TECHNICAL NOTE

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Company:	RSK	Date:	18 November 2022
Pages:	9	Our Ref:	RSK-TN-298391-TN-002(00)

1. Introduction

Scottish Power Energy Networks (SPEN) as agents for Scottish Power Transmission Ltd (SPT) propose to construct a 132kV continuous overhead line (OHL) between Kennoxhead Windfarm (Grid ref: 277165E 624386N) and Coalburn Substation ~14km north-north-east (Grid ref: 282510E 637337N). Kennoxhead Windfarm is located south of the A70, near the village of Glespin on the Douglas Estate while Coalburn substation is located west of the M74 near Coalburn.

RSK has been instructed to conduct a desktop-based assessment to predict the construction and operational noise impact from a new 132kV Point of Connection (PoC) for Kennoxhead Wind Farm (112MW), which is located approximately 14km south of Colborn 132/400kV substation.

2. Site Background

The proposed development, for the purpose of the application for consent, comprises the construction and operation of approximately 17km of 132kV OHL. The OHL would be supported by wood poles. Approximately 3.5km of underground cable is anticipated to make the connection into Coalburn substation and to connect into Kennoxhead substation and avoid a proposed wind turbine.

Although a number of residential properties were identified within the study area only residential properties within 200m of the OHL and the proposed main compound are considered to represent the most effected by noise levels from the proposed scheme and as such are considered worst case (sensitive receptors). Seven sensitive receptors have been identified within 200m of the OHL as shown in Table 2.1.

Receptors have been identified based upon client supplied drawings *Rev 1B-Proposed Overhead Alignment Cable Route and Temporary Accesses-Sheet1 to19 INRERIM.pdf*.

Table 2.1 Sensitive Receptors

No.	Location	Approximate Separation distance from closest point of OHL installation (m)	Approximate Separation distance from the nearest site compound or nearest laydown areas (m)
1	The Bungalow	200	115
2	Viaduct Cottage	150	250
3	Longhouse	120	215
4	Braeface Cottage	170	425
5	25 Coalburn Road	170	>500
6	311 Coalburn Road	170	120
7	Johnshill Farm	120	225

3. Construction Methodology

The following four construction tasks involved with the OHL installation construction works have been identified as having the potential to generate significant levels of noise.

1. Site Establishment & Compounds Installation.
2. Access tracks and haul roads – vehicle movements;
3. OHL Constructions and Excavations – removing and loading of material; and
4. Restoration works – unloading and placement of material

An estimation of each construction task methodology, along with the associated plant requirements are provided below:

Task 1 – Site Establishment & Compounds Installation

Establishment of the site compounds include the setting up of the contractor's compound and offices by the Contractor and Engineers. This includes cabins, stores, welfare facilities and a car park. Preparatory works for the temporary site establishments will involve plant to undertake site clearance work, minor earthworks operations to level the site, drainage works for the car park and service installation. Temporary site cabins will be erected using an electric drill and hand tools.

Due to the size of the project, it is anticipated that other smaller mobile welfare units will be established at different locations along the route.

The materials will be brought to site using an articulated lorry and will be placed into the designated location using a 594 sideboom. A generator will be used to power the site cabins.

Task 2 – Access Roads

Temporary accesses will be constructed, as necessary, and laydown /storage areas established to facilitate development depending on ground conditions, it may be possible to access work locations by tracked/low ground pressure vehicles, however trackway panels or temporary stone roads may be required in some circumstances.

Task 3 – OHL Constructions and Excavations

For wood pole line construction, the 'poles' are typically erected using normal agricultural machinery such as an excavator with a lifting arm. A tracked excavator and low ground-pressure vehicles, (e.g. tractor, ATV, quad bikes) are used to deliver, assemble and erect each wood pole structure at each location. The erection of the wood poles requires a typical excavation of 3 m 2 x 2 m deep. The excavated material is segregated into appropriate layers and used for backfilling. It is relatively rare for concrete or other backfill to be used in the foundations of wood poles. This would normally only be used where ground conditions are particularly unstable (identified by site investigations). An excavator is typically used to hoist the assembled structure into position and once the structure has been braced in position the trench is backfilled.

Stringing of conductors. The conductors would be winched to/pulled from section poles; these poles therefore require access for heavy vehicles to transport the conductor drums and large winches. Where the OHL crosses a road a scaffold tunnel would be used to protect the vehicles from the works. Existing distribution lines would be either switched off, deviated or protected using 'live line' scaffolds.

Task 4 – Restoration Works

Reinstatement of pole sites and removal and reinstatement of temporary infrastructure sites. In all cases, every effort is made to cause the least disturbance to landowners and local residents during construction. Following completion all ground disturbance resulting from the construction of the new line is reinstated.

Based upon client supplied information and also RSK's experience in such construction activities, the following plant lists have been derived.

Task 3.1 Main Site Compound Establishment

Task A - Site Establishment								
Plant	Noise Data			Number of plant items	On time (%)	Screening /dB	Total Correction / dB	Total Lp at 10m dB(A)
	Plant Ref	Type	Lp (at 10m) dB(A)					
Hand Tools	-	-	-	-	-	-	-	-
Core Drill	C 4. 69	250 mm	85	1	10	-5	-15	70
Generator	C 4. 78	-	66	1	100	-10	-10	56
594 sideboom	Manufacturer's data	-	75	1	30	0	-5	70
Articulated lorry	C11.13	44t	78	2	15	0	-5	73
JCB Fastrac Tractor	C4-75	Diesel	79	1	50	0	-3	76
							TOTAL	**79**

Task 3.2 Access Roads

Task 2 – Access Roads								
Plant	Noise Data			Number of plant items	On time (%)	Screening /dB	Total Correction / dB	Total Lp at 10m dB(A)
	Plant Ref	Type	Lp (at 10m) dB(A)					
Hand Tools	-	-	-	-	-	-	-	-
Excavator	C2. 5	16t	76	1	60	0	-7	74
Hiab Lorry	C 4. 53	6T	77	1	40	0	-7	73
Tipper lorry	D3.112	53KW	85	1	10	0	-10	75
							TOTAL	**79**

Task 3.3 OHL Constructions and Excavations

Task 3 – OHL Constructions and Excavations							
Plant	Plant Ref	L_p (at 10 m) dB(A)	No. of Plant Items	On-Time %	Screening (dB)	Total Correction (dB)	Total L_p (at 10 m) dB(A)
Tracked excavator	C2.14	79	1	70	0	-2	77
Low ground pressure vehicles (e.g. Tractor)	C4. 74	80	20	1	0	-7	73
Tipper (lorry)	D3.112	85	1	10	0	-10	75
Diesel Scissor lift / worker platform	C4.59	63	1	50	0	-3	60
JCB Fastrac Tractor	C4-75	79	1	20	0	-7	72
Hand Tools	-	-	-	-	-	-	-
Plant for stringing (WG ingersol winch)	Manufacturers data	89	1	10	0	-10	79
						Total	**83**

Task 3.4 Restoration Works

Task 4: Restoration Works							
Plant	**Plant Ref**	**L_p (at 10 m) dB(A)**	**No. of Plant Items**	**On-Time %**	**Screening (dB)***	**Total Correction (dB)**	**Total L_p (at 10 m) dB(A)**
Hand tools	-	-	-	-	-	-	-
Mini tracked excavator	C4.68	65	1	20	0	-7	58
Rammax 6000 roller	Manufacturer's Data	67	1	50	0	-3	64
Articulated dump truck	C8.14	80	1	25	0	-6	74
						Total	**75**

5. Criteria for Assessment

Construction noise is typically assessed by using the guidance prescribed in BS 5228-1. Annex E of BS 5228-1 provides guidance on how to assess the significance of construction noise on residential and commercial sensitive receptors. Annex E provides a number of assessment methods to determine the significance of construction related impacts.

BS 5228 Section E.3.2 details the 'ABC Method' of determining the potential significance of noise effects based upon noise change. This method requires the quantification of the existing baseline climate and the assessment of construction noise, in isolation, against the existing ambient levels.

In order to determine the significance of potential noise effect at dwellings, firstly the baseline climate is quantified for the appropriate assessment period (daytime, evening/weekends or night) and rounded to the nearest 5 dB. This is then compared to the measured or predicted site noise level (in isolation). If the site noise level exceeds the appropriate category value, as listed in Table 5.1 below, then a potential significance is indicated.

Table 5.1 Example threshold of significant effect at dwellings

Assessment category and threshold value period (L_{Aeq})	Threshold value in decibels		
	Category A [A]	Category B [B]	Category C [C]
Night-time (23.00 – 07.00)	45	50	55
Evening and weekends [D]	55	60	65
Daytime (07.00 – 19.00) and Sat (07.00 – 13.00)	65	70	75

NOTE 1 A potential significant effect is indicated if the $L_{Aeq, T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.

NOTE 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq, T}$ noise level for the period increases by more than 3 dB due to site noise.

NOTE 3 Applied to residential receptors only.

[A] Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values

[B] Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as the category A values

[C] Category C: Threshold values to use when the ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

[D] 19.00 – 23.00 weekdays, 13.00-22.00 Saturdays and 07.00 – 23.00 Sundays.

In the absence of baseline noise data for the receptors in proximity to the OHL route and the proposed daytime working hours for the construction works, it is considered appropriate to adopt the Category A criteria of **65 dB L_{Aeq}**, for the determination of potential significant noise impact from construction works.

6. Assessment Results

Construction

In the absence of existing baseline data for the works route an appropriate assessment criteria has been selected based on the BS 5228 'ABC Method' threshold values of significance. The most stringent Category A criteria of 65 dB $L_{Aeq,12h}$ for the daytime period (07:00 – 19:00) has been selected, in order to ensure a conservative assessment is undertaken. It should be noted that this method determines potential significance from construction noise levels in isolation, without a contribution from the existing ambient climate.

A summary of predicted construction noise levels at the closest properties to the works are presented in Table 6.1 to Table 6.4. Results are shown as free field noise levels at 1.5 metres height.

Table 6.1 Task 1- Predicted construction noise levels

Receptor	Task 1 - Predicted Construction Noise Levels $L_{Aeq,T}$ (dB)
The Bungalow	54
Viaduct Cottage	46
Longhouse	48
Braeface Cottage	41
25 Coalburn Road	40
311 Coalburn Road	54
Johnshill Farm	47

Table 6.2 Task 2 - Predicted construction noise levels

Receptor	Task 2 - Predicted Construction Noise Levels $L_{Aeq,T}$ (dB)
The Bungalow	54
Viaduct Cottage	46
Longhouse	48
Braeface Cottage	41
25 Coalburn Road	40
311 Coalburn Road	54
Johnshill Farm	47

Table 6.3 Task 3 - Predicted construction noise levels

Receptor	Task 3 - Predicted Construction Noise Levels $L_{Aeq,T}$ (dB)
The Bungalow	52
Viaduct Cottage	56
Longhouse	58
Braeface Cottage	54
25 Coalburn Road	54
311 Coalburn Road	54
Johnshill Farm	58

Table 6.4 Task 4 - Predicted construction noise levels

Receptor	Task 4 - Predicted Construction Noise Levels $L_{Aeq,T}$ (dB)
The Bungalow	44
Viaduct Cottage	48
Longhouse	50
Braeface Cottage	46
25 Coalburn Road	46
311 Coalburn Road	46
Johnshill Farm	50

7. Conclusion

Construction

The installation passes primarily through environments that are relatively rural in nature, however in order to conduct a 'worst-case' assessment, the construction noise impact has been determined at the four receptors at the nearest separation distance from the construction works, identified based upon client supplied drawings *Rev 1B-Proposed Overhead Alignment Cable Route and Temporary Accesses-Sheet1 to19 INRERIM.pdf,* have been

The results of the assessment, show that predicted noise levels would comply with the BS 5228, Category A criteria of 65 dB $L_{Aeq,}$ for the determination of potential significant noise impact from construction works. It should also be noted that when considering the construction noise impact, that the works are linear in the nature and are of a short duration at any one location. The noise generated by construction of the OHL will quickly diminish as the construction progresses, moving the activity away from each noise-sensitive location as construction and decommissioning continues.

Due to the short term and localised nature of the construction processes for the OHL and the main site compound, any temporary noise created is likely to be minimal and concentrated in small areas at any one time as the contractors progress along the course of the route.

In order to reduce the construction noise impact to as low as reasonably practicable, the works contractor is committed to implementing accepted good practice measures for controlling construction and decommissioning noise, which may include the following, as appropriate:

- restricted hours of construction works to avoid sensitive periods;
- the use of equipment with appropriate noise control measures (e.g. silencers, mufflers and acoustic hoods);
- the positioning of temporary site compounds as far as practicably possible from neighbouring residential properties; and
- additional good practice measures as set out in BS5228:2009.

Operational

Operating high voltage OHLs can generate audible noise, the level of which depends upon the operating voltage and the choice of conductor system. Noise from OHLs is produced by the phenomenon of 'corona discharge', this being a very limited breakdown of the air at points around the surface of the conductor. Conductor systems are designed and constructed to minimise corona discharge, but inevitable surface irregularities caused by surface damage or by deposition of surface contaminants such as insects, organic material such as seeds and dust, raindrops or pollution may locally enhance the electric field strength sufficiently for corona discharge to occur. The discharge can be audible in certain circumstances and would be heard as a crackling sound sometimes accompanied by a low frequency hum. Noise levels would increase during periods of rainfall. The OHL design for the New 132kV OHL is a 132kV Trident wood pole construction utilising Single Poplar

conductors. With this type of construction and operating voltage, and during certain weather conditions as mentioned above, audible noise would only be perceptible to an observer standing directly beneath the line. Noise levels a very short distance (50m) from the OHL would likely be imperceptible relative to the background. Therefore, there are no significant effects anticipated associated with operational noise.