Appendix J
Noise Assessment

Cimitiere Plains Solar Farm

envoca
ENVIRONMENTAL CONSULTANCY

Noise Assessment

Cimitiere Plains Solar Farm
George Town, TAS

Prepared for: Sunspot 9 Pty Ltd
C/- Envoca
January 2024
MAC221655-01RP1V5

Muller Acoustic Consulting

Document Information

Noise Assessment

Cimitiere Plains Solar Farm

George Town, TAS

Prepared for: Sunspot 9 Pty Ltd

c/- Envoca

Level 6, 201 Kent Street

Sydney NSW 2300

Prepared by: Muller Acoustic Consulting Pty Ltd

PO Box 678, Kotara NSW 2289

ABN: 36 602 225 132

P: +61 2 4920 1833

www.mulleracoustic.com

DOCUMENT ID	DATE	PREPARED	SIGNED	REVIEWED	SIGNED
MAC221655-01RP1V5	18 January 2024	Rod Linnett		Oliver Muller	

CONTENTS

1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Envoca on behalf of Sunspot 9 Pty Ltd (Sunspot 9) to prepare a Noise Assessment (NA) for the proposed Cimitiere Plains Solar Farm 5km northeast of George Town, TAS (the project). This report presents the methodology and findings of the NA for the construction and operation of the project.

1.1 Purpose and Objectives

The purpose of the NA is to quantify potential environmental noise emissions associated with the construction and operation of the project. Where impacts are identified, the assessment includes recommendations for potential noise mitigation and management measures.

1.2 Scope of the Assessment

The NA includes the following key tasks:

- review construction and operating activities to identify key noise generating plant, equipment, machinery or activities proposed to be undertaken as part of the project;
- identify the closest and/or potentially most affected receivers situated within the area of influence to the project;
- determine project-specific construction and operational noise criteria;
- undertake 3D noise modelling to predict levels that may occur as a result of the construction and operation of the project at the closest and/or potentially most affected receivers;
- provide a comparison of predicted noise levels against relevant construction and operational criteria;
- assess the potential noise impacts associated with construction and operational aspects of the project;
- assess the potential noise impacts associated with road traffic noise during construction; and
- provide feasible and reasonable noise mitigation and management measures, and monitoring options, where criteria may be exceeded.

The assessment has been undertaken in accordance with the following documents:

- TAS Department of State Growth (DSG), Tasmanian State Road Traffic Noise Management Guidelines 2015;
- TAS Department of Environment, Parks, Heritage and the Arts – Environmental Protection Policy (Noise), May 2009;
- Tasmanian Government Environmental Management and Pollution Control (Noise) Regulations 2016;
- Standards Australia AS 1055:2018 - Acoustics - Description and measurement of environmental noise - General Procedures;
- Standards Australia AS 2436:2010 - Guide to noise and vibration control on construction, demolition and maintenance sites;
- International Standard ISO 9613:1996 - Acoustics - Attenuation of sound during propagation outdoors;
- German Institute for Standardisation – DIN 4150 (1999-06) Part 2 (DIN4150-2) – Structural Vibration - Human Exposure to Vibration in Buildings; and
- British Standards Institution BS 7385: Part 2-1993 (BS7385.2:1993) - Evaluation and Measurement for Vibration in Buildings — Part 2 – Guide to Damage Levels from Ground-borne Vibration, 1993.

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

2 Project Description

2.1 Background

Sunspot 9 propose to construct and operate a 288-Megawatt (MW) solar farm using Photovoltaic (PV) technology approximately 5km northeast of George Town, TAS.

2.2 Description of Proposed Construction Works

The project includes installation of groups of PV panels on mounting structures of 2.5m to 4.5m in height. Approximately 600,000 PV panels will be installed using a single axis tracking system, tilting from east to west. The PV mounting structure would comprise steel posts driven into the ground using a small pile driver. Additional support structures would be attached to the piles, which would then support the PV panels.

As cabling of each PV array/module to inverters is required to be underground, earthworks will primarily involve trenching. Other minor earthworks would be completed for the preparation of the site. The project site is predominantly cleared agricultural land and relatively flat, so minimal site preparation will be required.

It is anticipated that the solar farm would be constructed in stages, with construction of two to three stages occurring at any one time over a 12-to-18-month period during standard construction hours.

During construction, traffic generated by the project would include employee and delivery vehicles. During the peak construction period, the total daily traffic volume is expected to be up to 208 heavy vehicle movements (rigid vehicles, semi-trailers, truck and dog and shuttle buses) and 246 light commercial vehicle movements (a vehicle driving to site, and back is two movements).

2.3 Description of Proposed Operation

PV infrastructure on site will comprise of groups of PV panels installed in rows running north to south. The PV modules will be on a single axis tracker system which will follow the sun and move in an east to west direction. Electrical cabling would be attached beneath the modules and would connect the individual PV modules to each other. Inverters will be located centrally and connected by underground cables. The project will be contained solely within the site as shown in **Figure 1**. Project layout drawings are presented in **Appendix B**.

The project would operate during daylight hours, seven days a week. During operation, the PV panels would generate electricity which would be fed into the power grid via a double circuit transmission line that will connect the solar farm substation to the George Town substation. The total length of the transmission line is approximately 6km. Key noise emissions from the operation of the project are associated with the inverter and transformer(s).

When required, maintenance activities will occur during standard working hours (except for emergencies) and are expected to include:

- panel cleaning;
- repairs, maintenance, and replacement of infrastructure, as required;
- security monitoring; and
- land management including mowing to control vegetation, as required.

Typical noise sources associated with maintenance activities would include light vehicle movements on site and maintenance of equipment.

2.4 Receiver Review

Using aerial photography, geospatial information and other project design information, MAC has identified the following potentially sensitive receivers that may be affected by noise from operation or construction activities and project related road traffic. **Table 1** presents a summary of receiver identification, type, address, and coordinates. These are reproduced visually in **Figure 1**.

Table 1 Receiver Locations

Receiver	Description	Receiver Type	Coordinates (GDA94/MGA55)	
			Easting	Northing
L01	382 Soldiers Settlement Road	Project Related	489371	5453709
L02	381 Soldiers Settlement Road	Project Related	489026	5453917
R01	259 Old Aerodrome Road	Rural Residential	489371	5453709
R02	229 Old Aerodrome Road	Rural Residential	489026	5453917
R03	160 Soldiers Settlement Road	Rural Residential	486183	5454173
R04	160 Soldiers Settlement Road	Rural Residential	486058	5453999
R05	70 Musk Vale Road	Rural Residential	488290	5452257
R06	Unknown Address	Rural Residential	488199	5452279
R07	599 Old Aerodrome Road	Rural Residential	488738	5452592
R08	549 Old Aerodrome Road	Rural Residential	489724	5450470
R09	489 Old Aerodrome Road	Rural Residential	488404	5456479
R10	106 Soldiers Settlement Road	Rural Residential	487836	5456480
R11	90 Soldiers Settlement Road	Rural Residential	487425	5456176
R12	40 Soldiers Settlement Road	Rural Residential	487064	5452325
R13	6524 Bridport Road	Rural Residential	486894	5452320
R14	6538 Bridport Road	Rural Residential	486525	5452108
R15	6542 Bridport Road	Rural Residential	493445	5450020
R16	6528 Bridport Road	Rural Residential	493308	5449409
R17	6533 Bridport Road	Rural Residential	493107	5449029
R18	10 Aitkins Road	Rural Residential	493204	5448982
R19	9 Aitkins Road	Rural Residential	493159	5448839
R20	11 Aitkins Road	Rural Residential	493253	5448295
R21	Low Head	Residential	483505	5453954
R22	BelBouy Beach	Residential	468051	5456528

Note: Project related receivers not included in assessment.

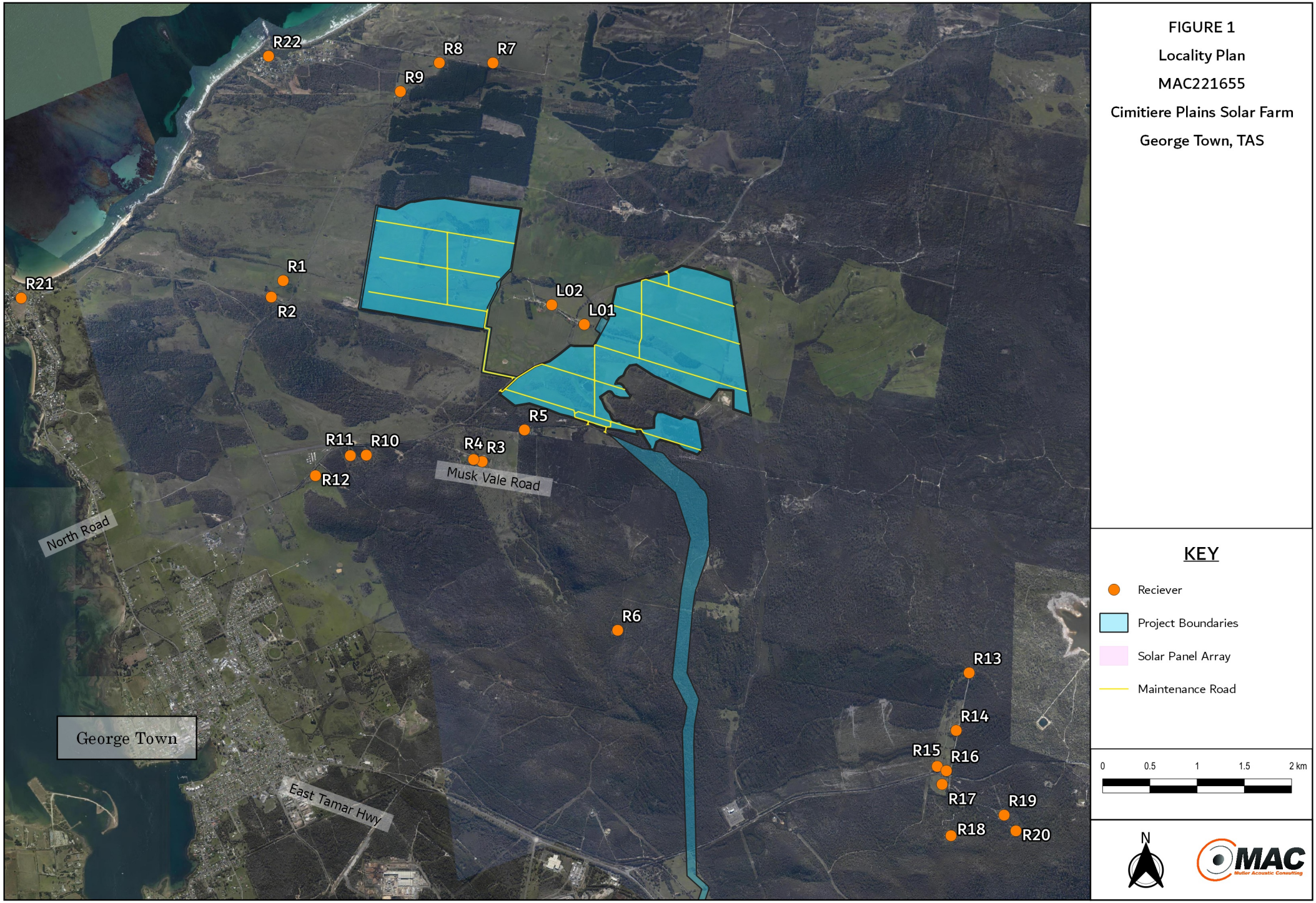


FIGURE 1

Locality Plan

MAC221655

Cimitiere Plains Solar Farm

George Town, TAS

KEY

- Reciever
- Project Boundaries
- Solar Panel Array
- Maintenance Road

0 0.5 1 1.5 2 km

N

MAC
Muller Acoustic Consulting

3 Noise Policy and Guidelines

3.1 Tasmanian Legislation

There are currently no specific operational noise criteria for solar farms in Tasmania. However, the Environment Management and Pollution (Noise) Regulations 2016 (the 'Noise Regulations') prescribes noise limits to industry on a case-by-case basis for noise generating activities. In regard to fixed equipment, the following provisions relate generally to received noise levels at a sensitive resident:

> *A person must not operate fixed equipment on any premises –*
>
> *(a) from 7.00 a.m. until 10.00 p.m., if the fixed equipment, when so operated, emits noise that is greater than 45dB(A); or*
>
> *(b) from 10.00 p.m. until 7.00 a.m., if the fixed equipment, when so operated, emits noise that is greater than 40dB(A).*

3.1.1 The Environment Protection Policy (Noise) 2009 (EPP-Noise)

The Environment Protection Policy (Noise) 2009 (EPP-Noise) refers to *WHO publication Guidelines for Community Noise (Berglund B, Lindvall T and Schwela D H, 1999)* for suitable noise indicator levels as shown in **Table 2** below. However, the noise levels specified below are indicative, non-mandatory noise levels.

Table 2 Acoustic Environment Indicator Levels

Specific Environment	Critical Health Effects	dB LAeq	Time Base hr	dB LAmax
Outdoor Living Area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling, Indoors	Speech intelligibility & moderate annoyance, daytime and evening	35	16	-
Inside Bedrooms	Sleep disturbance, night-time	30	8	45
Outside Bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

3.1.2 Noise Goals for Planning

The project operates between sunrise and sunset, which will be before 7am during spring and summer. The EPP-Noise calls on WHO guidance which aims for an internal noise level of 30dBA. Allowing for a (conservative) loss of 10dB through an open window from outside to inside correlates with the Noise Regulations external night time criteria of 40dBA, which is 5dB lower than the WHO preferred external noise level of 45dBA (refer 'outside bedrooms' in **Table 2**).

Therefore, the project has adopted a conservative external noise goal of 40dBA for the night-time period as it satisfies the requirements of the Noise Regulations and EPP-Noise.

As noise impacts from construction are considered to be of a temporary nature during the daytime over a 12 to 18 month construction period, noise goal of 50dBA has been derived from **Table 2** (moderate annoyance in outdoor living areas) during permissible hours of use. 'Permissible hours of use' have been adopted in accordance with the Tasmanian EPA Noise Regulations for mobile machinery, forklift trucks and industrial motor vehicles and are reproduced below:

- Monday to Friday 7am to 6pm;
- Saturday 8am to 6pm; and
- Sunday and Public Holidays 10am to 6pm.

3.2 Traffic Noise Management Guidelines

The road traffic noise criteria are provided in the Tasmanian State Road Traffic Noise Management Guidelines 2015. The policy sets out noise criteria applicable to different road classifications for the purpose of quantifying traffic noise impacts. Road noise criteria relevant to this assessment are presented in detail in **Section 4.3**.

4 Assessment Criteria

4.1 Operational Noise Goals

As outlined in **Section 3.1.2** conservative noise goals have been adopted for this assessment. Noise goals for the project are presented in **Table 3** and only apply to residential receivers.

Table 3 Operational Noise Goals

Location	Receiver Type	Assessment Period[1]	Adopted Noise Goal dB $L_{Aeq(15minute)}$[2]
R01-R20	Residential	Day Evening Night	40

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Noise goal for external façade at residential receivers. Conservatively assuming a 10dB decrease in noise transmission through an open window, internal noise goal is 30dBA.

4.2 Construction Noise Goals

The relevant construction noise goals for standard construction hours are presented in **Table 4**.

Table 4 Construction Noise Goals

Location	Receiver Type	Assessment Period[1]	Adopted Noise Goal dB $L_{Aeq(15minute)}$[2]
R01-R20	Residential	Permissible use hours	50

Note 1: Refer to **Section 3.1.2** for permissible use hours for construction.

Note 2: Noise goal for external façade at residential receivers.

4.3 Traffic Noise Criteria

Table 5 presents the road traffic noise assessment criteria reproduced from the Tasmanian State Road Traffic Noise Management Guidelines 2015. The design target level of 63dB $LA_{10(18hr)}$ is a commonly used target in Australia on new and upgraded roads. It should be noted that the criteria will not be appropriate for all situations, and will not always be reasonable, practical, or affordable to achieve.

The operational practical upper limit of 68dB $LA_{10(18hr)}$ will be used to trigger mitigation retrofitting considerations when incremental noise increases occur on existing roads, such from traffic growth or maintenance changes to seal type.

Table 5 Target traffic noise criteria for new roads and major road upgrades		
Target Traffic Noise Level dB $LA_{10(18hr)}$	Application	Comments
68 dB(A)	Outside road construction and upgrade projects, where increases in traffic noise levels occur the Department will consider an operational traffic noise level of 68dB $LA_{10(18hr)}$ to be a practical upper limit.	As levels increase above 63dB impacts become less acceptable to more people. A level above 68dB (measured at a building façade) is considered by the Department to be undesirable for sensitive uses.

4.4 Construction Vibration

A qualitative assessment of potential vibration impacts has been completed. Due to the nature of the works proposed and distances to potential vibration sensitive receivers, vibration impacts from the project would be negligible.

The British Standard *Evaluation and measurement for Vibration in Buildings* -Part 2. Guide to Damage Levels from Ground-borne Vibration (BS 7385.2 1993) provides guidance on levels of vibration above which building structures are susceptible to cosmetic damage. The *German Institute for Standardisation – Structural Vibration - Human Exposure to Vibration in Buildings (DIN4150-2)* provides guidance on levels of vibration above which human response can occur. The key vibration generating source proposed to be used would be a small pile driver. For a small pile driver, a minimum safe working distance of 15m is anticipated to prevent cosmetic damage. To achieve the residential human response criteria for continuous vibration, a minimum safe working distance of 50m is recommended. Therefore, as the nearest receivers to the project are greater than 50m, exposure to vibration is anticipated to be minimal. Therefore, vibration impacts are not considered to be a significant issue and have not been considered further in this assessment.

This page has been intentionally left blank

5 Modelling Methodology

A computer model using DGMR (iNoise, Version 2022) noise modelling software was used to quantify noise emissions from the project. iNoise is an intuitive and quality assured software for industrial noise calculations in the environment. 3D noise modelling is considered industry best practice for assessing noise emissions from projects.

The model incorporated a three-dimensional digital terrain map giving all relevant topographic information used in the modelling process. Additionally, the model uses relevant noise source data, ground type, attenuation from barrier or buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers. Where relevant, modifying factors have been applied to calculations.

The model calculation method used to predict noise levels was in accordance with ISO 9613-1 'Acoustics - Attenuation of sound during propagation outdoors. Part 1: Calculation of the absorption of sound by the atmosphere' and ISO 9613-2 'Acoustics - Attenuation of sound during propagation outdoors. Part 2: General method of calculation' including corrections for meteorological conditions using CONCAWE[1]. The ISO 9613 standard from 1996 is the most used noise prediction method worldwide. Many countries refer to ISO 9613 in their noise legislation. However, the ISO 9613 standard does not contain guidelines for quality assured software implementation, which leads to differences between applications in calculated results. In 2015 this changed with the release of ISO/TR 17534-3. This quality standard gives clear recommendations for interpreting the ISO 9613 method. iNoise fully supports these recommendations. The models and results for the 19 test cases are included in the software.

5.1 Construction Assessment Methodology

Construction activities are proposed to be progressive (trenching, piling and assembly) and will occur at several locations simultaneously. Noise emissions were modelled for the following four scenarios:

- earthworks for internal roads and compound construction including the stripping of topsoil and unsuitable soil and the placement and compaction of road base for internal roads;
- earthworks involving trenching for cabling;
- piling of panel supports; and
- assembly of the panels.

[1] Report no. 4/18, "the propagation of noise from petroleum and petrochemical complexes to neighbouring communities", Prepared by C.J. Manning, M.Sc., M.I.O.A. Acoustic Technology Limited (Ref.AT 931), CONCAWE, Den Haag May 1981

It is envisaged that all four construction scenarios have the potential to occur simultaneously at up to four key locations across the site. Although this scenario is unlikely to occur, it provides a conservative 'worst case' assessment of construction noise emissions for the project. Noise emission data used in this assessment was adapted from *AS 2436–2010– Guide to Noise and Vibration Control on Construction, Demolition and Maintenance sites* is summarised in **Table 6**. All significant noise generating construction activities will be limited to standard construction hours. Where low intensity construction activities are required to be undertaken outside standard construction hours, such as cabling, minor assembly, use of hand tools etc, they will be managed such that they are not audible at any residential receivers.

Table 6 Construction Equipment Sound Power Levels, Lw dBA (re 10^{-12} Watts)

Noise Source/Item	Utilisation %	Quantity	Lw/Item	Total Lw
Trenching & Earthworks				
Backhoe	80	1	104	103
Light vehicle	25	2	76	73
Total – Trenching & Earthworks				**103**
Piling				
Piling Rig (hydraulic)	80	1	113	112
Tele-handler	75	1	106	105
Light vehicle	25	2	76	73
Total – Piling				**113**
Assembly				
Mobile Crane/HIAB	75	1	104	103
Tele-handler	75	1	106	105
Light vehicle	25	2	76	73
Hand tools/Power tools	50	1	102	99
Welder	50	1	105	102
Total – Assembly				**109**
Transport (on site)				
Heavy vehicle	40	1	104	101
Tele-handler	50	1	106	103
Total – Transport				**105**

5.2 Operational Assessment Methodology

The potential for noise emissions from the operation of the project are associated with the inverter and transformer(s). The project operates at full capacity during daylight hours. After sunset, noise emissions are at a lower level as the panels are at rest and inverters are not operating at their full capacity as the project is not generating power. Therefore, noise predictions were modelled for a typical worst-case operational scenario over a 15-minute assessment period based on the assumptions and sound power levels in **Table 7.** Plant noise emission data used in modelling for this assessment were obtained from manufacturers data or the MAC database.

Table 7 Operational Equipment Sound Power Levels, Lw dBA (re 10^{-12} Watts)

Noise Source/Item	Activity	Quantity	Lw/Item	Total Lw
PV Panel Tracking Motor[1, 2]	All tracking motors in operation 1 minute per 15-minute period	8755	78	100
4.5MW Inverter PCU[2,3]	Constant	80	93	112
Substation[4]	Constant	1	95	95

Note 1: Tracking motor is situated underneath the PV panel, -5dB attenuation applied to account for shielding provided by the panel.

Note 2: Modifying factor penalty of +5dB added for low frequency and +5dB added for tonality.

Note 3: Sound power levels for inverters have been assessed at 100% operation, however after daylight hours, the inverters will operate at lower noise levels.

Note 4: Modifying factor penalty of +5dB added for intermittent operation and +5dB added for low frequency.

5.2.1 Meteorological Analysis

Noise emissions can be influenced by prevailing weather conditions. Light stable winds (<3m/s) and temperature inversions have the potential to increase noise at a receiver.

A detailed analysis of the significance of noise enhancing conditions has not been undertaken and hence, (worst case) noise enhancing meteorological conditions have been applied to the noise modelling assessment and are presented in **Table 8**.

Table 8 Modelled Meteorological Parameters

Assessment Condition[1]	Temperature	Wind Speed[2]/ Direction	Relative Humidity	Stability Class[2]
Day	20°C	3m/s all directions	50%	D
Evening	10°C	3m/s all directions	50%	D
Night	10°C	2m/s all directions	50%	F

Note 1: Day 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening 6pm to 10pm; Night - the remaining periods.

Note 2: Implemented using CONCAWE meteorological corrections.

5.3 Road Traffic Noise Assessment Methodology

During construction, traffic generated by the project include employees/subcontractors and delivery vehicles. The major transport route for the majority of vehicles to the access the project site is via East Tamar Highway through North Street, and then Soldier Settlement Road. Vehicle movements are also expected to occur along Bridport Road via East Tamar Highway for construction of the transmission line, and along Muskvale Vale Road for the construction of the substation and part of the transmission line.

The traffic volume over a typical 18hr period during peak construction is expected to be up to 208 heavy vehicle movements (rigid vehicles, semi-trailers, truck and dog and shuttle buses) and 246 light commercial vehicle movements.

Due to the low traffic volume generated by the project over a typical day during the construction phase, road traffic noise calculation methods such as Calculation of Road Traffic Noise (CRTN - ISBN 0 11 550847 3) by Department of Transport (UK) 1988 or Traffic Noise Model (TNM) by the United States Department of Transport, Federal Highway Administration are not considered appropriate as they are primarily intended to calculate noise emissions from motorways and highways. Whilst each method has a low volume correction, the project traffic volume is out of the scope of these methods.

Therefore, road traffic noise has been modelled using iNoise modelling software using ISO 9613-1 and ISO 9613-2 calculation methods, representing the road traffic as “moving sources” along the transport route using the parameters presented in **Table 9**.

Table 9 Road Traffic Noise Modelling Parameters

Noise Source/Item	Lw dBA re 10^{-12} W	Movements/18hr	Speed, km/h	Source Height, m[1]
Heavy Vehicle	104	208	50	1.5
Light Vehicle	96	246	50	0.75

Note 1: Height above ground level.

6 Noise Assessment Results

6.1 Construction Noise Assessment

Noise levels were predicted to all identified receivers at 1.5m above ground level for typical construction activities for standard construction hours. **Table 10** summarises the predicted noise level range and maximum predicted noise level for each of the construction scenarios (trenching, piling and assembly) at identified receivers. Predicted noise levels are below the Noise Goal at all receivers. Predicted noise levels are presented as contours in **Appendix C**.

Table 10 Predicted Construction Noise Levels

Receiver	Description/Address	Predicted Noise Level Range dB $L_{Aeq(15min)}$[1]	Highest Predicted Noise Level dB $L_{Aeq(15min)}$	Noise Goal dB $L_{Aeq(15min)}$	Noise Goal Achieved
R01	259 Old Aerodrome Road	<20 - 34	34	50	✓
R02	229 Old Aerodrome Road	<20 - 31	31	50	✓
R03	160 Soldiers Settlement Road	27 - 38	38	50	✓
R04	160 Soldiers Settlement Road	<20 - 34	34	50	✓
R05	70 Musk Vale Road	36 - 48	48	50	✓
R06	Unknown Address	<20 - 20	20	50	✓
R07	599 Old Aerodrome Road	<20 - 26	26	50	✓
R08	549 Old Aerodrome Road	<20 - 27	27	50	✓
R09	489 Old Aerodrome Road	20 - 30	30	50	✓
R10	106 Soldiers Settlement Road	<20 - 26	26	50	✓
R11	90 Soldiers Settlement Road	<20 - 26	26	50	✓
R12	40 Soldiers Settlement Road	<20 - 24	24	50	✓
R13	6524 Bridport Road	<20	<20	50	✓
R14	6538 Bridport Road	<20	<20	50	✓
R15	6542 Bridport Road	<20	<20	50	✓
R16	6528 Bridport Road	<20	<20	50	✓
R17	6533 Bridport Road	<20	<20	50	✓
R18	10 Aitkins Road	<20	<20	50	✓
R19	9 Aitkins Road	<20	<20	50	✓
R20	11 Aitkins Road	<20	<20	50	✓
R21	Low Head	<20	<20	50	✓
R22	Bellbouy Beach	<20	<20	50	✓

Note 1: Noise levels from construction activities vary due to their position across the project site with respect to surrounding receivers.

Notwithstanding, noise control recommendations during construction are provided in **Section 7.1** for consideration.

6.2 Operational Noise Assessment

Noise levels were predicted at all identified receivers at 1.5m above ground level for a typical worst case daylight operational scenario are presented in **Table 11**. Noise levels are expected to satisfy the noise goals at all receivers. Predicted noise levels are presented as contours in **Appendix C**.

Table 11 Predicted Operational Noise Levels

Receiver	Description/Address	Predicted Noise Level dB LAeq(15min)	Noise Goal dB LAeq(15min) Day/Eve/Night[1]	Noise Goal Achieved
R01	259 Old Aerodrome Road	<30	40	✓
R02	229 Old Aerodrome Road	<30	40	✓
R03	160 Soldiers Settlement Road	<30	40	✓
R04	160 Soldiers Settlement Road	<30	40	✓
R05	70 Musk Vale Road	32	40	✓
R06	Unknown Address	<30	40	✓
R07	599 Old Aerodrome Road	<30	40	✓
R08	549 Old Aerodrome Road	<30	40	✓
R09	489 Old Aerodrome Road	<30	40	✓
R10	106 Soldiers Settlement Road	<30	40	✓
R11	90 Soldiers Settlement Road	<30	40	✓
R12	40 Soldiers Settlement Road	<30	40	✓
R13	6524 Bridport Road	<30	40	✓
R14	6538 Bridport Road	<30	40	✓
R15	6542 Bridport Road	<30	40	✓
R16	6528 Bridport Road	<30	40	✓
R17	6533 Bridport Road	<30	40	✓
R18	10 Aitkins Road	<30	40	✓
R19	9 Aitkins Road	<30	40	✓
R20	11 Aitkins Road	<30	40	✓
R21	Low Head	<30	40	✓
R22	Bellbouy Beach	<30	40	✓

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

6.3 Road Traffic Noise Assessment

For this assessment, noise levels have been calculated at an offset of 15m along the transport route including North Road, Musk Vale Road, Bridport Road and East Tamar Highway to represent a worst-case conservative scenario. Residential receivers on Soldiers Settlement Road have considerable offsets and are typically 50m or more from the road. Predicted noise levels from project related construction traffic has been calculated using the methodology and the most conservative parameters presented in **Section 5.3**. It is expected that if the predicted noise level associated with peak construction traffic volumes (**Table 9**) is below the criteria at the closest offset distances, then smaller volumes of traffic at larger offsets will also be below the assessment criteria.

The results presented in **Table 12** show the calculated and $LA_{eq(18hr)}$ noise levels to align with the road traffic noise assessment period.

Table 12 Predicted Construction Road Traffic Noise Levels

Road Name	Offset Distance to Receiver	Predicted Noise Level	Traffic Noise Criteria	Compliance Achieved
Musk Vale Road North Road Bridport Road East Tamar Highway	15m	50dB LAeq(18hr)	68dB LAeq(18hr)	✓
Soldiers Settlement Road	50m	42dB LAeq(18hr)	68dB LAeq(18hr)	✓

Results demonstrate that project construction traffic noise levels would comply with the relevant traffic noise criteria.

This page has been intentionally left blank

7 Recommendations

7.1 Construction Noise Recommendations

It is noted that construction noise emissions are anticipated to be below the relevant noise goals at all receivers. Nonetheless, the following noise mitigation measures should be considered during the construction phase to reduce emissions to the surrounding community and be considered for inclusion in the project construction management plan:

- to minimise road traffic noise:
  - schedule heavy vehicle deliveries to avoid bunching of vehicles which may cause short term elevated noise levels;
  - where feasible use minibuses or similar to transport construction personnel to and from the site to avoid excessive noise from light vehicle movements.
- operating plant in a conservative manner (no over-revving), shutdown when not in use, and be parked/started at farthest point from relevant assessment locations;
- selection of the quietest suitable machinery available for each activity;
- minimise noisy plant/machinery working simultaneously where practicable;
- minimise impact noise wherever possible;
- utilise a broadband reverse alarm in lieu of the traditional high frequency type reverse alarm;
- provide toolbox meetings, training and education to drivers and contractors visiting the site during construction so they are aware of the location of noise sensitive receivers and to be cognisant of any noise generating activities;
- signage is to be placed at the front entrance advising truck drivers of their requirement to minimise noise both on and off-site; and
- utilise project related community consultation forums to notify residences within proximity of the site with project progress, proposed/upcoming potentially noise generating works, its duration and nature and complaint procedure.

The reduction achieved from the mitigation measures will depend on the specific measures implemented.

This page has been intentionally left blank

8 Discussion and Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Assessment for a proposed Cimitiere Plains Solar Farm 5km northeast of George Town, TAS

The results of the Noise Assessment demonstrate that construction noise is expected to be at levels below the construction noise goals at all receivers. Recommendations have been provided to minimise any potential noise impacts from construction, albeit of a temporary nature during the daytime over a 12-to-18-month construction period.

The results of the Noise Assessment demonstrate that emissions from the project would satisfy the operational noise goals at all identified receivers for a typical worst case daylight operational scenario.

Road noise emissions associated with the project are anticipated to satisfy the relevant traffic noise criteria at all receivers along the proposed transportation route.

Based on the Noise Assessment results, the project satisfies the criteria adopted for operational and construction noise.

This page has been intentionally left blank

Appendix A – Glossary of Terms

A number of technical terms have been used in this report and are explained in **Table A1**.

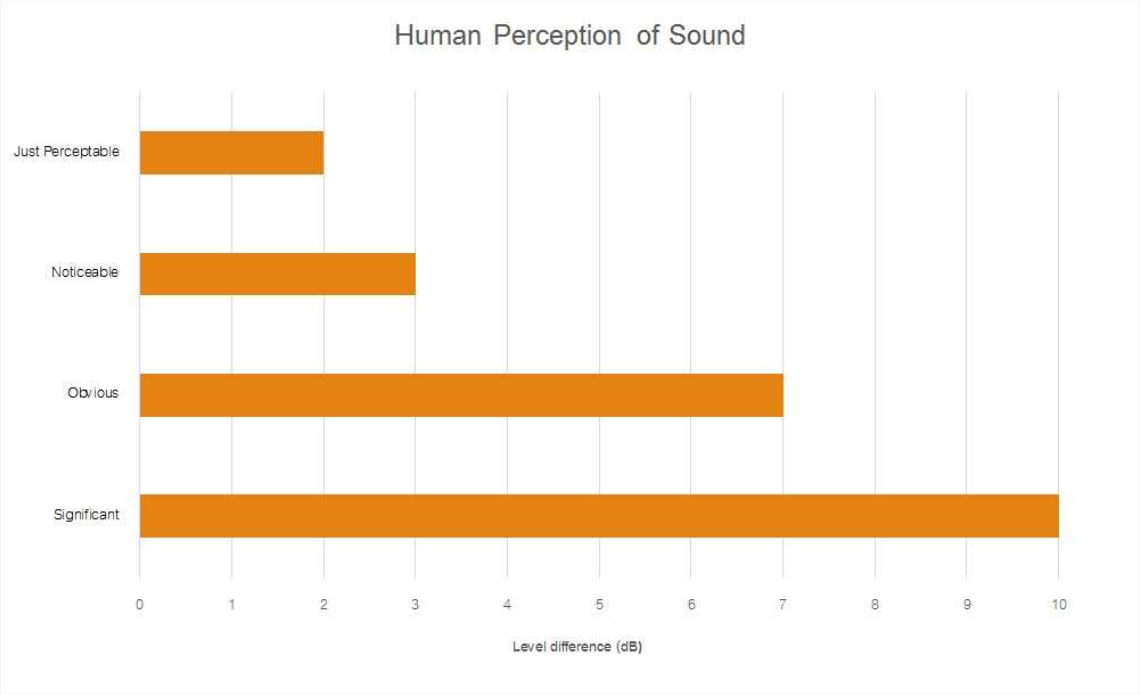
Table A1 Glossary of Acoustical Terms

Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L90 statistical noise levels.
Ambient Noise	The total noise associated with a given environment. Typically, a composite of sounds from all sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to sound.
Background Noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is usually represented by the LA90 descriptor
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z), dB(L)	Decibels Z-weighted or decibels Linear (unweighted).
Extraneous Noise	Sound resulting from activities that are not typical of the area.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A sound level which is exceeded 10% of the time.
LA90	Commonly referred to as the background noise, this is the level exceeded 90% of the time.
LAeq	Represents the average noise energy or equivalent sound pressure level over a given period.
LAmax	The maximum sound pressure level received at the microphone during a measuring interval.
Masking	The phenomenon of one sound interfering with the perception of another sound. For example, the interference of traffic noise with use of a public telephone on a busy street.
RBL	The Rating Background Level (RBL) as defined in the NPI, is an overall single figure representing the background level for each assessment period over the whole monitoring period. The RBL, as defined is the median of ABL values over the whole monitoring period.
Sound power level (Lw or SWL)	This is a measure of the total power radiated by a source in the form of sound and is given by 10.log10 (W/Wo). Where W is the sound power in watts to the reference level of 10^{-12} watts.
Sound pressure level (Lp or SPL)	the level of sound pressure; as measured at a distance by a standard sound level meter. This differs from Lw in that it is the sound level at a receiver position as opposed to the sound 'intensity' of the source.

Table A2 provides a list of common noise sources and their typical sound level.

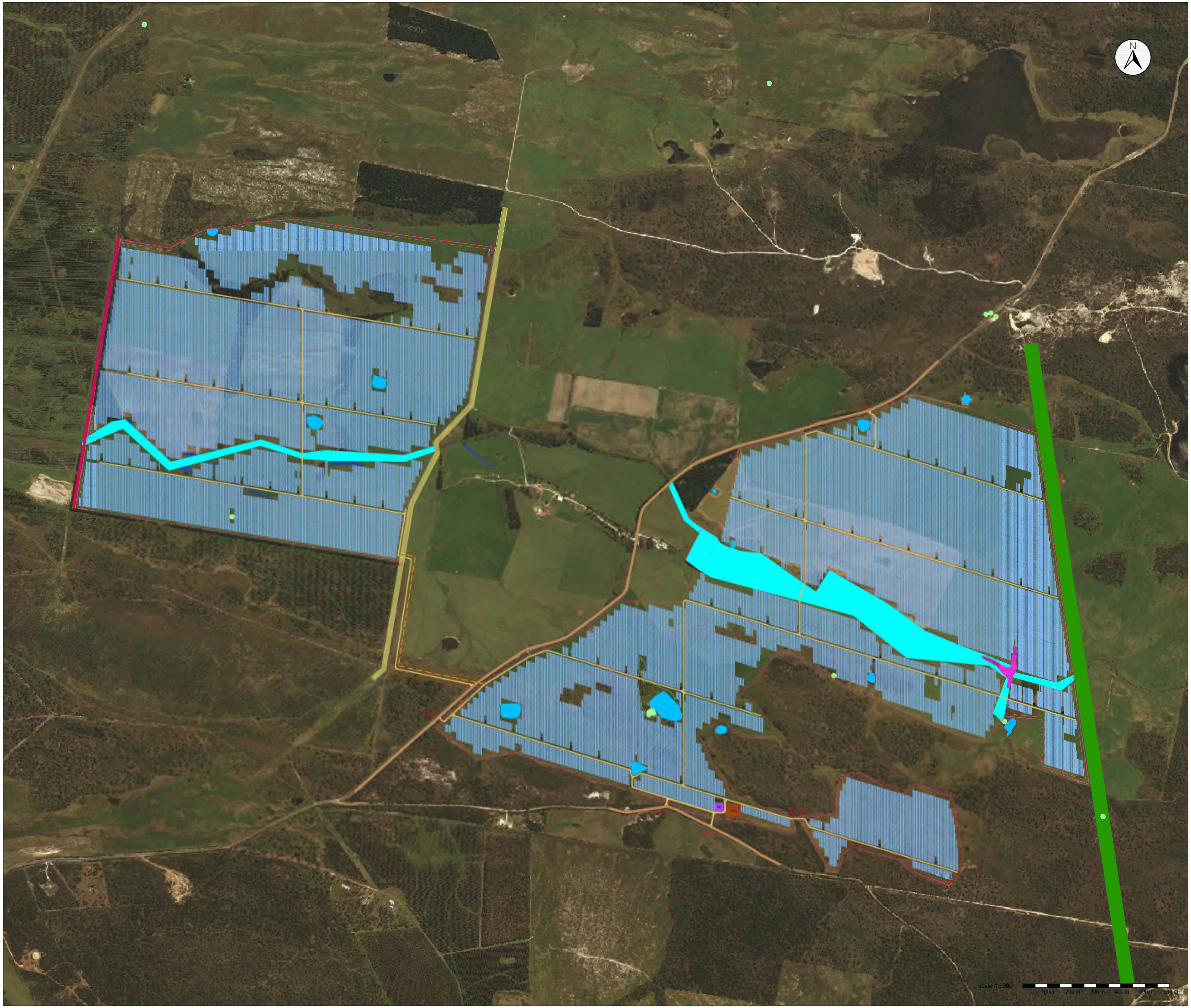
Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA	
Source	Typical Sound Pressure Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



This page has been intentionally left blank

Appendix B – Project Layout



Geographical Coordinates

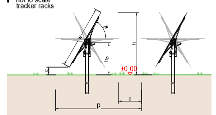
Country:	Australia
Address:	Tasmania George Town
Latitude:	-41.067526
Longitude:	148.872389
Altitude:	16 ... 49 m

Areas

	Fenced Area	Fence Length
Field 1	1.829.046 m²	5.398 m
Field 2	2.339.367 m²	9.394 m
Field 2	186.088 m²	2.050 m
Total	**4.354.501 m²**	**16.843 m**

1 Typical Substructure

not to scale
tracker racks



Orientation	Portrait
Module dimensions [mm]	2300 x 1150
Plane Tilt β [°]	+/- 50
Azimuth [°]	0
Clearance c [m]	min. 0.50
Height h [m]	max. 2.50
Pitch p [m]	min. 4.60
Aisle width a [m]	min. 2.30
Width w [m]	min. 2.30
Post height h_P [m]	min. 1.40
No. of panels	612820

Legend

- Fence - min. 3m distance to Development Site
- PV Area - min. 10m distance to fence
- Development Site
- Maintenance Road
- Central Inverter Transformer Station
- Gate
- Spare Parts Container 40 ft
- O&M Building Container 20ft
- Underground Powerline
- Overhead PowerLine
- Substation Area
- Control Building
- Creek
- Flood Zone
- Native Vegetation
- Threatened Communities
- Gas Pipeline Easement
- 10m Lanscaping
- Basslink Easement
- Aboriginal Site

Before undertaking any civil works, the location of overhead-lines, burried cables, gas and water pipes are to be checked on site and also the corresponding owners of the utilities are to be contacted

Document-no.: AUS.2514.DEV.M2.001.0.E

Revi.	Date	Desi.	Chec.	Appr.	Revision Description
E	13 Oct 22	MCA	MMA		New land and removed areas. Substation location changed. Constraint update
D	13 Jun 22	DTH			New land and removed areas. Substation location changed. Field 2 creek crossing location changed
C	19 May 22	DTH			Updated drawing frame. New land and constraints. Substation location changed
B	11 Sep 20	JMO			Redesign for higher module power class. New site constraints included.
A	25 Aug 20	JMO			Redesigned for new grid conection capacity.
0	14 Sep 18	PUD	MAB		Original drawing

Client:

Please note that all drawing contents have to be checked on the contractor's own responsibility prior to construction start. Discrepancies have to be communicated to the contractual partner or to the responsible technical planners. Drawing numbers and index have to be observed. With release of new drawing, previous drawings lose their validity and will not be withdrawn.

Project Management / Engineering Design:
ib vogt GmbH
Helmholtzstr. 2-9
10587 Berlin
Tel. +49 30 397440-0
www.ib-vogt.com

Engineering Design:
ib vogt GmbH
Helmholtzstr. 2-9
10587 Berlin
Tel. +49 30 397440-0
www.ib-vogt.com

Supplier:

Version:	Metric	European Proj.
	Name	Date
Designed	Udayakumar	14 Sep 2018
Checked	Abst	14 Sep 2018
Approved		

Project: *George Town Solar Farm*

Planning Phase: Preliminary Design

Size:	A0_1189x841	Drawing Scale:	1:5000
Page:	001 / 001	Status:	13 Oct 2022

Title: Module Array Layout

Document-No.: AUS. 2514. DEV. M2. 001. 0. E

Appendix C – Noise Contours

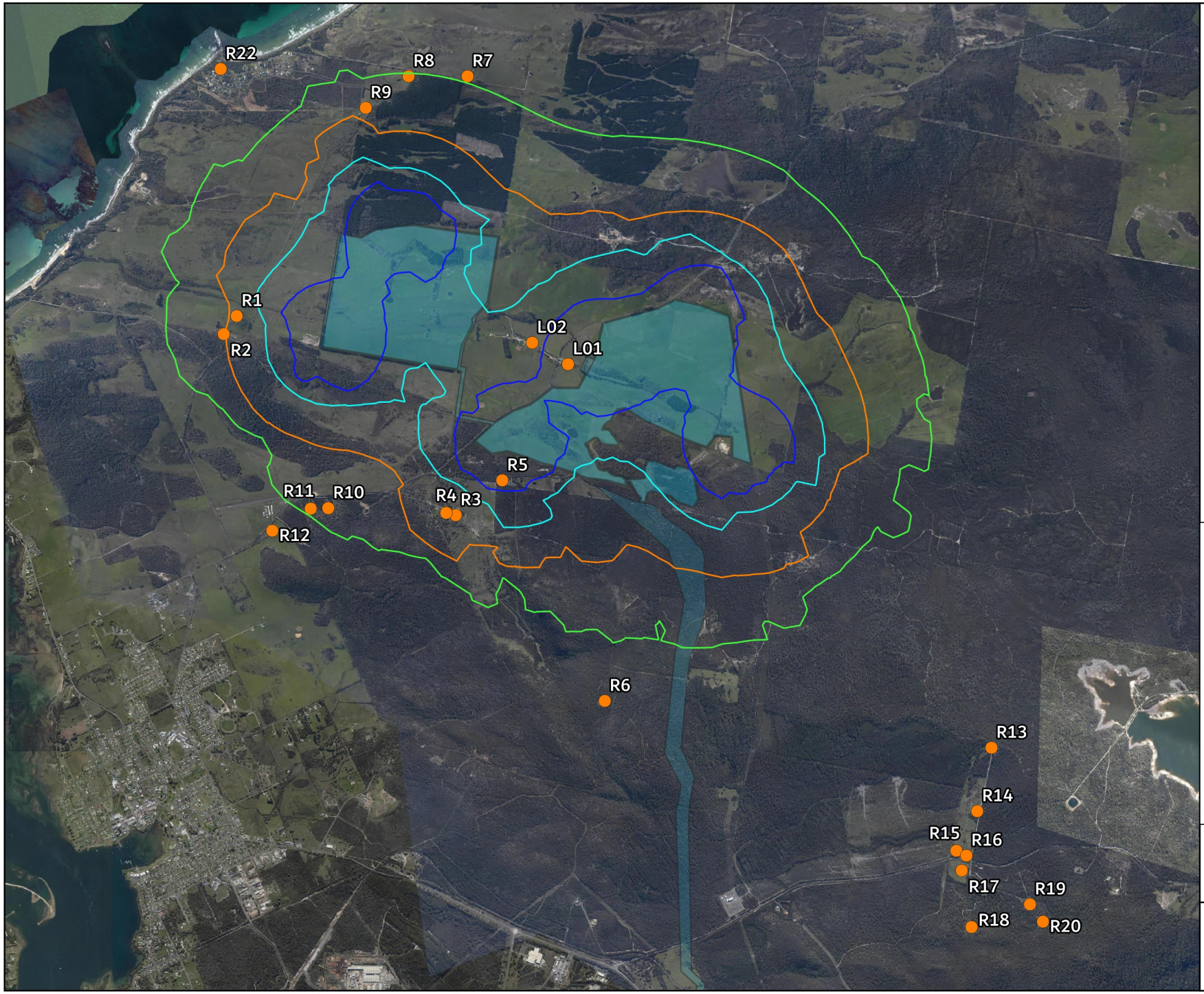


FIGURE C1

Construction Noise Contours

Maximum Impact from Piling Activities

MAC221655-01

Cimitiere Plains Solar Farm

George Town, TAS

KEY

Project Boundaries

Receiver

Noise Level, dBA

30

35

40

45

0 500 1,000 1,500 m

N

MAC
Muller Acoustic Consulting

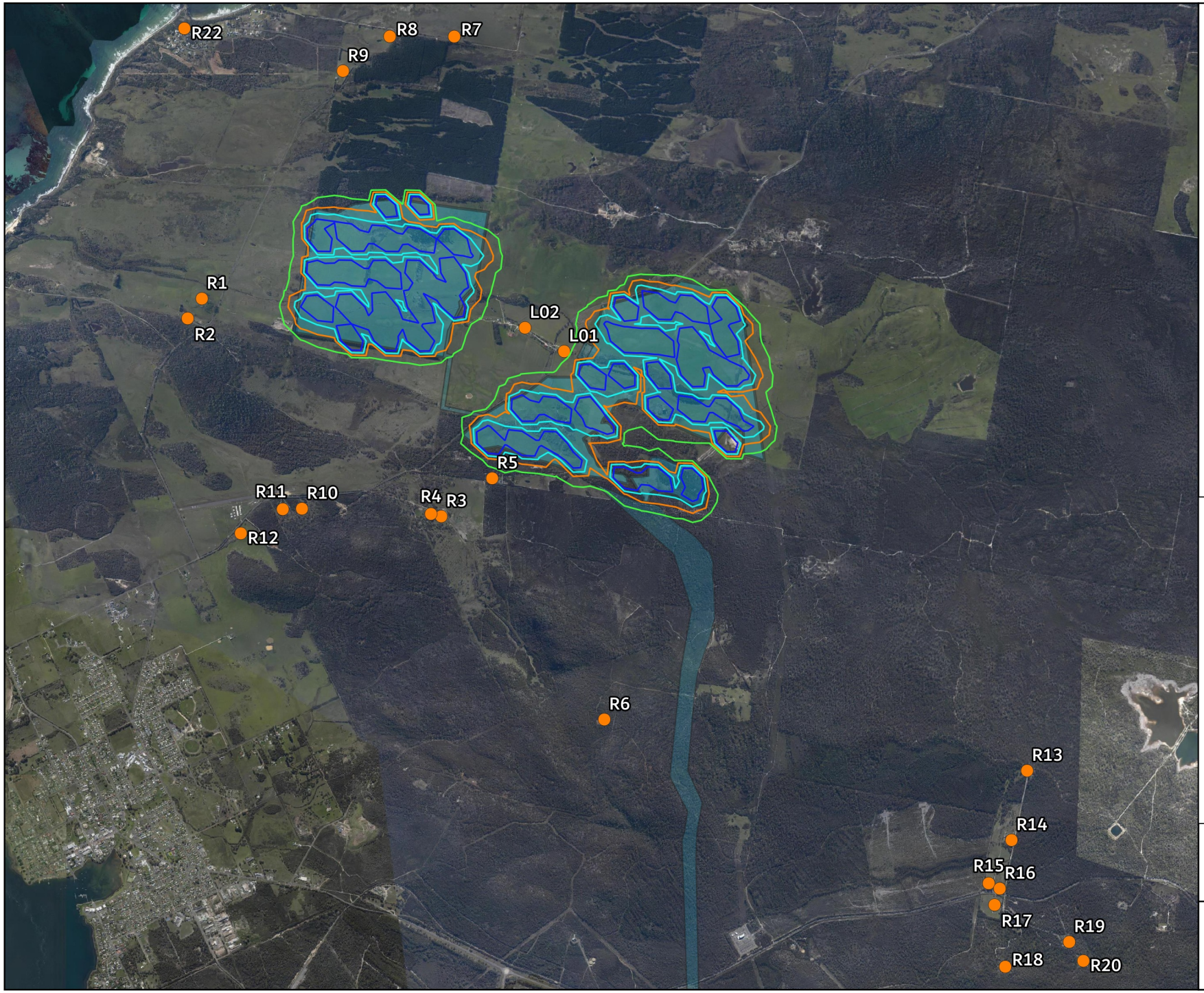


FIGURE C2

Operational Noise Contours

MAC221655-01

Cimitiere Plains Solar Farm

George Town, TAS

KEY

Project Boundaries

Receiver

Noise Level, dBA

30

35

40

45

0 500 1,000 1,500 m

N

MAC
Muller Acoustic Consulting

Muller Acoustic Consulting Pty Ltd
PO Box 678, Kotara NSW 2289
ABN: 36 602 225 132
Ph: +61 2 4920 1833
www.mulleracoustic.com

MAC
Muller Acoustic Consulting