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Dear Tatsiana

Re: 18-441 Culcairn Solar Farm (SSD-10288)

NGH completed an Amendment Report (AR) (dated 3 June 2020) for the proposed Culcairn Solar Farm, to detail the amended layout and design. As part of this AR, NGH completed an updated operational noise assessment.

Since the submission of the AR, it has come apparent to both NGH and the Department that a miscalculation has occurred, resulting in several operational noise exceedances at night across the site. This is due to an incorrect combined sound pressure calculation for components of the Battery Energy Storage System (BESS).

On revision, it was found that one operational noise exceedances can be expected for the proposed Culcairn Solar Farm. This exceedance can be seen at Receiver 33, an unoccupied derelict home. Please see updated calculations and details overleaf.

If you have any questions, please contact me on (02) 6923 1562. I would be pleased to discuss this project with you further.

Yours sincerely,

Sarah Hillis
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Operational Noise Assessment

Assessment criteria

The Rural Background Noise Levels (RBLs) have been adopted from Table 2.3 of the *Noise Policy for Industry* (NPI). Background noise levels were adopted from the NPI due to the rural location of the proposal. The adopted levels are considered to be conservative due to the proximity of activity adjacent to the site including agricultural activity, rural and regional road traffic and quarrying. The RBLs for the site have been used to calculate the intrusive noise levels, the project amenity noise levels (PANLs) and the project operational noise trigger levels (PNTL) (Table 1).

Table 1 Projected noise trigger levels

Catchment	Time of day	Intrusive Noise Level dB L _{Aeq} , 15 min	PANL dB L _{Aeq} , 15 min	PNTL dB L _{Aeq} , 15 min
Rural Receptors	Day	45	45	45
	Evening	40	40	40
	Night	35	35	35

Operational noise source

Noise from the operation of the solar farm would be generated by:

1. The onsite substation.
2. Maintenance activities such as visual inspections of panels and structures, general maintenance (e.g. replacing fuses, replacing panels), cleaning of panels and emergency repairs (e.g. replacing tracking motors).
3. Tracking motors and movement of the solar panels.
4. Inverter stations.
5. Centralised BESS including Heating, Ventilating and Air Conditioning (HVAC) systems.

BATTERY ENERGY STORAGE SYSTEM

The proposed centralised BESS would include up to 50 battery container units. On either side of these battery units is a heating, ventilation and air conditioning (HVAC) unit. In addition, the BESS would require the operation of up to 100 power conversion units, two step-up transformer units and one control room.

Table 2 Operational sound levels for BESS plant and equipment

Equipment		Sound Pressure Levels, L _{Aeq} dB(A) (@ 7 m)	Number of units	Combined sound pressure level dB(A)
BESS	HVAC equipment (fans, pumps etc)	67	200	92.3 90
	Power Conversion Units (inverter stations)	80.5	50	97.5
	Step up transformers (33kV)	59	2	95 62

Operational noise assessment – Scenario 2

Noise levels have been calculated for the BESS operation out of standard work hours, previously reported as Scenario 2 in the AR.

This scenario is deemed to have the highest noise impact, that is all of the plant within the BESS would be operating simultaneously (refer Table 2). The activities selected provide a worst-case scenario for noise generated from the BESS.

The operational noise predictions are based on noise attenuation with distance from source. They do not take into account any obstacles between the source or weather conditions which can influence the level of noise perceived.

Table 3 Predicted noise level and impact key

Predicted Noise Level dB (A)	Description
Green = no exceedance	
Yellow = Minor exceedance	Clearly audible = < 10 dB (A) above PNTL
Orange = Substantial exceedance	Moderately intrusive = > 10 dB (A) above PNTL
Red = highly noise affected	Highly intrusive = > 75 dB (A) above NML

Operation of the BESS outside standard working hours

During operation, the BESS would not operate continuously. The noise modelling is based on the BESS operating at full output. However, the level of output would be intermittent. As such, these noise levels should be considered as a peak in operation of the BESS rather than the ongoing operational noise levels.

Based on the predicted operational noise levels presented in Table 2, noise levels at all sensitive receivers would comply with the evening criteria outside standard working hours. The calculations predict there would be audible noise of an acceptable level at each of the sensitive receivers. This assessment does not include any effect that the landscape may have on noise transmission.

However, if the BESS is operational at 'worst-case scenario' for periods during night-time hours, the BESS would be audible at receiver R33 (noting that the residence at R33 is currently unoccupied). The PNTL for operation is 40 dB LAeq, 15 min for evening hours and R35 dB LAeq, 15 min. There is an exceedance of 1 dB at R33. It should be noted however that exceedances of ≤ 2 dB(A) are not perceptible.

Table 4 Predicted noise levels for operation of BESS outside standard working hours

Receiver	Distance from BESS (m)	Predicted Noise Level dB (A)	Description
R30	3661	20	Not noticeable
R31	3560	25	Not noticeable
R29	3039	30	Not noticeable
R28	3195	17	Not noticeable
R24	1525	37* 34	Not noticeable
R32	3540	15	Not noticeable
R19	2835	27	Not noticeable
R17	4107	15	Not noticeable

Receiver	Distance from BESS (m)	Predicted Noise Level dB (A)	Description
R33	1315	40 36	Not noticeable
R34	1595	36* 34	Not noticeable
R14	1686	36* 33	Not noticeable
R09	2059	24	Not noticeable
R08	3692	17	Not noticeable
R03	4569	12	Not noticeable

Note: * Exceedances of ≤ 2 dB(A) are not perceptible.