ADP Consulting : Engineering

Solar Farm – Charlton, VIC

Noise Impact Assessment

Prepared for: Tetris Energy

Project No: MEL3190
Date: 8 April 2022
Revision: 02

Creating great environments with great people

Project:	Solar Farm – Charlton, VIC
Location:	Lot 2 PS403054 126 Biddlestones Road Charlton, VIC 3525
Prepared by:	ADP Consulting Pty Ltd Level 11, 60 Albert Road South Melbourne VIC 3205
Project No:	MEL3190
Revision:	02
Date:	8 April 2022

Rev	Date	Comment	Author	Signature	Technical Review	Signature	Authorisa-tion & QA	Signature
00	19.01.2022	DRAFT – for comment	AS		TC		TC	
01	25.01.2022	Final	TC		CC		TC	
02	08.04.2022	Equipment Revisions	JMa		JMa		JS	

Project Team	
Client / Principal	Tetris Energy Pty Ltd ABN 81 625 741 399

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Introduction

1.1 Document purpose

ADP Consulting has been engaged by Tetris Energy to conduct a noise impact assessment for a proposed solar farm, to be located at Lot 2 PS403054 of 126 Biddlestones Road, Charlton VIC 3525.

We understand that this document may be submitted to a relevant authority in support of a planning application.

This report contains acoustic design advice, for documentation by others, which delivers an assessment of the noise impacts at the nearest residential receivers due to proposed operations.

It is the responsibility of the contractor to ensure the acoustic design intent of this document is implemented, including compliance with any criteria, codes, standards and specifications.

1.2 References

The following drawings, conditions and other project-specific information have been referenced in the preparation of this report:

- Tetris Energy, Charlton Solar Farm Site Layout, Rev B, dated 16 November 2021.
- NEXTracker, Motor Sound Test Summary, dated March 2017.
- Tesla, Tesla Megapack 2 XL Datasheet, Revision 1.2, dated 2022.
- Tesla, Tesla Megapack – third-octave sound data, dated 2021.
- FIMER, String inverter PVS-175-TL datasheet, dated 9 June 2021.
- Tetris Energy, SunGrown noise data, dated 25 November 2021.

The following guidelines, standards and regulatory requirements have been used in defining the site-specific acoustic criteria and for conducting the acoustic assessment:

- EPA Victoria, Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues (Publication 1826.4), dated 4 May 2021 (EPA Noise Protocol)
- NSW EPA's Industrial Noise Policy, dated January 2000 (INP)

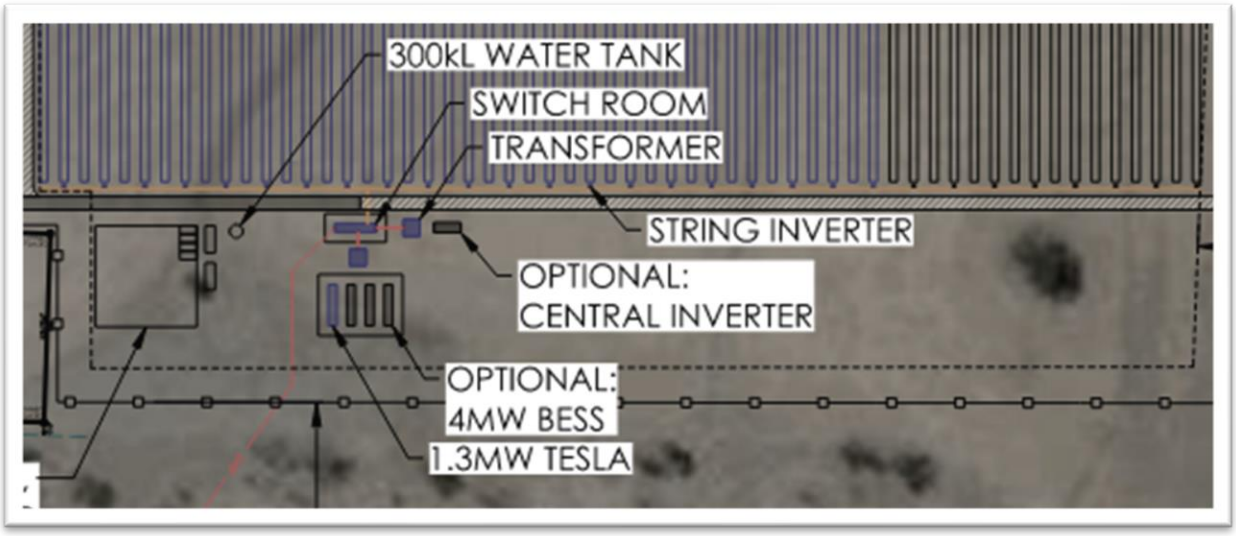
1.3 Project description

The proposed solar farm will have a power generation system that consists of tracked PV modules, an inverter system and battery energy storage system. The modules will be connected to one of two inverter options:

1. thirty (30) string inverters: with each inverter located at the ends of PV module rows (Figure 1)
2. one (1) central inverter: near the Battery Energy Storage System (BESS) unit (Figure 1)

In both options, the BESS will contain up to two (2) Tesla 1.3 MW Megapack units, 126 tracking motors will be used to orient the panels in rows of PV modules.

Figure 1 Site layout containing string and central inverter locations, as well as the location of the battery system. From Site Layout



Site investigations

2.1 Sensitive receivers

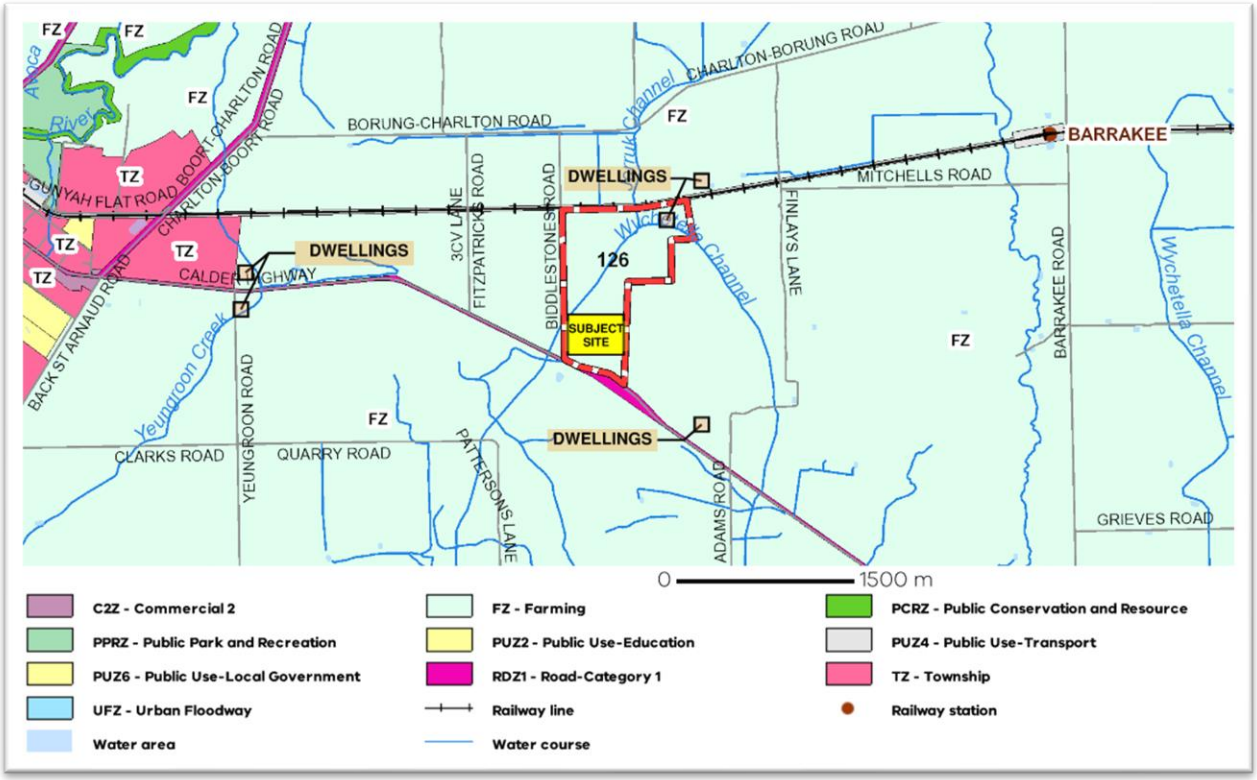
We have identified nearest noise-sensitive receivers to the proposed site, located at dwellings at the following addresses:

- 2464 Calder Highway, Charlton 3525, approx. 1.2 km to the SE.
- 126 Biddlestones Road, Charlton 3525 approx. 1.3 km to the NE.
- 344 Borung-Charlton Road, Charlton 3525, approx. 1.4 km to the NE.
- 1302 Yeungroon Road, Charlton 3525 approx. 2.9 km to the NW.
- 2888 Calder Highway, Charlton 3525 approx. 2.8 km to the NW.

2.2 Planning zones

ADP Consulting have determined that the subject site and nearest noise-sensitive areas all lie contiguously in an FZ zone. The location of the identified receivers and their zone types can be seen in Figure 2.

Figure 2 Identified residential dwellings nearest to the subject site. Planning z ones from Victoria ELWP 11/01/2022.



Criteria

3.1 Noise criteria – EPA Noise Protocol

Noise emission criteria for the proposed development have been determined based on the methodology contained in the EPA Noise Protocol for commercial, industrial and trade premises (EPA 1826.4). The cumulative noise emissions from the operations of the proposed development are to meet the specified noise criteria in Table 1.

Table 1 EPA 1826.4 Noise Protocol criteria for the identified nearest noise-sensitive receivers

Location	Time Period, 24 Hr	EPA Noise Protocol Criteria, dB(A)
Residential dwellings at: > 126 Biddlestones Road > 344 Borung-Charlton Road > 2464 Calder Highway > 2888 Calder Highway > 1302 Yeungroon Road	Day: (0700 – 1800) Evening: (1800 – 2200) Night: (2200 – 0700)	46 41 36

Assessment

4.1 Equipment noise levels – EPA Noise Protocol

We have scheduled the sound power levels of major equipment proposed in Table 2. Both inverter options have been considered for the two operational scenarios of our assessment, where either string inverters or one central inverter are installed. We note that in some instances the sound power levels of equipment have been estimated, and the noise levels here are to be used as a guide only.

Table 2 Sound power levels of major plant and equipment

Equipment	Sound Power Level, dB(A)
Tracker	
NEXTracker Horizon (each, 126off)	49
Inverter	
Option 1: SUNGROW 4.95 MW (SG4950HV-MV) (each, 1off)	92
Option 2: ABB PVS-175TL (each, 30off)	76
BESS	
Tesla Megapack 1.3 MW (each, 2off)	100% capacity: 95

The inverters and BESS units generate noise which can be characterised as being tonal in nature (as defined by the EPA Noise Protocol). The inverter tonality is expected due to transformer noise, usually centred at twice the overhead grid frequency (typically 125 Hz), and for the BESS units due to mechanical fans on the top of the enclosure. We have applied a +6 dB and +5 dB tonality adjustment for the BESS units and inverters respectively, to reflect the effective noise level tonality adjustments in the EPA Noise Protocol.

4.2 Noise assessment – EPA Noise Protocol

A prediction of the noise emission from the proposed equipment operating at the subject site has indicated compliance with the EPA Noise Protocol criteria established in Section 3.1.

The following has been considered in our assessment:

- The maximum effective noise levels of all equipment, scheduled in Section 4.1.
- That the inverters will operate in the early morning (particularly in summer) before 7am.
- Noise emission penalties apply due to tonal characteristics of the photovoltaic inverters and the BESS.
- BESS will operate as follows (based on the number of units installed) as per the data provided by Tesla:
  - 2 BESS operating at 100% fan capacity at all periods
- Distance sound attenuation formulas for the equipment in an unshielded free field (i.e., free from buildings, barriers, mounds or hills, etc.). We believe that this is the most conservative approach as any shielding between the sources and receivers has not been included.

> Calculations considered unfavourable meteorological conditions at temperatures of 20˚ C and relative humidity 70%.

> Temperature inversions for adverse acoustic conditions at night (ap per Appendix D of the INP)

Table 3 schedules the calculated noise levels at the worst affected noise-sensitive receivers and presents compliance with the Noise Protocol criteria. Both inverter options have been shown to comply with the Noise Protocol criteria at the nearest sensitive receivers.

Table 3 Noise emission assessment, compliance check with EPA Noise Protocol criteria

Receiver	Time Period	Predicted Level, $L_{Aeq,t}$ dB(A)* *Trackers, BESS, Central Inverter*	Predicted Level, $L_{Aeq,t}$ dB(A)* *Trackers, BESS, String Inverters*	EPA Criteria, dB(A)	Complies? Y/N
Dwellings, 1.2 km to SE					
2464 Calder Highway, Charlton	Day	35	35	46	Y
	Evening	35	35	41	Y
	Night	35	35	36	Y
Dwellings, 1.3 km to the NE					
126 Biddlestones Road, Charlton 344 Borung-Charlton Road, Charlton	Day	34	34	46	Y
	Evening	34	34	41	Y
	Night	34	34	36	Y
Dwellings, 2.8km to the NW					
2888 Calder Highway, Charlton 1302 Yeungroon Road, Charlton	Day	23	23	46	Y
	Evening	23	23	41	Y
	Night	23	23	36	Y

*In accordance with the Noise Protocol, we have included a 6dB tonality penalty for the BESS and a 5dB tonality penalty for the inverters.

Compliance at these locations is indicative of compliance at receivers located further away.

Conclusion

Current regulations and standards associated with the proposed development have been reviewed and assessed in accordance with existing site constraints.

Noise emissions have been predicted at the nearest noise-sensitive receivers using a conservative approach, that indicates compliance with site-specific EPA Noise Protocol criteria.

Based on our assessment, we believe that there are no site conditions or statutory requirements that would preclude this development from complying with the noise criteria presented in this report.

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