise is taking place in city centre developments the hours of construction activity are typically controlled by way of planning conditions, codes of construction practice with strict operating hours and the requirements of the Control of Pollution Act. Such controls will typically include both the setting of noise limits and limiting construction to specific time periods and certain days only. Unlike such developments the proposed development at Wylfa Newydd would operate 24/7 and as such as stated by HNP there would be no period when construction was not taking place.

1.28. With regards to the insulation of the Site Campus, it is understood that the building façade is to be constructed from a Premier Modular System. Although it has not been possible to review the

make-up of the proposed façade, experience suggests that when considering lightweight modular construction there is limited scope to control low frequency noise due to the lack of mass in the construction. This was confirmed by HNP who stated that the low frequency performance of the building façade at 63Hz was 19dB R_w. For comparative purposes a standard block façade would provide in the region of 33dB R_w in the same frequency band.

1.29. When considering the façade system as a whole, HNP have suggested a performance of 50dB R_w for the façade system. However, when considering the design of such a light-weight system it is important that the C_{tr} correction, that is a correction for the low frequency performance of the façade system, is allowed for. Allowing for this correction the overall performance of the non-glazed elements of the façade based upon information provided by HNP would be 39dB R_{w+ctr}. This would be coupled with a glazing unit which provides a performance of 30dB R_{w+ctr}. Taking both elements in conjunction and assuming a standard $2m^2$ window opening, the façade as a whole would provide a composite R_{w+ctr} of 35dB. Such a performance is not considered to be a high performing acoustic façade.

1.30. As stated in our DL6 submission, based upon the conservative external noise levels quoted by HNP in their ES of between 54 and 70dB L_{Aeq} during the daytime and 43 and 54dB L_{Aeq} during the night-time and using the calculation procedures set out in BS8233:2014, such a façade construction would result in internal noise levels in the region of 24 to 40 dB L_{Aeq} during the daytime and 13 to 24dB L_{Aeq} during the night-time. Considering previous comments with regards to the appropriateness of the adopted internal design criteria and taking 30dB L_{Aeq} , the night-time bedroom criteria, set out in BS8233:2014 as appropriate for both the daytime and night-time period given the nature of the shift patterns proposed, it can be seen that for the noisiest façades the proposed façade system would be insufficient to control noise break-in from construction noise during the daytime period, albeit based upon the lower night-time predicted noise levels provided by HNP night-time noise levels would be achieved. However, should construction activities be consistent between the daytime and night-time period noise levels within the Site Campus during the night-time period are unlikely to be achieved

1.31. With regards to the $L_{AF,max}$ criteria HNP suggests that the 2018 WHO Environmental Noise Guidelines for the European Region notes that the assessment of the relationship between different types of single-event noise indicators and long term health impacts is tentative. This statement although technically correct is out of context, the statement as provided in the 2018 WHO guidelines reads:

"In many situations, average noise levels like the L_{den} or L_{night} indicators may not be the best to explain a particular noise effect. Single-event noise indicators – such as the maximum sound pressure level (L_{Amax}) and its frequency distribution – are warranted in specific situations, such as in the context of night-time railway or aircraft noise events that can clearly elicit awakenings and other physiological reactions that are mostly determined by L_{Amax}. Nevertheless, the assessment of the relationship between different types of single-event noise indicators and long-term health outcomes at the population level remains tentative. The guidelines therefore make no recommendations for single-event noise indicators."

1.32. In this context given construction noise, which is intermittent in nature, would have the potential to generate individual events of high noise levels which in turn may elicit wakening and therefore the use of the L_{Amax} criteria would be considered appropriate in this instance.

1.33. HNP stated at the ISH that given the high number of noise sources present it would be in-practicable to consider maximum noise levels. The façade of the Site Campus should be designed to protect residents from the most realistic maximum noise level that would be generated during each construction stage. Guidance provided by the WHO in their 'Guidelines to Community Noise'

suggests that where noise levels exceed 45dB L_{Amax} more than several times in any period (normally taken as 15 occurrences) sleep disturbance may arise. Based upon the described construction activities and the proposed modular façade system, it is considered unlikely that the L_{Amax} internal noise criteria would be achieved.

CONSTRUCTION VIBRATION

1.34. It is noted that during the ISH hearing HNP made a commitment to complete vibration intensive tunnelling works prior to occupation of the closest buildings to the Site Campus or where this is not possible to arrange for the closest blocks to these works to be unoccupied for short periods.

1.35. HNP went on to state that in their opinion vibration impacts associated with the works would be minimal and that occupants would tolerate higher levels of vibration than typical residents. This is an unsupported statement.

1.36. Of key importance here and as set out in our DL6 submission is that the ES defines an impact of large magnitude of change typically resulting in Significant Adverse Impacts when vibration levels are at a level of greater than 10mm/s Peak Particle Velocity (PPV), a level at which it is commonly accepted as the point at which the onset of cosmetic damage may arise to structures. When considering human perception guidance provided in BS5228:2009 Part 2 states:

"Human beings are known to be very sensitive to vibration, the threshold of perception being typically in the PPV range of 0.14 mm/s to 0.3mm/s. Vibration above these values can disturb, startle cause annoyance or interfere with work activities. At higher levels they can be described as unpleasant or even painful. In residential accommodation, vibrations can promote anxiety lest some structural mishap may occur"

1.37. The above criteria are reported by HNP in Table 5-2 of Chapter B6-2 Noise and Vibration as replicated below.

Vibration Level	Effect
0.14mm/s	Vibration might just be perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3mm/s	Vibration might just be perceptible in residential environments.
1.0mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10mm/s	Vibration is likely to be intolerable for any more than a brief exposure to this level.

1.38. In light of the above it is considered that a “large magnitude of change” to residents would occur at a much lower level than the 10mm/s quoted by HNP and as such the potential impacts of vibration upon nearby existing and proposed noise sensitive receptors are therefore under reported.

1.39. Further to the above, the guidance provided in BS5228:2009 Part 2 is intended for guidance only and to allow the assessment of impacts of construction vibration upon existing noise sensitive receptors. When considering the impacts of vibration upon new residential receptors, the primary source of guidance is BS6472:2008. This document allows the assessment of vibration at the point at which it enters the body against a criterion which more accurately represents the response of human beings to vibration, that is the Vibration Dose Value.

1.40. The guidance provided in this document required vibration levels external to the building to be corrected for both damping and amplification through the building structure. This is of particular importance when considering light-weight structures such as those proposed for the Site Campus. Furthermore, given the residential nature of the development some consideration of structure-borne noise would be required.

1.41. In light of the above and as set out at the ISH, it is considered that the impacts of vibration upon the Site Campus have not been fully considered in the ES and that there would be the potential for disturbance to future residents as a result of on-site construction related vibration.

SUMMARY

1.42. In summary, and as set out in both our DL6 submission and during our oral representation at the ISH, it is reiterated that the ES does not adequately assess the impacts of noise and vibration upon the proposed Site Campus. Based upon the information provided, noise and vibration levels on areas of the Site Campus would fall above those which are commonly acceptable for residential development and would not be conducive to a good standard living. Given that alternative accommodation sites proximate to the works, but without the associated noise and vibration constraints, are available, it is considered that further justification for the inclusion of a Site Campus on the Wylfa Newydd site is required.

LAND AND LAKES (ANGLESEY) LIMITED

DEADLINE 7 SUBMISSIONS

relating to

Wylfa Newydd Nuclear Power Station
Development Consent Order Application

Post Hearing Submissions from 4 March 2019

1. INTRODUCTION

1.1. On the 4 March 2019 the Examining Authority ("ExA") held an Issue Specific Hearing ("ISH") into matters concerning the proposed Wylfa Newydd Development Area. Land and Lakes (Anglesey) Limited ("L&L") attending the ISH and made oral representations based upon their Relevant Representation and written submissions from previous deadlines.

1.2. In accordance with the current examination timetable, L&L now sets out below its post hearing note covering the substance of these submissions and including additional information where this was sought by the ExA.

2. ORAL CASE AT 4 MARCH 2019 ISH

Agenda item 6: Site Campus/ Temporary Workers Accommodation (TWA)

Agenda item 6(b): quality of accommodation and timescales for delivery

2.1. L&L's DL 5 submission [REP5-079] includes the completed table as suggested by the ExA in their Further Written Questions. The table sets out both the nature and quantity of the development proposed by L&L and the timescales for its delivery. The achievability of the timescales proposed are supported by the evidence of Arcadis submitted at DL2 [REP2-249]. Arcadis undertook a thorough review of both sites, the planning permission and pre-commencement conditions and reached the view that the timescales proposed are achievable.

2.2. For ease of reference the timescales are as follows:

Cae Glas
Number of months following receipt of
order from Horizon:-
Phase 1 : 141 lodges (980 beds) – 18 months
Phase 2 : 74 lodges (502 beds) – 19 months
Phase 3 : 76 lodges (518 beds) – 24 months

Kingsland
Number of months following receipt
of order from Horizon:-
Phase 1 : 220 houses (1000 beds) - 19 months
Phase 2 : 99 houses (500 beds) – 22 months

2.3. IACC approved the quantity and quality of accommodation as part of the planning permission and no objection is raised by any party to the examination as to the suitability of the sites or accommodation proposed, save for the objection by HNP. As set out in L&L's previous representations, HNP's objections appear to be made without sight or consideration of L&L's evidence to the ExA. For example, HNP persist with a complaint that the L&L sites cannot accommodate 4000 workers when this is demonstrably not the case. Detailed plans were provided at DL2 [REP2-249] demonstrating that all 4000 beds could be accommodated on the site with ease.

2.4. Therefore, there are no reasonable objections remaining to the L&L scheme.

Agenda item 6(e): noise monitoring

2.5. These representations need to be read alongside the appended note from Mr Maclagan, Technical Director with Waterman Infrastructure & Environment Limited.

2.6. There are four main points of difference between HNP and L&L in relation to noise:

- The correct assessment of the baseline and approach to the 'hum' from existing transformers;
- Whether the correct methodology has been used by HNP in the ES and the consequential underassessment of noise effects on residents of the site campus;
- Whether it is possible to sufficiently mitigate adverse noise effects through construction amendments to the Site Campus; and
- The assessment of vibration effects and the threshold for significance used within the ES.

2.7. L&L's evidence in this regard is contained within the evidence submitted at DL6 [REP6-055]. In short, it is considered that HNP have under assessed the adverse noise effects that will be experienced by residents of the proposed TWA with the result that workers will experience a noisy and uncomfortable living environment and choose to live elsewhere.

2.8. HNP asserted at the ISH that all of L&L's concerns had been "addressed" within previous written submissions. This is plainly incorrect as L&L's detailed noise evidence on these issues was provided at DL6 on 19 February 2019, immediately prior to the ISH on 4 March and no response has been received from HNP either before the ISH or since. L&L's noise case had therefore not been addressed by HNP at the time of the ISH or at the time of writing.

2.9. As set out within Mr Maclagan's post hearing note, the four points of difference remain outstanding and the comments made on behalf of HNP at the ISH on these points do not provide sufficient comfort that the noise issues are capable of being addressed. In summary, in relation to each of the four outstanding issues in turn, L&L comment as follows:

- The hours of operation of machinery on the construction site provided by HNP provide for a period of 4.8 hours in each 24 hour period when the transformer 'hum' is likely to become the dominant noise source. The figure of circa 35dB(A) at the Site Campus is not accepted as it is based upon calculations which have not been provided and appear to over-estimate the degree of noise attenuation over a relatively short distance. A figure of 43dB at the Site Campus is likely to be more accurate, representing a significant noise source. A further omission is the failure of the ES to assess the effects on the Site Campus in the operational phase; this is the result in a change of plan by HNP to retain the Site Campus into the operational phase of the project. The Site Campus was not assessed as a receptor during this phase of the project.

- Waterman do not accept that the correct methodology has been used. However, even on the basis of HNP's preferred methodology, the result is that permission should not be granted for the Site Campus as quieter alternative sites exist.

- It is unlikely that the lightweight modular construction of the TWA will provide sufficient mitigation for the noise effects experienced. The result will be noise effects in excess of the WHO guidelines and an unattractive environment for the workers. In turn, this will result in workers choosing to reside elsewhere and the Site Campus not being the “accommodation of choice”.

- It is not accepted that workers would, in the words of HNP, tolerate higher levels of vibration than typical residents, especially when choice exists and workers may choose to reside elsewhere. Nor should they be expected to suffer disrupted sleep and the discomfort of vibration within their accommodation.

2.10. Waterman have reviewed the up to date information and comments from HNP and remain of the view that the ES has not adequately assessed noise effects on residents of the Site Campus. The result will be an unattractive residential environment for workers which they will choose to avoid.