Q4.11 - APPENDIX 1 - EVALUATION OF NOISE IMPLICATIONS FROM AIL IMPORTATION VIA JETTY

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Memorandum (Memo)

Project Number:	0284005	**Date:**	20 May 2015
Project Name:	White Rose CCS DCO	**Subject:**	Jetty Noise Assessment for DCO
From:	Mike Fraser/ Rod Linnett	**Reference:**	Drax DCO Jetty NIA Rpt01.docx
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1. OVERVIEW

This document has been prepared by Environmental Resources Management Ltd (ERM) for Capture Power Limited (CPL). It presents the methodology, findings and any recommendations of a noise assessment of the use of the Jetty during construction at the White Rose CCS Project.

The Jetty will be used during the construction period and normally deliveries of equipment will be scheduled for daytime. However, to inform planning of the activities, evening and night activities have been included in this assessment. The use of the Jetty will continue over a two year period, but only 50 loads will be delivered in this way with a peak of 2 loads a week for months 12 & 13. A temporary site office and a 200t crane will be on site during lifts which will take approximately one hour each.

Two scenarios were considered for the assessment. The first scenario (Sc1) predicted noise levels associated with “summer” Jetty operations as planned for normal daytime requiring lighting (which will be powered by up to two mobile generators) for the late evening and night time. The second scenario (Sc2) predicted noise levels associated with the “winter” Jetty operations where lighting is required for the early morning and late afternoon periods. Consideration of noise emissions during normal and after hours periods have been assessed.

The deliveries will be moved to the Project site by low loader, but the number of vehicles using the road will be limited two per week which will not result in significant noise impacts. There will be up to 10 cars associated with the Jetty per day, which is also expected to lead to insignificant noise impacts. Therefore, the effects of traffic have not been considered quantitatively in this note.

2. Noise Assessment Criteria

The same assessment criterion for daytime work has been adopted as was used in the ES. A criterion of LAeq, period ≤ 65 dB(A) (façade) for the daytime period was therefore adopted. For operations during the evening and night periods, lower criteria of LAeq, period ≤ 55 dB(A) and LAeq, period ≤ 45 dB(A) have been adopted based on the guidance in BS5228.. The criteria adopted are based on the most stringent set of criteria in the “ABC Method” described in Section E3.2 of BS5228, and assuming background noise is low, which is a worst case assumption.

3. METHODOLOGY, INPUTS AND ASSUMPTIONS

The methodology, inputs and assumptions that have informed the noise modelling and assessment are outlined below:

- Brüel & Kjær’s Predictor 7810 (Version 10.1) noise modelling software package was utilised to calculate noise propagation using ISO 9613-2:1996 (ISO9613:2) - *Acoustics - Attenuation of Sound during Propagation Outdoors - Part 2: General Method of Calculation noise propagation algorithms* (international method for general purpose, 1/1 octaves).

- The Predictor software package allows topographic details to be combined with ground regions, water, foliage, significant building structures etc. and receptor locations, to create a detailed and accurate representation of the site and surrounding area. The noise model allowed for the quantification of noise levels from multiple sources, based on sound emitted from each.

- Sound Power Level Lw, dB(A) data (refer *Table 2*) for a Leibherr LTM 1750 mobile crane and power generators used for lighting was adopted for the noise assessment. All data was obtained from British Standard BS 5228:2009 *Code of Practice for Noise And Vibration Control On Construction And Open Sites* Part 1 – Noise; and the ERM noise database for items of similar duty. Safety factors of +5 dB and a +3 dB have been added to the crane and generator Lw respectively to provide a conservative worst case noise emission scenario.

- Noise levels have been calculated based on a maximum of 2 lifts per day. As a likely worst case scenario, noise levels have been calculated on the basis that these 2 lifts may occur in any period (day, evening and night time).

- It has been assumed that each lift takes a total of one hour. During the lift it has been assumed that the crane engine would on load for 45 minutes (75%) of the 1 hour period and would be at idle for the remaining 15 minutes (25%).

- $L_{Aeq,\ 1hour}$ levels have been calculated to present the maximum 1 hour noise level that would be experienced during a lift.

- Neutral weather conditions were modelled, which is compatible with the approach in BS5228. However, ISO 9613 does include moderately unfavourable propagation conditions.

- A ground factor of 0.5 was adopted for the general modelling area (0.0 is acoustically hard, 1.0 is soft) with a ground factor of 0.1 (mostly hard) adopted for the jetty site hard standing.

- All noise levels are expressed in dB(A).

- Periods of the day are defined as: Day 07:00-19:00; Evening 19:00-23:00; Night 23:00– 07:00.

a. NOISE SENSITIVE RECEPTORS

The potentially sensitive receptors considered in the noise model are presented below in *Table 1* and identified in *Figure 1*.

Table 1 – Noise Sensitive Receptors

ID	Description	GPS		Ground Height, m
		Easting	Northing	
R1	The Lodge	468437	427508	6
R2	Ouse Bridge Cottages	468473	427979	6

b. NOISE EMISSION SOURCES

LW data incorporated into the noise model is presented in *Table 2.1 and Table 2.2* with the location of each source (and other key features of the model) identified in *Figure 1*.

Guidance Note on Acoustic Terminology

Sound Power Level (LW) is a measure of the total power radiated by a source. The Sound Power of a source is a fundamental property of the source and is independent of the surrounding environment. This differs from a Sound Pressure Level (LP) which is the level of sound pressure as measured at a distance by a standard sound level meter with a microphone. LP is the received sound as opposed to LW which is the sound 'intensity' at the source.

Figure 1 – Noise Modelling layout, Sensitive Receptors and Emission Sources

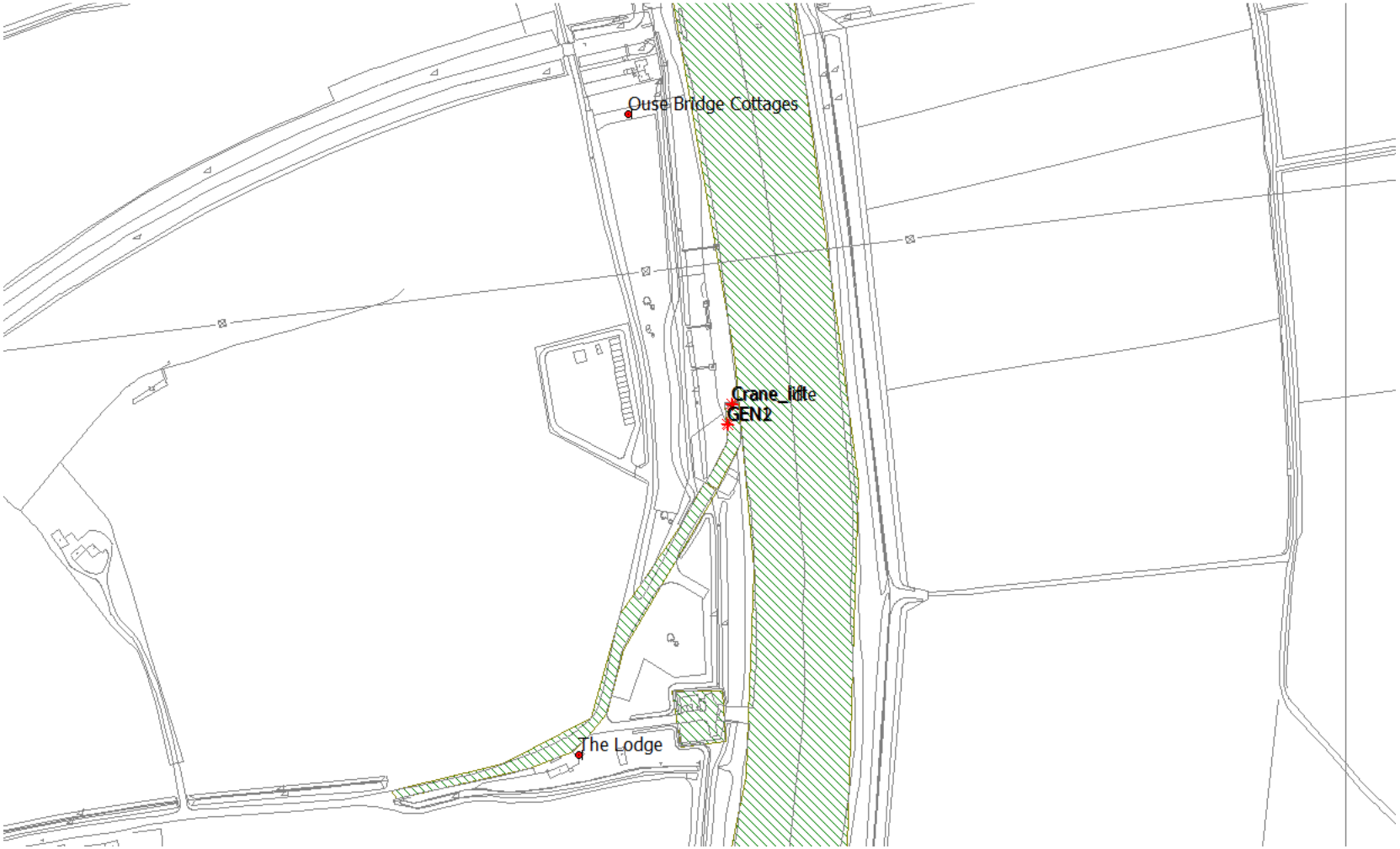

Table 2.1 – Sound Power Level Data – Scenario 1

ID	Description	% On Time			Quantity	Emission Height above ground, m	Frequency (Hz)								
		Day	Evening	Night			63	125	250	500	1k	2k	4k	8k	LW
Crane	Leibherr LTM 1750 Lifting	75	75	75	1	2	101	104	101	95	99	99	88	79	**108.5**
Crane	Leibherr LTM 1750 Idling	25	25	25	1	2	99	100	93	94	95	94	83	73	**104.5**
Gen	50 kVA Generator	0	50	100	2	1.5	91	89	92	93	87	90	83	72	**98.8**

Table 2.2 – Sound Power Level Data – Scenario 2

ID	Description	% On Time			Quantity	Emission Height above ground, m	Frequency (Hz)								
		Day	Evening	Night			63	125	250	500	1k	2k	4k	8k	LW
Crane	Leibherr LTM 1750 Lifting	75	75	75	1	2	101	104	101	95	99	99	88	79	**108.5**
Crane	Leibherr LTM 1750 Idling	25	25	25	1	2	99	100	93	94	95	94	83	73	**104.5**
Gen	50 kVA Generator	25	100	100	2	1.5	91	89	92	93	87	90	83	72	**98.8**

4. PREDICTED NOISE LEVELS

Based on the methodology, inputs and assumptions described above ERM have predicted $L_{Aeq,\ 1hour}$ and $L_{Aeq,\ period}$ noise levels for the two noise assessment scenarios. The resultant noise levels for each scenario are presented in *Table 3* to *Table 4*. The $L_{Aeq,\ 1hour}$ values are included for information only, and the period values are the ones that should be compared to the criteria.

a. Sc1 - SUMMER OPERATIONS

The predicted façade $L_{Aeq,\ 1hour}$ and $L_{Aeq,\ period}$ noise levels are presented in *Table 3.1* and *Table 3.2*.

Noise levels that are predicted to comply with the daytime noise criteria of $L_{Aeq,\ period} \leq 65$ dB(A) and evening criterion of $L_{Aeq,\ period} \leq 55$ dB(A). Noise levels are predicted to exceed the night time criteria of $L_{Aeq,\ period} \leq 45$ dB(A) without further mitigation, based on the worst case assumptions described in Section 3

Table 3.1 – Predicted $L_{Aeq,\ Period}$ Noise Levels

Name	Description	Height, m	Day	Evening	Night
Rec_1_A	The Lodge	1.5	43	48	**48**
Rec_1_B	The Lodge	3.5	42	48	**48**
Rec_2_A	Ouse Bridge Cottages	1.5	43	59	**48**
Rec_2_B	Ouse Bridge Cottages	3.5	43	48	**48**

Predicted *$L_{Aeq,\ 1hour}$ Noise Levels* do not exceed the (period) criterion, but do exceed the numerical value for the night time period during the 1 hour required for the lift. However, it is not possible to compare these with the period criteria and the assessment is based on Table 3.1.

Table 3.2 – Predicted $L_{Aeq,\ 1hour}$ Noise Levels

Name	Description	Height, m	Day	Evening	Night
Rec_1_A	The Lodge	1.5	50	51	**51**
Rec_1_B	The Lodge	3.5	50	51	**51**
Rec_2_A	Ouse Bridge Cottages	1.5	51	52	**52**
Rec_2_B	Ouse Bridge Cottages	3.5	50	51	**51**

b. Sc1.1 WINTER OPERATIONS

The predicted façade $L_{Aeq,\ 1hour}$ and $L_{Aeq,\ period}$ noise levels are presented in *Table 4.1* and *Table 4.2*.

Noise levels that are predicted to comply with the daytime noise criterion of $L_{Aeq,\ period} \leq 65$ dB(A) and evening criterion of $L_{Aeq,\ period} \leq 55$ dB(A). Noise levels are predicted to exceed the night time criteria of $L_{Aeq,\ period} \leq 45$ dB(A).

Table 4.1 – Predicted $L_{Aeq, Period}$ Noise Levels

Name	Description	Height, m	Day	Evening	Night
Rec_1_A	The Lodge	1.5	44	49	48
Rec_1_B	The Lodge	3.5	43	49	48
Rec_2_A	Ouse Bridge Cottages	1.5	44	49	48
Rec_2_B	Ouse Bridge Cottages	3.5	44	49	48

Predicted $L_{Aeq, 1hour}$ *Noise Levels* do not exceed the (period) criteria, but do exceed the numerical value for the night time period during the 1 hour required for the lift. However, it is not possible to compare these with the period criteria and the assessment is based on Table 3.1.

Table 4.2 – Predicted $L_{Aeq, 1hour}$ Noise Levels

Name	Description	Height, m	Day	Evening	Night
Rec_1_A	The Lodge	1.5	51	51	51
Rec_1_B	The Lodge	3.5	51	51	51
Rec_2_A	Ouse Bridge Cottages	1.5	52	52	52
Rec_2_B	Ouse Bridge Cottages	3.5	51	51	51

5. MITIGATION

The following recommendations are made with regards to minimising noise emissions form the site in general and with respect to the predicated disturbance that may occur during a night time lift.

- Ensure the source noise levels (Lw) of the equipment (crane and generators) to be used on site via measurement or supplier specification is compliant with the Lw used in this modelling assessment. If the Lw levels are greater than those modelled (*Table 2.1)*, it is recommended that the operation is re-assessed, and alternative equipment procured if practicable.

- Similarly, if Lw levels are significantly lower (> 5 dB lower) than the modelled, it is recommended that the operation is re-assessed to establish if further mitigation is required to meet noise criterion.

- Avoid night time operations wherever possible. In the event that the need for night time operations is identified, then good construction practice requiring notification to the residents would be recommended. The reduction that is required in the noise level to meet the night time criterion could be achieved by limiting the number of lifts to one per night, and therefore careful scheduling of the work would be sufficient to meet the criterion.

- If continued night time operations are identified to need to occur, the installation of a barrier around the generators would be required to reduce noise levels. Typically this type of mitigation would reduce noise levels by approximately 5 to 10 dB(A).

6. DISCUSSION

The predicted noise levels and reductions are summarised below:

- At the closest and/or potentially most affected noise sensitive receptors, the predicted façade noise levels comply with the daytime noise criteria of $L_{Aeq, period} \leq 65$ dB(A) and evening criteria of $L_{Aeq, period} \leq 55$ dB(A) for both the "summer" and "winter" operations scenarios.
- At the closest and/or potentially most affected noise sensitive receptors, the predicted façade noise levels exceed night time daytime noise criteria of $L_{Aeq, period} \leq 45$ dB(A) for both the "summer" and "winter" operations scenarios.
- Night time noise levels are predicted to exceed the criteria by 3 dB over the whole period (8 hrs).
- Where night time lifts are to occur, they need to be managed accordingly.
- Recommendations have been provided to manage and reduce the potential for noise impacts. Based on the predicted analysis it is likely that, with management and mitigation, the use of the jetty will result in noise levels that meet the noise criteria at receptors. Therefore, no significant impacts are likely.