

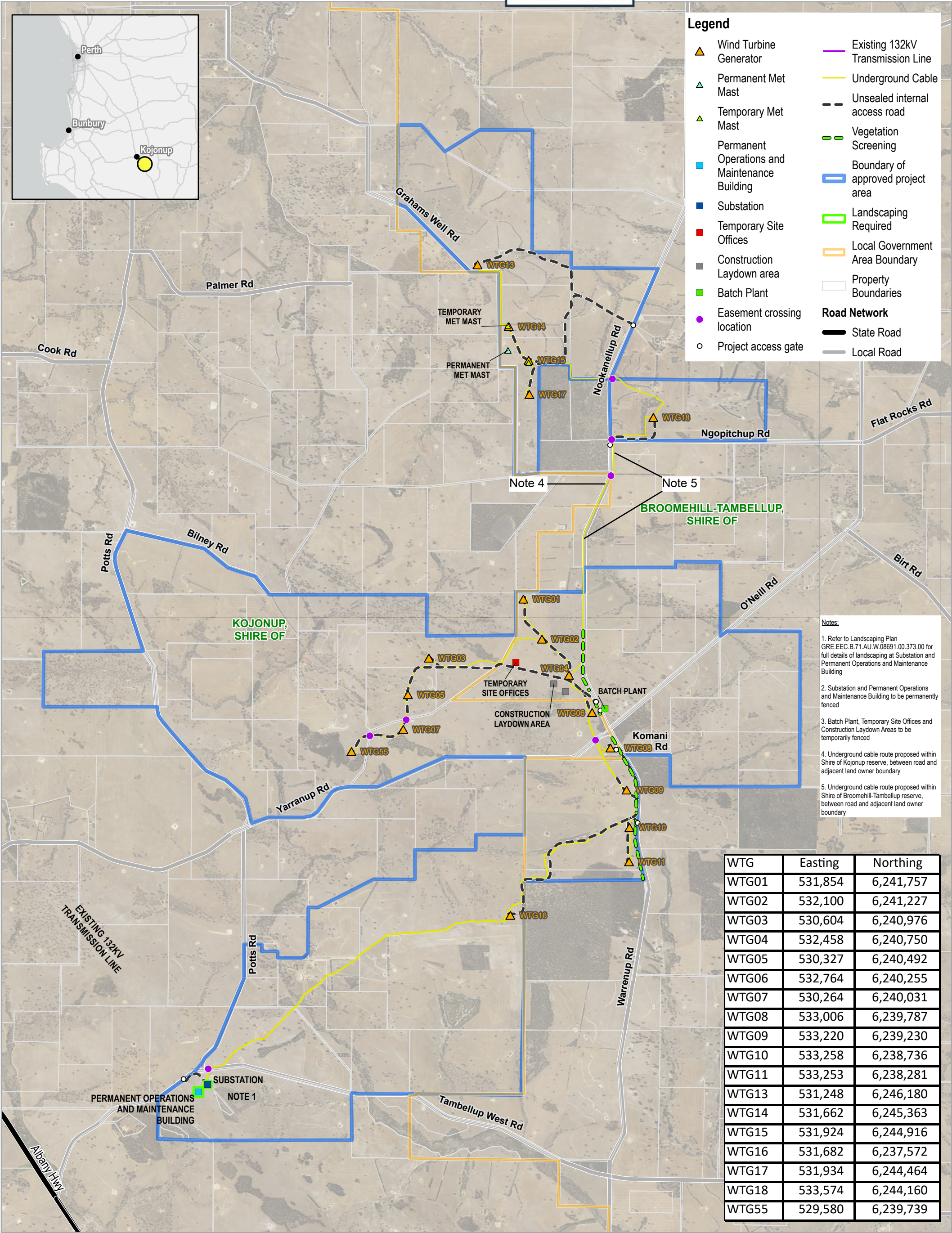
# Appendix C

## Proposed Development Plans and Management Plans

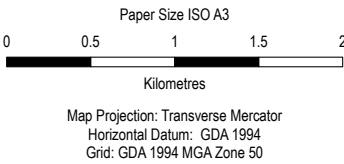
|   |  |
|---|--|
| Bushfire Management Plan                | Envision Bushfire Protection (Sept 2022) |
| Noise Impact Mitigation Management Plan | Marshall Day Acoustics (Nov 2022)        |
| Construction Management Plan            | GHD (July 2022)                          |
| Landscape Management Plan               | Moir Landscape Architects (August 2022)  |
| Traffic Management Plan                 | August 2022                              |

# Development Plans





| REVISIONS | REV | BY | DATE       | DESCRIPTION      | CKD | APP |
|-----------|-----|----|------------|------------------|-----|-----|
|           | 0   | AK | 27.06.2022 | ISSUED FOR USE   | MM  | RS  |
|           | 1   | AK | 07.07.2022 | REISSUED FOR USE | MM  | RS  |
|           | 2   | AK | 14.07.2022 | REISSUED FOR USE | MM  | RS  |
|           | 3   | AK | 01.09.2022 | REISSUED FOR USE | MM  | RS  |
|           | 4   | BM | 13.09.2022 | REISSUED FOR USE | MM  | RS  |
|           | 5   | BM | 04.11.2022 | REISSUED FOR USE | MM  | RS  |
|           | 6   | BM | 15.12.2022 | REISSUED FOR USE | MM  | RS  |



ENEL

Flat Rocks Wind Farm Stage One

12574907-00000-MD-LAD-001

Development Layout Plan

Project No. 12574907

Revision No. 6

Date 1/24/2023



Notes

1. Refer to Landscaping Plan  
GRE.EEC.B.71.AU.W.08691.00.373.00  
for full details of Project landscaping  
details.  
Landscaping of NSH19 pending approval  
of landowner

Legend

● Dwelling

▲ Wind Turbine Generator

▲ Permanent Met Mast

▲ Temporary Met Mast

▲ Wind Turbine Generator V1

Permanent Operations and Maintenance Building

■ Substation

■ Temporary Site Offices

■ Construction Laydown area

■ Batch Plant

○ Project access gate

Existing 132kV Transmission Line

Unsealed internal access road

Vegetation Screening

Wind Turbine Generator - 1000m Radius

Landscaping Required

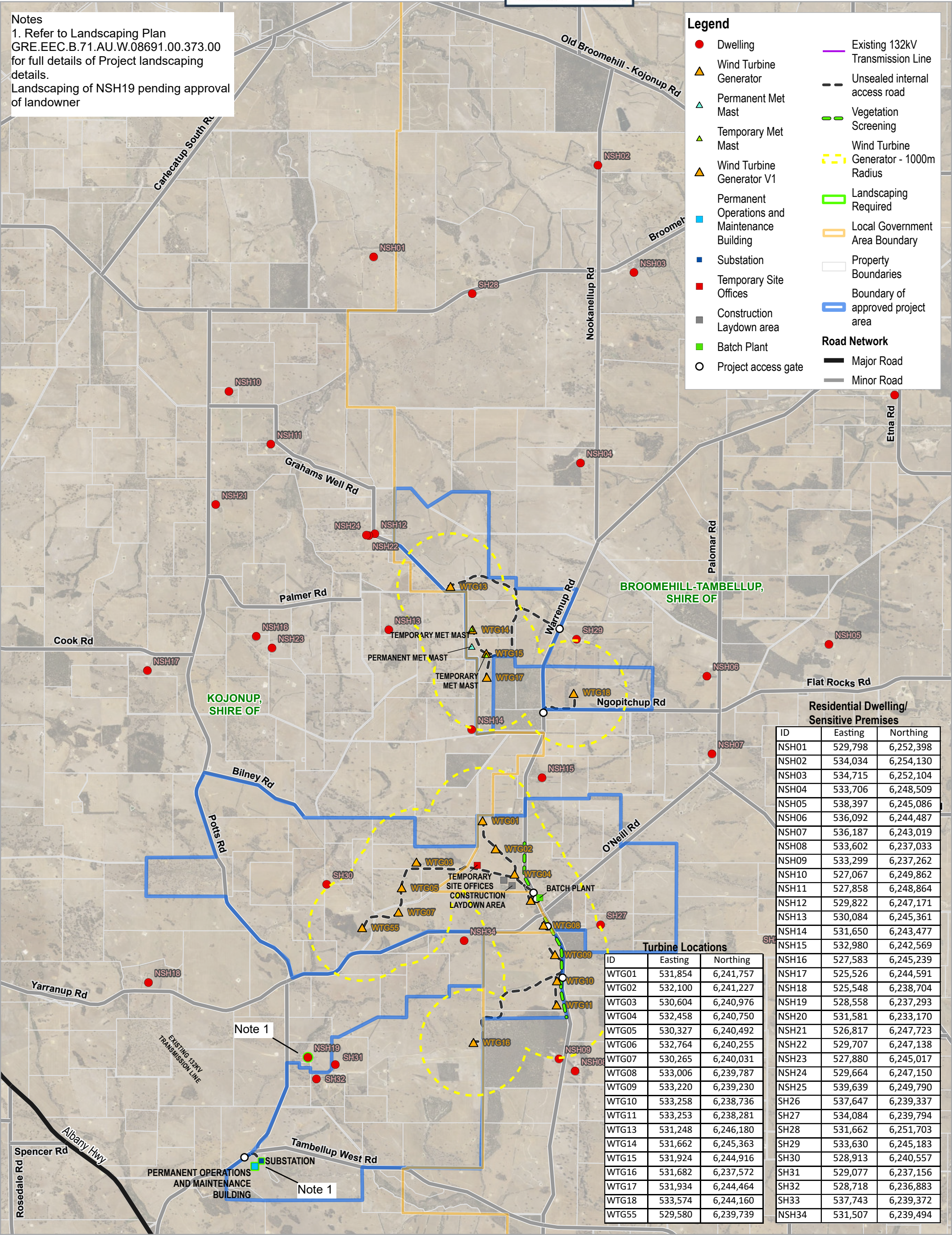
Local Government Area Boundary

Property Boundaries

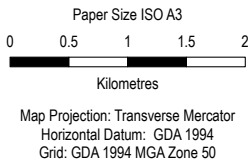
Boundary of approved project area

Major Road

Minor Road



|           |    |      |             |                  |     |     |
|-----------|----|------|-------------|------------------|-----|-----|
| REVISIONS | A  | AK   | 07.07.2022  | ISSUED FOR USE   | MM  | RS  |
|           | B  | AK   | 13.07.2022  | REISSUED FOR USE | MM  | RS  |
|           | C  | BM   | 13.09.2022  | REISSUED FOR USE | MM  | RS  |
|           | D  | BM   | 04.11.2022  | REISSUED FOR USE | MM  | RS  |
|           | E  | BM   | 15.12.2022  | REISSUED FOR USE | MM  | RS  |
| REV       | BY | DATE | DESCRIPTION |                  | CKD | APP |

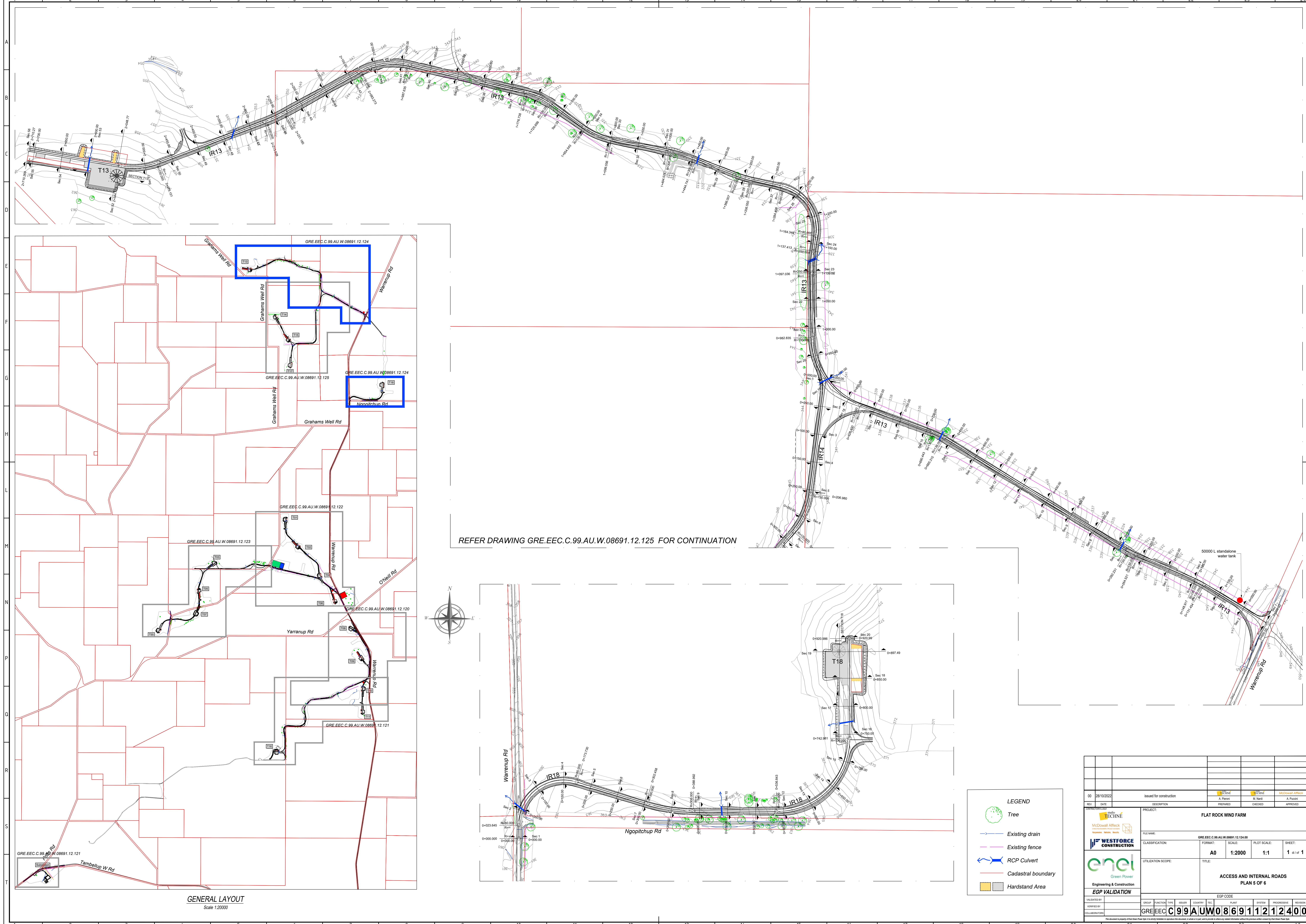


ENEL  
Flat Rocks Wind Farm Stage One

12574907-00000-MD-LAD-002  
Development Layout Plan –  
Dwelling Locations

Project No. 12574907  
Revision No. E  
Date 15/12/2022



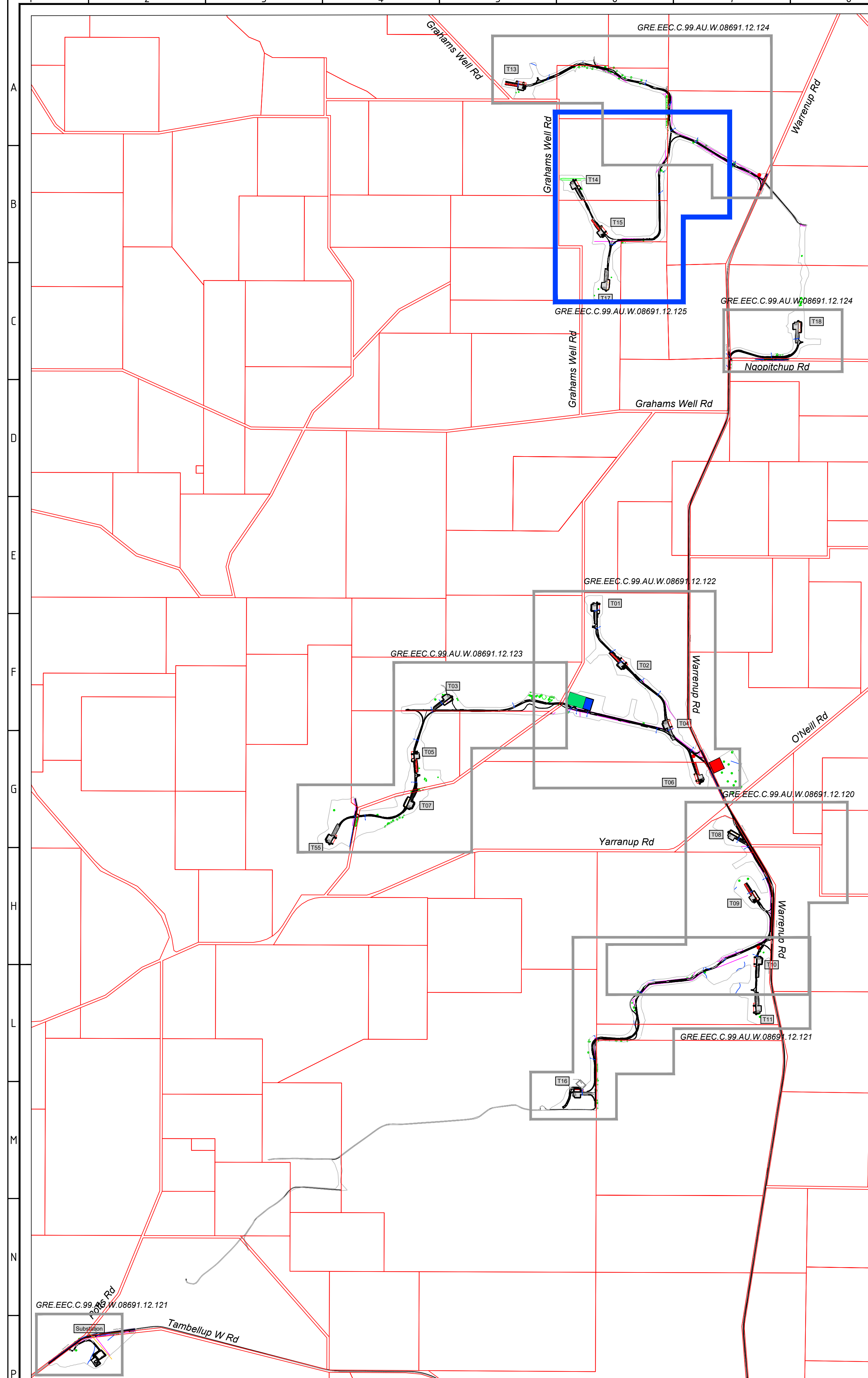


REFER DRAWING GRE.EEC.C.99.AU.W.08691.12.125 FOR CONTINUATION

GENERAL LAYOUT  
Scale 1:20000

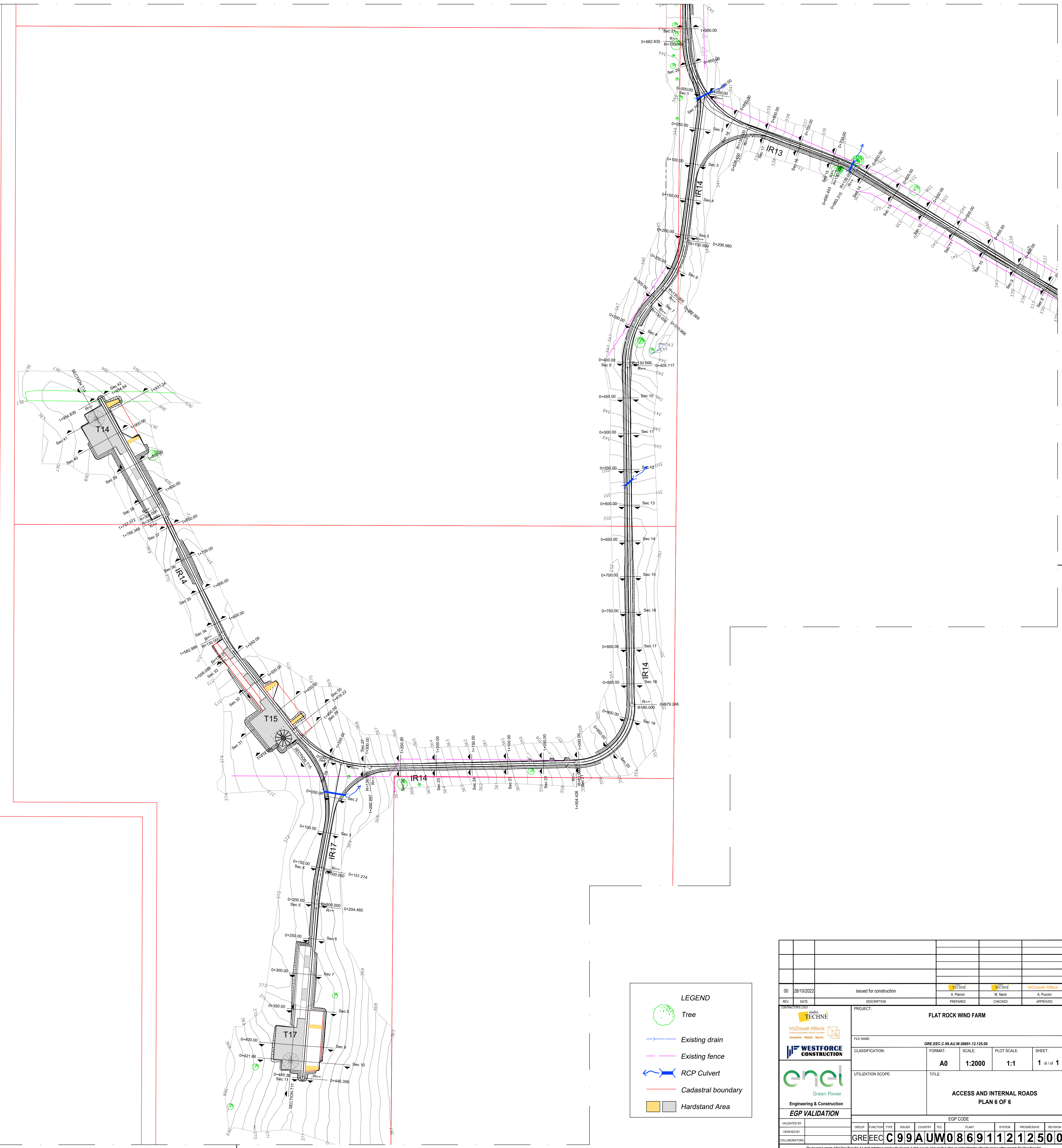
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|--------------------|--------|--|----------|------------------|----------|------------------|---------|
| 00 28/10/2022      |        | Issued for construction                  |          | McDONALD AFFLECK |          | McDONALD AFFLECK |         |
| REV                | DATE   | DESCRIPTION                              | PREPARED | CHECKED          | APPROVED |                  |         |
| PROJECT:           |        | FLAT ROCK WIND FARM                      |          |                  |          |                  |         |
| FILE NAME:         |        | GRE.EEC.C.99.AU.W.08691.12.124.00        |          |                  |          |                  |         |
| CLASSIFICATION:    |        | FORMAT:                                  | SCALE:   | PLOT SCALE:      | SHEET:   |                  |         |
|                    |        | A0                                       | 1:2000   | 1:1              | 1 of 1   |                  |         |
| UTILIZATION SCOPE: |        | TITLE:                                   |          |                  |          |                  |         |
|                    |        | ACCESS AND INTERNAL ROADS<br>PLAN 5 OF 6 |          |                  |          |                  |         |
| EGP VALIDATION     |        | EGP CODE                                 |          |                  |          |                  |         |
| VALIDATED BY:      | GROUP: | FUNCTION:                                | TYPE:    | ISSUED:          | COUNTRY: | PLANT:           | SYSTEM: |
| VERIFIED BY:       | GROUP: | FUNCTION:                                | TYPE:    | ISSUED:          | COUNTRY: | PLANT:           | SYSTEM: |
| COLLABORATORS:     |        | GRE.EEC.C.99.AU.W.08691.12.124.00        |          |                  |          |                  |         |





GENERAL LAYOUT  
Scale 1:20000

REFER DRAWING GRE.EEC.C.99.AU.W.08691.12.124 FOR CONTINUATION



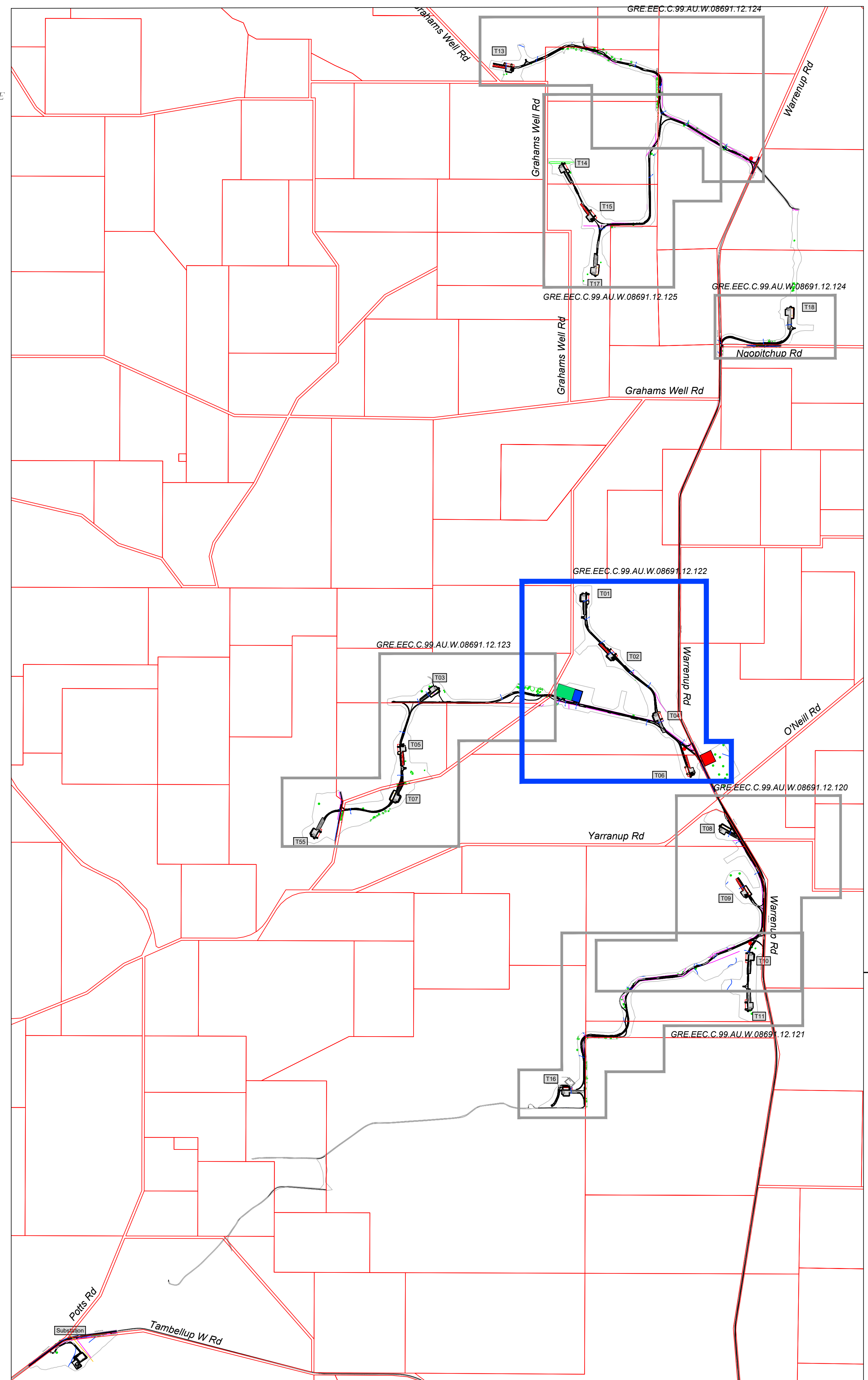
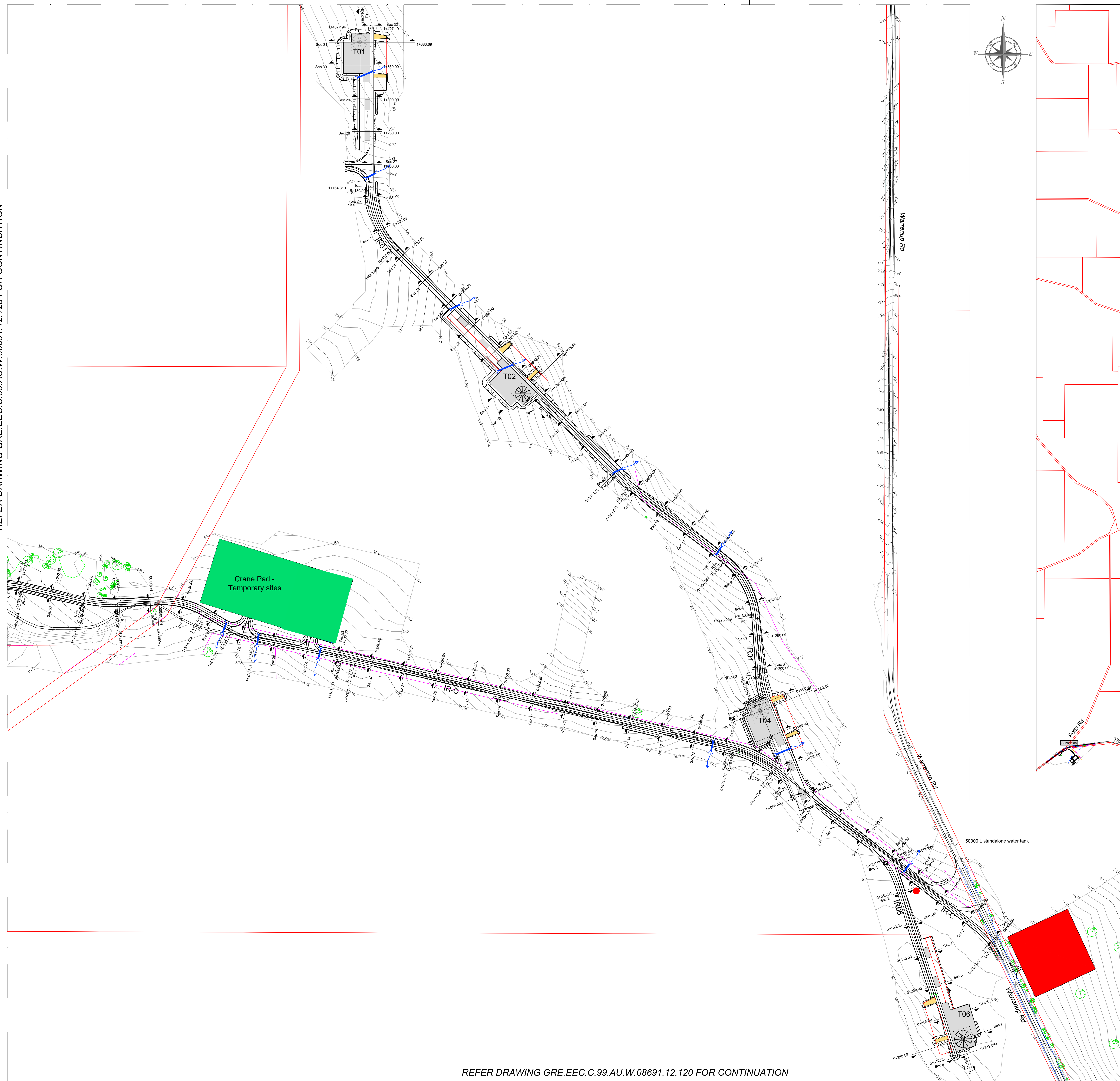
**LEGEND**

- Tree
- Existing drain
- Existing fence
- RCP Culvert
- Cadastral boundary
- Hardstand Area

|                                  |                                   |                         |  |                  |                  |
|----------------------------------|-----------------------------------|-------------------------|--|------------------|------------------|
| 00                               | 28/10/2022                        | Issued for construction | McDONALD AFFLECK                             | McDONALD AFFLECK | McDONALD AFFLECK |
| REV                              | DATE                              | DESCRIPTION             | PREPARED                                     | CHECKED          | APPROVED         |
| PROJECT: FLAT ROCK WIND FARM     |                                   |                         | FILE NAME: GRE.EEC.C.99.AU.W.08691.12.125.00 |                  |                  |
| CLASSIFICATION:                  |                                   |                         | FORMAT: A0                                   | SCALE: 1:2000    | PLOT SCALE: 1:1  |
| UTILIZATION SCOPE:               |                                   |                         | SHEET: 1 of 1                                |                  |                  |
| TITLE: ACCESS AND INTERNAL ROADS |                                   |                         | PLAN 6 OF 6                                  |                  |                  |
| EGP VALIDATION                   |                                   |                         | EGP CODE                                     |                  |                  |
| VALIDATED BY                     | GROUP                             | FUNCTION                | TYPE   | ISSUER           | COUNTRY          |
| VERIFIED BY                      | GROUP                             | FUNCTION                | TYPE   | ISSUER           | COUNTRY          |
| COLLABORATOR(S)                  | GRE.EEC.C.99.AU.W.08691.12.125.00 |                         |  |                  |                  |









REFER DRAWING GRE.EEC.C.99.AU.W.08691.12.123 FOR CONTINUATION



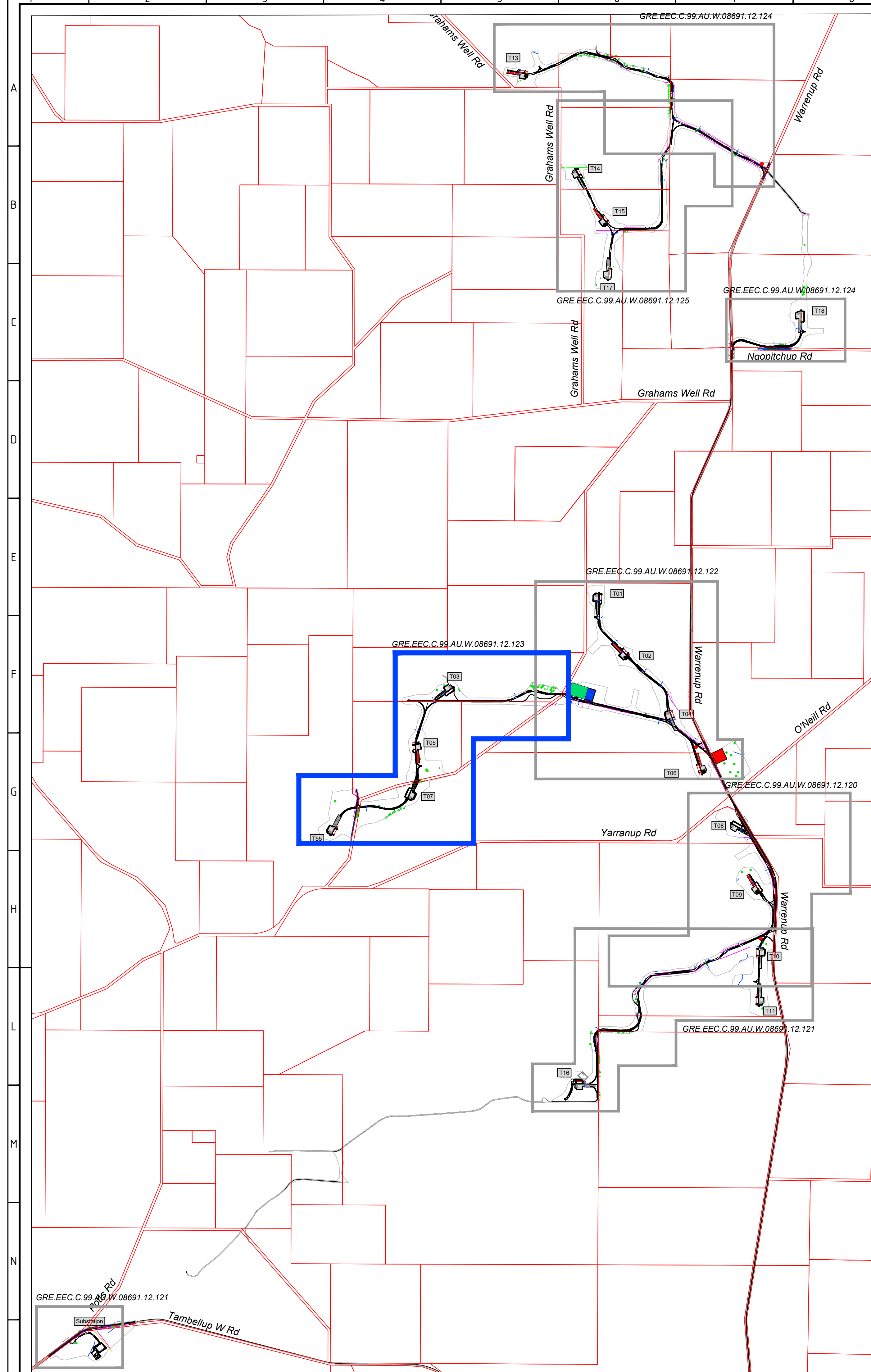
GENERAL LAYOUT  
Scale 1:20000

**LEGEND**

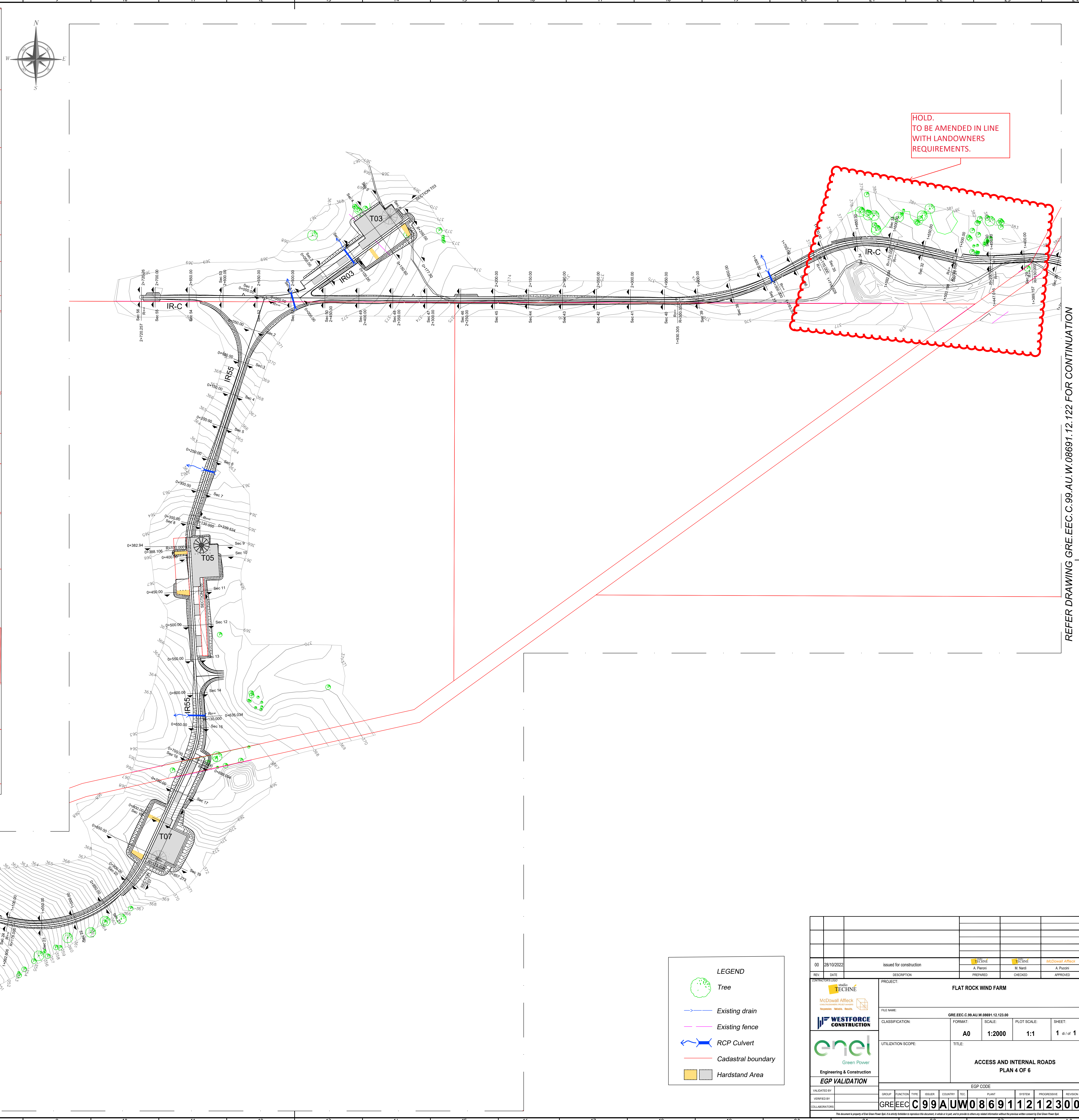
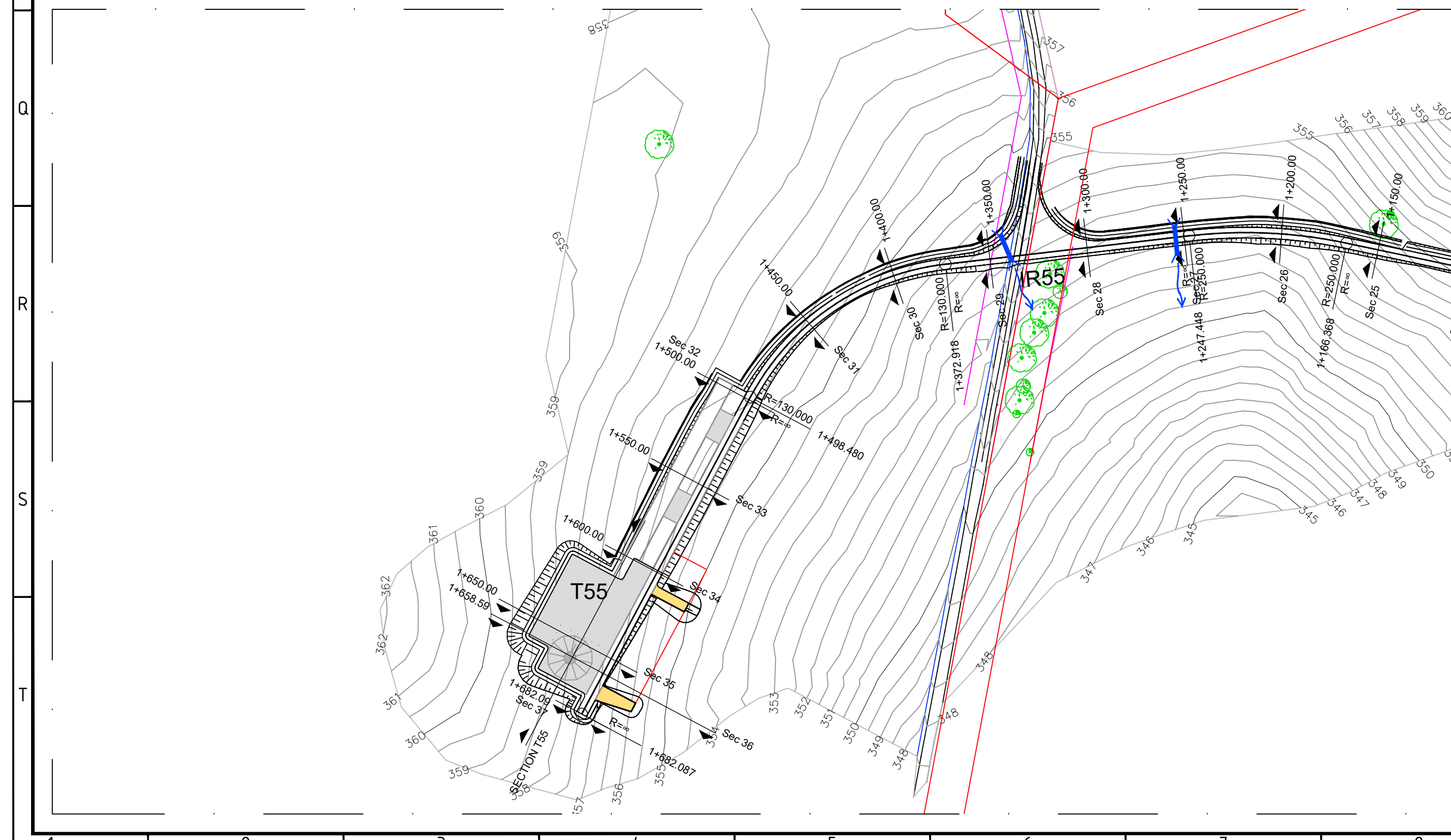
-  Tree
-  Existing drain
-  Existing fence
-  RCP Culvert
-  Cadastral boundary
-  Hardstand Area

[illegible]





GENERAL LAYOUT  
Scale 1:20000



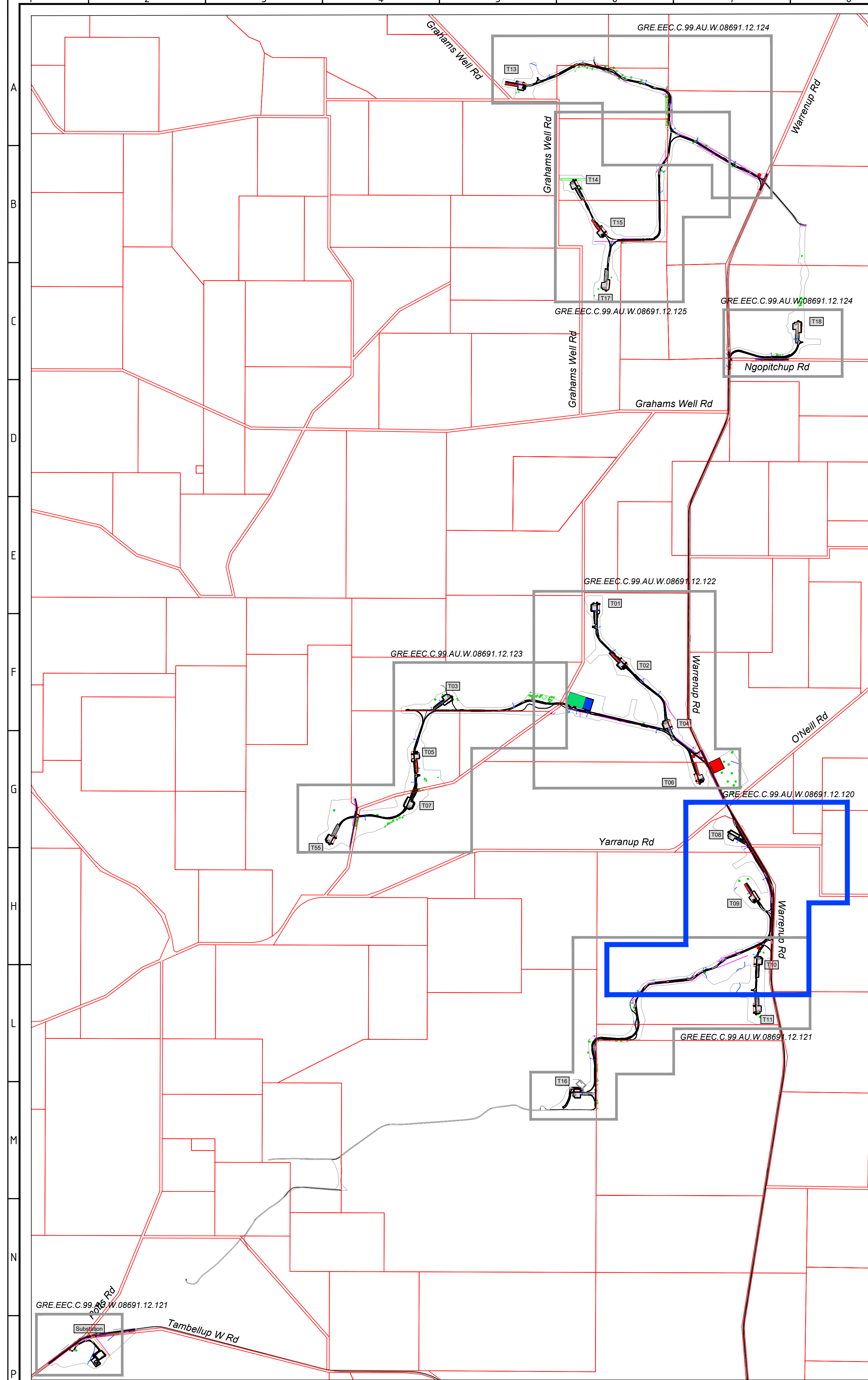
HOLD.  
TO BE AMENDED IN LINE  
WITH LANDOWNERS  
REQUIREMENTS.

**LEGEND**

- Tree
- Existing drain
- Existing fence
- RCP Culvert
- Cadastral boundary
- Hardstand Area

|  |                                   |                         |  |                   |                   |
|--|-----------------------------------|-------------------------|--|-------------------|-------------------|
| 00   | 28/10/2022                        | Issued for construction | McDonnell Affleck                            | McDonnell Affleck | McDonnell Affleck |
| REV  | DATE                              | DESCRIPTION             | PREPARED                                     | CHECKED           | APPROVED          |
| PROJECT: FLAT ROCK WIND FARM                 |                                   |                         | FILE NAME: GRE EEC C.99 AU W.08691.12.123.00 |                   |                   |
| CLASSIFICATION: A0                           |                                   |                         | SCALE: 1:2000                                | PLOT SCALE: 1:1   | SHEET: 1 of 1     |
| UTILIZATION SCOPE: ACCESS AND INTERNAL ROADS |                                   |                         | TITLE: PLAN 4 OF 6                           |                   |                   |
| EGP VALIDATION                               |                                   |                         |  |                   |                   |
| VALIDATED BY:                                | GROUP:                            | FUNCTION:               | TYPE:  | ISSUED:           | COUNTRY:          |
| VERIFIED BY:                                 | GROUP:                            | FUNCTION:               | TYPE:  | ISSUED:           | COUNTRY:          |
| COLLABORATOR(S):                             | GRE EEC C.99 AU W.08691.12.123.00 |                         |  |                   |                   |





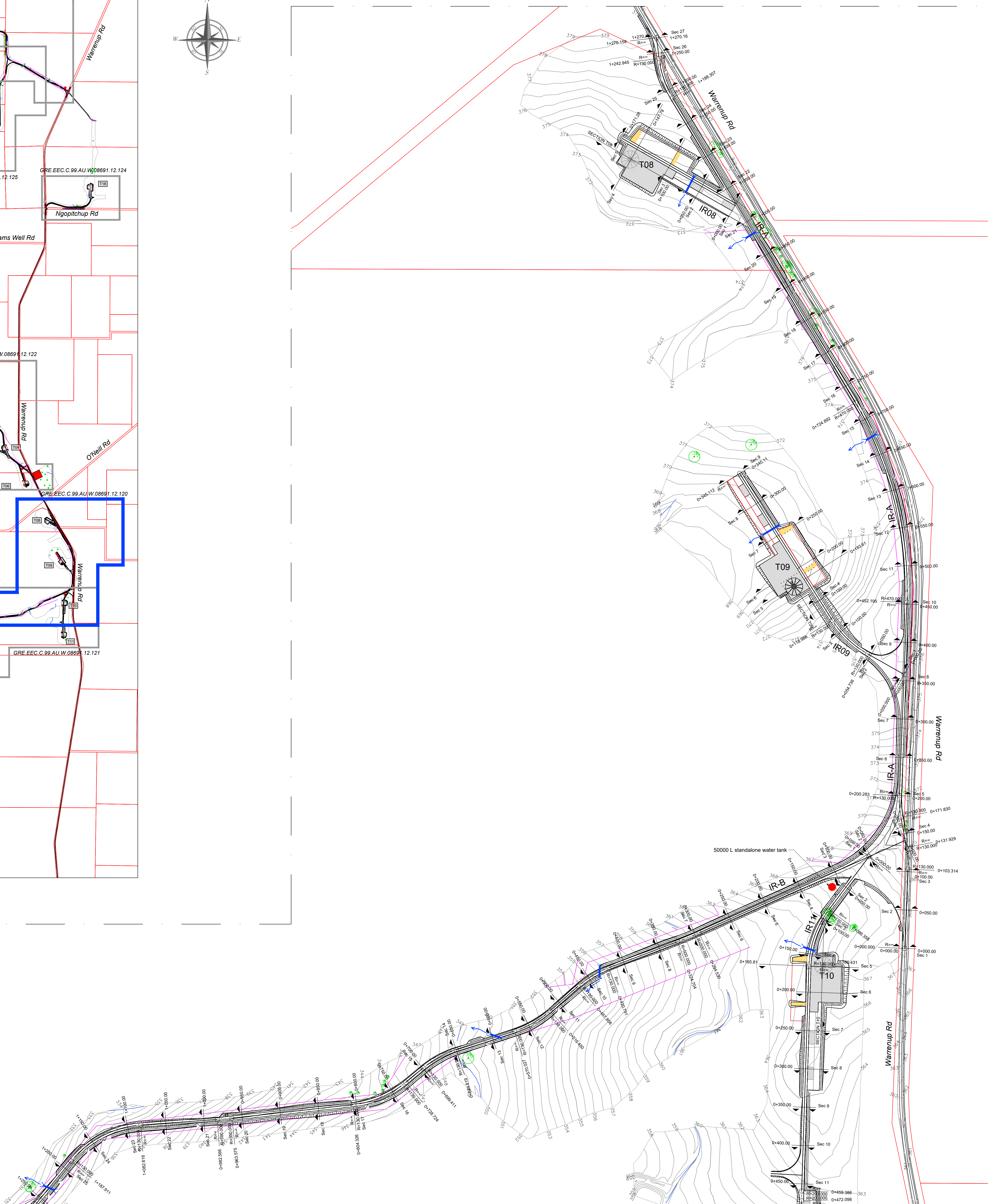
GENERAL LAYOUT  
Scale 1:20000

**LEGEND**

- Tree
- Existing drain
- Existing fence
- RCP Culvert
- Cadastral boundary
- Hardstand Area

REFER DRAWING GRE.EEC.C.99.AU.W.08691.12.121 FOR CONTINUATION

REFER DRAWING GRE.EEC.C.99.AU.W.08691.12.122 FOR CONTINUATION



|     |            |                         |          |         |                  |
|-----|------------|-------------------------|----------|---------|------------------|
| 00  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| REV | DATE       | DESCRIPTION             | PREPARED | CHECKED | APPROVED         |
| 01  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| 02  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| 03  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| 04  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| 05  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| 06  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| 07  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| 08  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| 09  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| 10  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| 11  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
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| 13  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
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| 15  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| 16  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
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| 18  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| 19  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| 20  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| 21  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| 22  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| 23  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |
| 24  | 28/10/2022 | issued for construction | TECHNE   | TECHNE  | McDowall Affleck |

|                    |  |
|--------------------|--|
| PROJECT:           | FLAT ROCK WIND FARM                      |
| FILE NAME:         | GRE.EEC.C.99.AU.W.08691.12.120.00        |
| CLASSIFICATION:    | FORMAT: SCALE: PLOT SCALE: SHEET:        |
| UTILIZATION SCOPE: | A0 1:2000 1:1 1 of 1                     |
| TITLE:             | ACCESS AND INTERNAL ROADS<br>PLAN 1 OF 6 |

|                |  |
|----------------|--|
| EGP VALIDATION | EGP CODE   |
| VALIDATED BY:  | GROUP: FUNCTION: TYPE: ISSUED: COUNTRY: TEC: PLANT: SYSTEM: PROGRESSIVE: REVISION: |
| VERIFIED BY:   | GRE.EEC.C.99.AU.W.08691.12.120.00  |
| CHECKED BY:    |  |







NOTES:

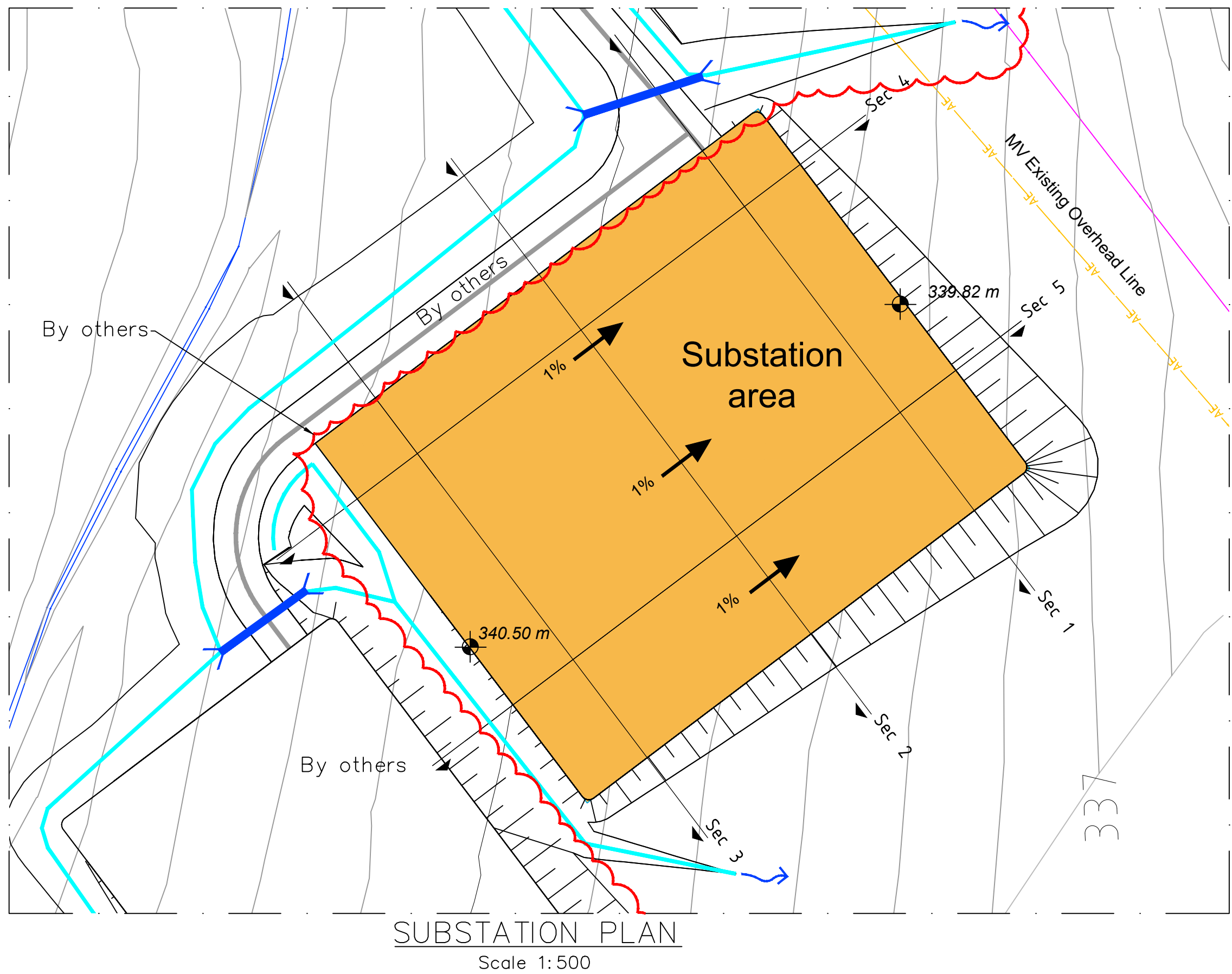
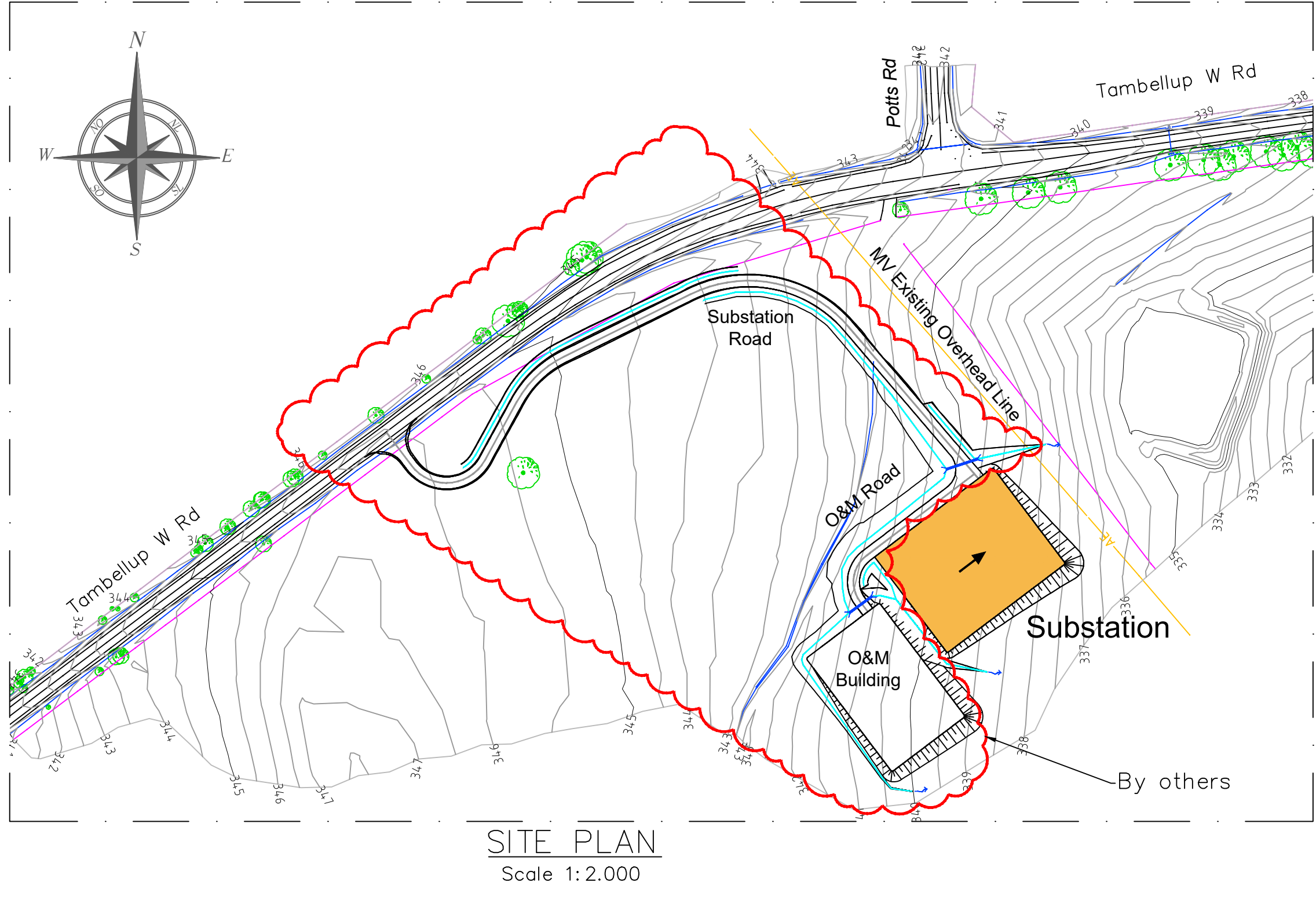
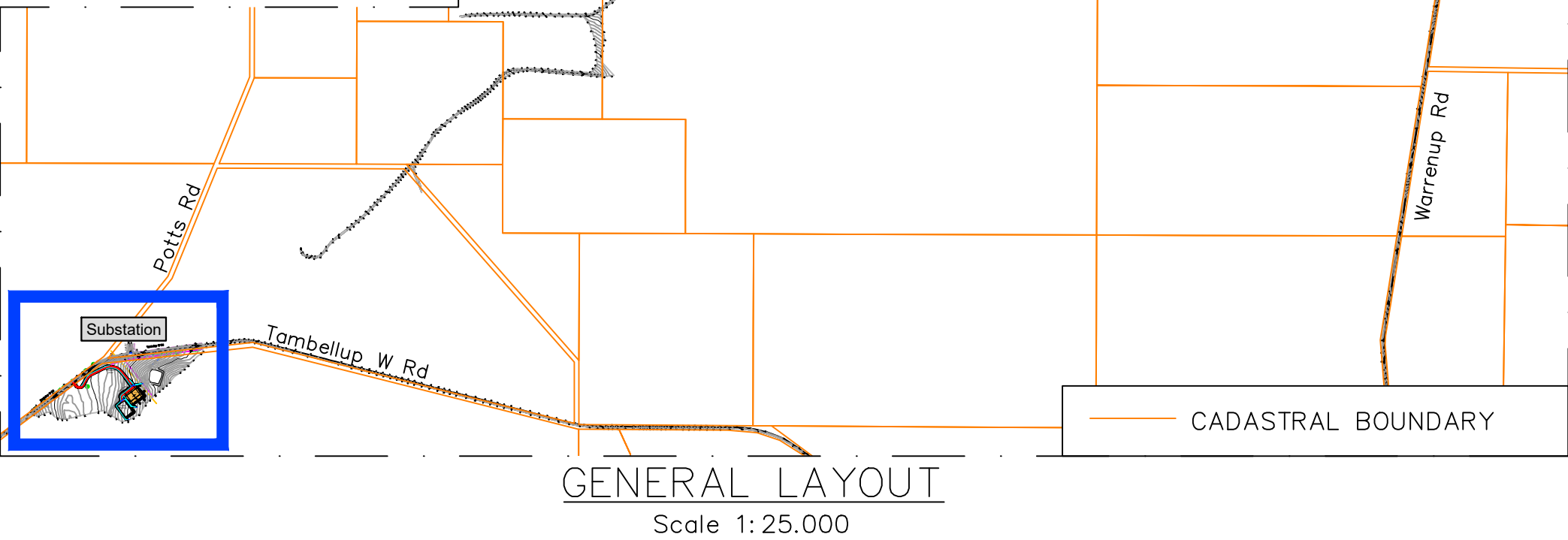
- GEOTECHNICAL INVESTIGATION REPORT: 21471732-001-R-Rev1 (ISSUED BY GOLDER ASSOCIATES PTY LTD IN JANUARY 2022).
- REFER TO WESTERN POWER TECHNICAL SPECIFICATION "TRANSMISSION SUBSTATION EARTHWORKS, ROADS AND DRAINAGE" REV.0 DATED FEBRUARY 2020 AS APPLICABLE TO BULK EARTHWORKS
- PAD TO BE SUITABLE FOR THE FOLLOWING LOADS:
  - 16t AXLE LOADS
  - 250 kPa
- DIMENSIONS SHOWN IN METERS UNO
- BENCHING OF EXCAVATIONS IS TO BE EMPLOYED WHERE REQUIRED
- EMBANKMENT FOUNDATION: 92% MMDD  
SUBGRADE COMPACTION: 96% MMDD
- LEVEL TOLERANCES OF PAVEMENT MATERIALS  
After compaction and grading of any layer of pavement material, the surface shall be uniform in appearance, tightly bonded and shall conform to the following tolerances:  
Horizontally  
+/- 50 mm  
Vertically  
Subbase surface tolerance of +/- 15 mm at any point  
Basecourse surface tolerance of +/- 10 mm at any point  
Layer Thickness  
Subbase +/- 15 mm of the layer thickness specified at any point  
Base +/- 10 mm of the layer thickness specified at any point.  
Shape  
No point on the surface of any pavement layer should vary by more than 5-10 mm from a 3 m straight edge (DTEI SA 2007, RTA 2007a, VicRoads 2008b)  
At no location should water pond on the surface of any pavement layer.

| 8. FREQUENCY OF TESTING                |   |   |
|--|---|---|
| Test                                   | Test Method   | Test Frequency                              |
| Fill Materials Testing                 |   |   |
| Particle Size Distribution             | AS 1289.3.6.1   | 1 test per 1,000m3 of each type of material |
| Linear Shrinkage                       | AS 1289.3.4.1   | 1 test per 1,000m3 of each type of material |
| Plasticity Index                       | AS 1289.3.3.1   | 1 test per 1,000m3 of each type of material |
| Maximum Modified Dry Density           |   |   |
| Optimum Moisture Content               | AS 1289.5.2.1   | 1 test per 2,000m3 of each type of material |
| California Bearing Ratio (CBR)         | AS 1289.6.6.1   | 1 test per 2,000m3 of each type of material |
| Earthworks Testing Finished            |   |   |
| Earthworks Levels                      | Surveyed as-constructed drawing showing finished contours | 1 per project                               |
| Compaction control during construction | AS 1289.5.2.1, 5.4.1, 5.8.4                               | 1 per 500m2                                 |

9. PAVEMENT COMPACTION TESTING
- In situ density of the compacted layers shall be determined using a Nuclear Density Meter in accordance with AS 1289.5.8.1. The moisture content of the tested layer shall be determined by oven drying in accordance with AS 1289.2.1.1. Density and dry back testing shall be undertaken at a frequency of not less than one test per 500 m<sup>2</sup> of pavement material placed.
- Repairs to the locations tested shall be made using identical materials to that being tested and shall be locally compacted to the same condition as the adjacent pavement.
- The Contractor shall produce and submit promptly following completion of the testing, to the WP Representative, verified records to confirm that the Specification requirements have been achieved. The results of the testing shall be supplied to the WP Representative as soon as possible. The layer shall not be accepted until the WP Representative has viewed and approved the test results.
- The WP Representative may also elect to have separate independent tests performed. The repairs to the tested pavement as necessary to render the pavement uniform for compaction and level shall be made.

PLAN LEGEND:

- TREE
- EXISTING DRAIN
- EXISTING FENCE
- RCP CULVERT
- TABLE DRAIN



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| DRAWING NUMBER | DRAWING TITLE | REV | DATE       | DESCRIPTION               | MAPL | MO | DW | EGP | CLIENT |
|----------------|---------------|-----|------------|---------------------------|------|----|----|-----|--------|
|                |               | 0   | 16/12/2022 | APPROVED FOR CONSTRUCTION |      |    |    |     |        |

REFERENCE DRAWINGS

REVISIONS & APPROVALS

APPROVALS

SCALE 1:

|             |      |            |
|-------------|------|------------|
| DRAWN       | MAPL | 16/12/2022 |
| CHECKED     | MO   | 16/12/2022 |
| DESIGNED    | MAPL | 16/12/2022 |
| RJE C.E.    | DW   | 16/12/2022 |
| CLIENT C.E. |      |            |
| CLIENT P.E. |      |            |
| CLIENT M.E. |      |            |

APPROVED DATE

APPROVED FOR CONSTRUCTION

115 MORPHETT ROAD  
MORPHETTVILLE, SA,  
5043  
TEL +61 8 8300 9500  
FAX +61 8 8300 9501  
EMAIL  
enquiries@rjeglobal.com

ACAD FILE:Y12022122-096 AUS Flat Rock - Westforce\1\PROJECT\TTO\ C ESE\100%

DOCUMENT No. GRE.EEC.D.99.AU.W.08691.00.465

ENEL GREEN POWER

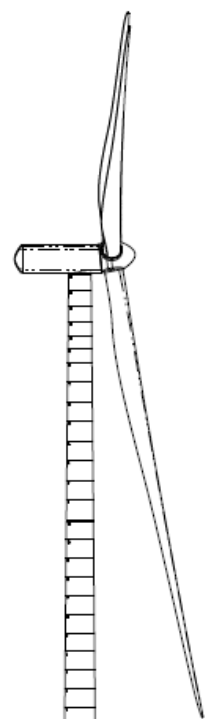
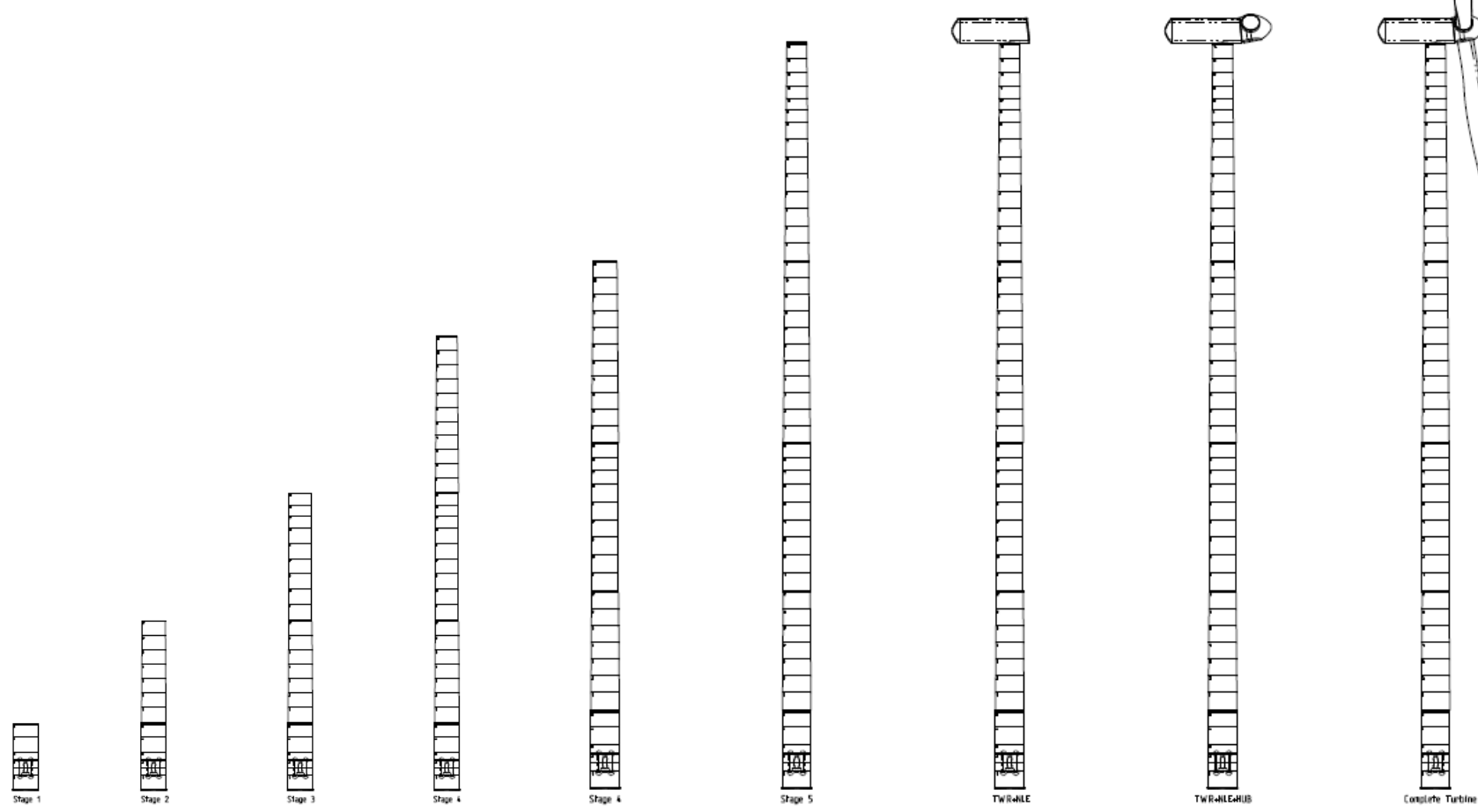
FLAT ROCK WIND FARM  
132/33kV SUBSTATION  
SUBSTATION EARTHWORKS PLAN AND SECTIONS  
SHEET 1 OF 3

PROJECT No. 1949  
DRAWING No. 1949-122-1007

SIZE A1

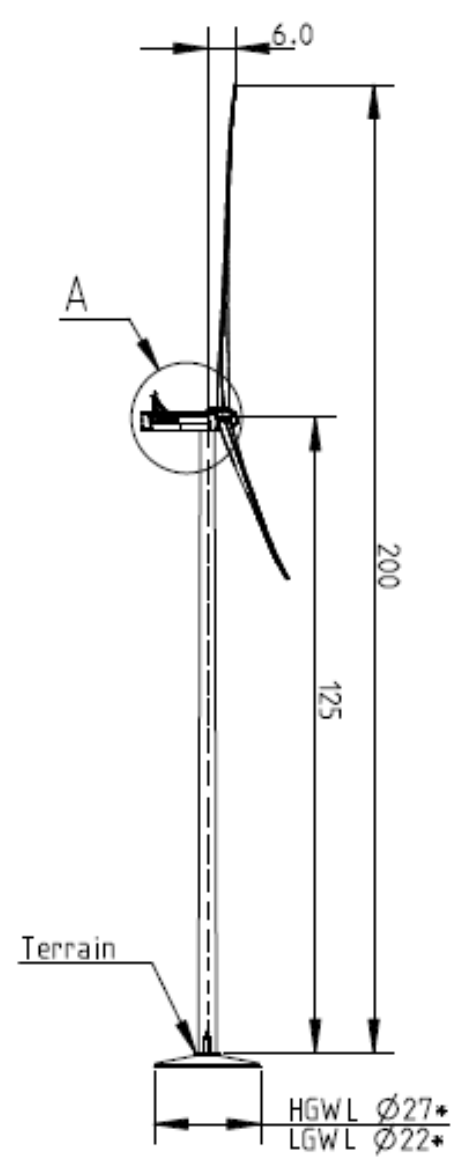
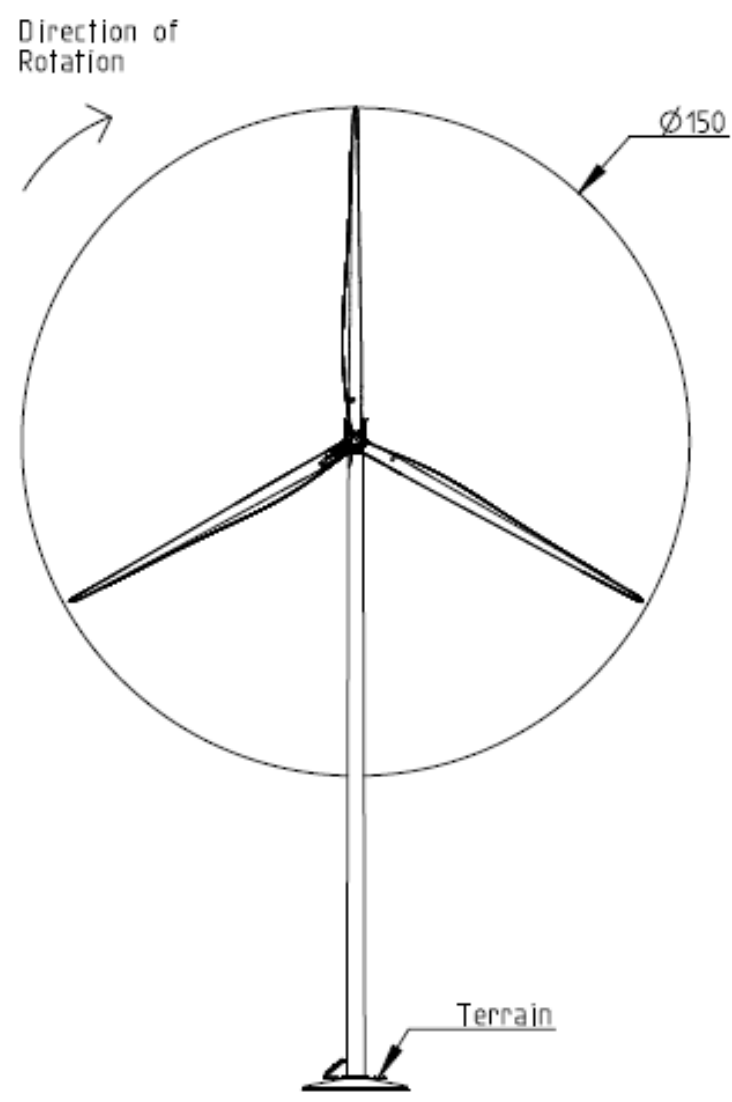
REV. 0





Dimension of Fully Assembled turbine

Blade in Inverted-Y Position

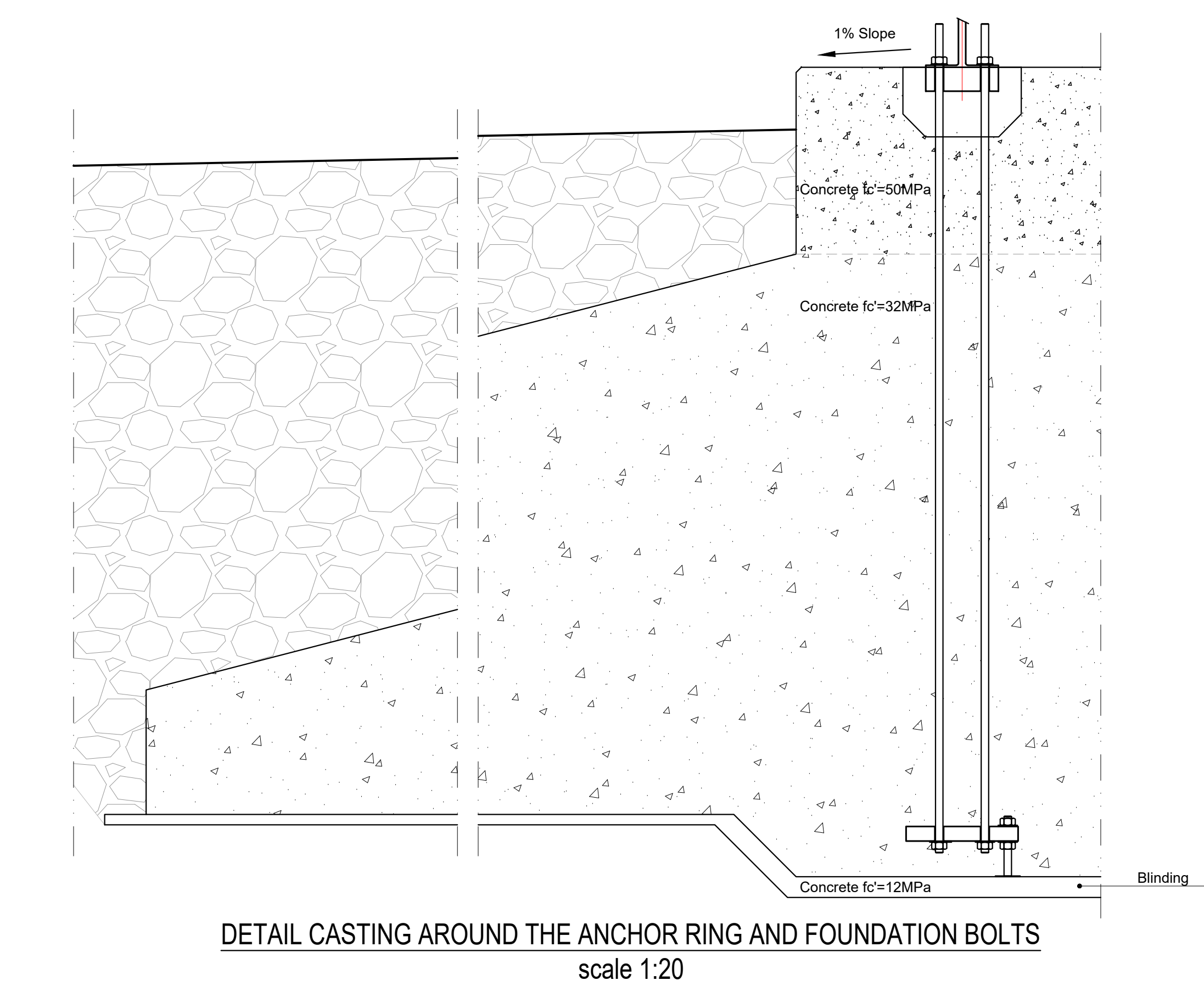


Site Assembly Drawing for V150 for 5 sections  
Turbine Specification- V150 4.2MW HH 125m

| Component   | Length (mm) | Width (mm) | Height (mm) | Weight (kg) |
|-------------|-------------|------------|-------------|-------------|
| Blade       | 73,650      | 4,083      | 3,025       | 17,500      |
| Nacelle     | 12,940      | 3,981      | 3,387       | 69,500      |
| Hub         | 5,469       | 3,741      | 3,460       | 32,535      |
| Drive Train | 7,323       | 3,500      | 3,200       | 62,000      |

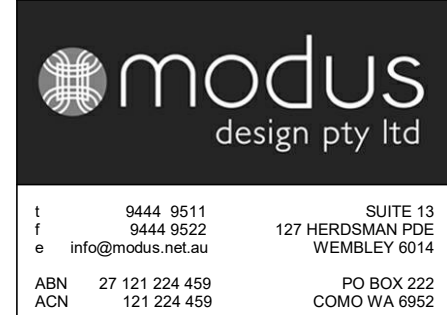
| Component                | Length (mm) | Dia 1 (bottom) (mm) | Dia 2 (Top) (mm) | Weight (kg) |
|--------------------------|-------------|---------------------|------------------|-------------|
| Tower Section 1 (Bottom) | 12,680      | 5,000               | 4,694            | 82,500      |
| Tower section 2          | 19,600      | 4,694               | 4,434            | 83,500      |
| Tower Section 3          | 24,360      | 4,434               | 4,424            | 77,500      |
| Tower section 4          | 29,960      | 4,424               | 3,919            | 68,000      |
| Tower section 5 (Top)    | 36,000      | 3,919               | 3,268            | 63,000      |





| Material                       | Item          | Quantity | Unit           |
|--------------------------------|---------------|----------|----------------|
| Concrete f'c=20MPa             | Blinding      | 24.0     | m <sup>3</sup> |
| Concrete f'c=32MPa             | Slab          | 640.3    | m <sup>3</sup> |
| Concrete f'c=50MPa             | Pedestal      | 27.6     | m <sup>3</sup> |
| Refer to Vestas Specifications | Grouting      | 2.05     | m <sup>3</sup> |
| D500N                          | Reinforcement | 68545    | kg             |





SITE PLAN

OPP&MAINTENANCE FACILITY -  
LOT 6315 TAMBELLUP WEST RD,  
LUMEAH: FLAT ROCKS WIND  
FARM, KOJONUP



- 40.00 LITRE WATER TANK CAPACITY TO BE SUPPLIED AND INSTALLED IN THE OBM COMPOUND (1) HAZARDOUS MATERIAL STORAGE 6m x 2.4m DIMENSIONS GOODS CONTAINER
- FIRE PROTECTION AND DETECTION SYSTEM IN ACCORDANCE WITH RELEVANT CODES/REGULATION.
- OPERATED ROLLER DOORS OF A SUITABLE WIDTH AND HEIGHT TO ALLOW ACCESS VIA MOBILE EQUIPMENT SUCH AS CRANES AND FORK TRUCKS. MINIMUM HEIGHT 3.6m AND A MINIMUM WIDTH 3.6m). THE ROLLER DOOR IS TO BE ELECTRICALLY OPERATED WITH MANUAL OVERRIDE FUNCTIONALITY.
- BOTH PEDESTRIAN ACCESS DOORS TO HAVE GLASS VIEWING PANE.
- CONCRETE TO BE SEALED
- BIRD NETTING IN RAFTERS.
- THE BUILDING WILL HAVE LED LIGHTING.
- LARGE WASH TROUGH SUITABLE FOR HANDWASHING.
- PORTABLE GRAVITY-FEED EMERGENCY EYE WASH STATION
- NOMINAL WAREHOUSE HEIGHT 6m.
- AIR CLIMATISED/CLIMATE CONTROLLED DRY ROOM (MINIMUM 3 m<sup>3</sup> m/s) WITH STANDARD CEILING HANGING IN ONE CORNER OF THE WORKSHOP TO STORE TEMPERATURE SENSITIVE PARTS
- DIRTY WORKBENCH (SOLID METAL CONSTRUCTION) FOR PARTS.
- CLEAN ASSEMBLY WORKBENCH OF SOLID TIMBER CONSTRUCTION.
- FULL BUILDING HEIGHT PALETTE SHELVING/RACKING (ACCESSIBLE BY FORK/LIFT) INSTALLED AND CERTIFIED.
- RACKING IS TO BE AT A DEPTH OF 1200mm TO ACCOMMODATE EUROS SKIDS
- DECK MESH BE INSTALLED ON ALL RACK LEVELS EXCEPT GROUND LEVEL
- ALL BACK TO BACK RACKING TO HAVE BACK SUPPORT TO ENSURE NO ITEM IN ONE RACK CAN PUSH THROUGH TO THE BAY BEHIND AND DISCLOSE IT, CAUSING IT TO FALL TO THE FLOOR
- INDUSTRIAL SHELVING FOR TOOLS/SMALL PARTS WITH DGPS INSTALLED AND CERTIFIED.
- CONCRETE SLAB DESIGN IN ACCORDANCE WITH LOADING SPECIFIED IN AS1170
- COMMON UPS SUPPLY WITH THE OBM OFFICE BUILDING
- CONNECTION TO THE WIND FARM AUXILIARY POWER SYSTEM (MAIN POWER SUPPLY FOR THE WORKSHOP)
- DELIVER (HOT MIX CONCRETE OR EQUIVALENT) TO PREVENT MUD OR DUST INGRESS TO THE FACILITY YARD AREA INCLUDING A HARDEST AREA OF 800mm (10 AXLE LOADS) FOR SELECTION TRUCKS AND LOADING/EQUIPMENT WITH FORK/LIFT OR SIMILAR PROVIDING ACCESS. THE FACILITY AREA SHALL ALSO INCLUDE THE AREA BETWEEN THE WORKSHOP AND OFFICE BUILDING.
- SEALED ON THE BUILDING TO MOUNT AT LEAST TWO (2) COMMUNICATION ANTENNAS ON THE SIDE OF THE BUILDING. IT SHALL BE POSSIBLE TO INSTALL COAXIAL CABLES TO THE INSTALLED ANTENNAS TO THE MAIN PANEL IN THE SCADA SERVER ROOM. ANTENNA SHALL NOT BE INSTALLED IN THE MAIN CATCHMENT AREA.
- INSULATION AND VENTILATION IN THE ROOF OF THE WAREHOUSE.
- SECURELY BUNDLED AND LOCKABLE OIL/CHEMICAL STORAGE FACILITIES)
- WHERE THE WORKSHOP AND OFFICE BUILDING ARE SEPARATED A LEAN TO OR APPROPRIATE SHELTER SHALL BE INSTALLED BETWEEN THE TWO ADJACENT DOORS BETWEEN BUILDINGS.

**12.5m x 9.6m x 3m OFFICE BUILDING (STAND ALONE BUILDING**

- DOUBLE GLAZED AND TINTED WINDOWS.
- WINDOWS TO HAVE ADEQUATE INTERNAL FURNISHINGS (IE BLINDS, SHUTTERS OR CURTAINS)
- WATER TANKS FOR O&M BUILDING CONNECTED TO DOWNPIPES
- ALL RAWWATER GATHERING SYSTEMS SHALL BE FITTED WITH LOW MAINTENANCE FIRST FLUSH DEVICES
- WATER FILTERING SYSTEM SHALL BE PROVIDED THAT ENSURES POTABLE QUALITY WATER THROUGHOUT THE ENTIRE FACILITY (EXCLUDING FRIREFIGHTING SYSTEMS)
- PRESSURE PUMP SHALL BE FITTED WITH A SURGE ALARM/CUTOFF TO PREVENT PUMP CYCLING
- DEDICATED FRIREFIGHTING WATER SUPPLY AND EQUIPMENT WILL BE PROVIDED COVERED TO THE SUBSTATION FOR O&M AND SUBSTATION FACILITIES (IN ACCORDANCE WITH RELEVANT CODE/REGULATION AND BUSHFIRE MANAGEMENT PLANS)
- MINIMUM 5 STAR AIR CONDITIONING UNITS WILL BE REVERSE CYCLE (COOLING AND HEATING)
- WHEELCHAIR RAMP WILL BE ADJACENT TO DADA PARKING SPACE (SUBJECT TO BUILDING SURVEYOR REVIEW AND APPROVAL)
- LED LIGHTING THROUGHOUT
- WALL MOUNTED COAT HOOKS TO BE PROVIDED ADJACENT TO THE DOORS IN THE COMMON AREA
- POWER, LAN & RAS DATA POINTS AND NOGGINS IN WALL, SUITABLE FOR W-LK SCREEN DISPLAY/TO BE PROVIDED TO OFFICE AREA WALL
- SERVER ROOM SOLID CORE DOOR AND DEADLOCK TO BE INSTALLED
- ELECTRIC HOT WATER SYSTEM
- 15A BENCHTOP POWER OUTLET TO BE PROVIDED IN THE KITCHEN FOR APPLIANCES
- COAT HOOKS TO BE PROVIDED ON THE BACK OF CUBICLE DOORS IN THE TOILETS
- ELECTRIC HAND DRYERS TO BE PROVIDED IN LIEU OF PAPER TOWELS IN THE TOILETS
- POWER/GPS FOR TROUBLESHOOTING SHELVING UNIT IN SERVER/STORE ROOM (FOR SECURE OVERNIGHT CHARGING)
- A SCADA COMMUNICATIONS ROOM SHALL BE PROVIDED. THE ROOM SHALL HAVE SPACE FOR 2 FULL SIZE 19" COMMUNICATIONS RACKS
- THE BOP SUBCONTRACTOR SHALL DELIVER A SINGLE RAIL HEIGHT (420) 19" COMMUNICATIONS RACK INSTALLED IN THE SCADA COMMUNICATIONS ROOM. THIS PANEL SHALL HAVE A POWER SUPPLY FROM THE O&M BUILDING UPS
- CONNECTION TO THE WIND FARM AUXILIARY POWER SYSTEM (MAIN POWER SUPPLY FOR THE OFFICE BUILDING)
- ALL UPS SHALL BE SUPPLIED DESIGNED TO RUN ESSENTIAL LOADS FOR A MINIMUM OF 4HRS. THE ESSENTIAL LOADS SHALL BE DEFINED DURING THE DETAILED DESIGN
- A DATA OUTLET TO BE WIRED BACK TO A PATCH PANEL IN THE 19" COMMUNICATIONS RACK
- POWER OUTLETS/GPDS AND DATA POINTS IN ADDITION TO ANY SPECIFIC REQUIREMENTS NOTED ABOVE. ESSENTIAL REQUIREMENT IS FOR AN EVEN DISTRIBUTION OF GPDS AND DATA POINTS TO BE PROVIDED THROUGHOUT THE BUILDING AND AT EVERY WORKSTATION
- A SCADA WORKSTATION AREA SHALL BE DEFINED AND THIS AREA WILL BE SUPPLIED WITH A 2 X 12 CORE SINGLE RIBBED FIBRE CABLES SHALL BE RUN AND TERMINATED BETWEEN THE O&M BUILDING AND THE SUBSTATION. TERMINATION OF THE FIBRES TO BE IN INDUSTRY STANDARD FIBRE'S IN THE SUBSTATION FIBRE PANEL. O&M BUILDING COMMUNICATIONS PANEL
- EMERGENCY BACKUP LIGHTING (UPS DIESEL GENERATOR WITH AUTOMATIC START UP)
- DEDUCE DATA POINTS SHALL BE PROVIDED IN THE WAREHOUSE FACILITY, EACH OFFICE ROOM AND MINIMUM OF DOUBLE CABLED IN THE TECHNICIAN COMMUNITY WORK AREA. ALL DATA POINTS WILL BE CABLED WITH DATA CABLEING BACK TO THE COMM/SERVER ROOM
- INSULATION TO AISING STANDARDS FOR LOCAL CLIMATIC ZONE
- THE COMMON SECURITY SYSTEM SHALL CONSIST OF AT LEAST 8 CCTV (WIDE VIEW FIXED CAMERA), KEY/FOR ACCESS AND VIDEO INTERCOM FOR ENTRY

| 05/11/2022               | B   |  |  |  | ISSUED FOR TENDER       |
|--------------------------|-----|--|--|--|-------------------------|
| 3/10/2022                | A   |  |  |  | ISSUED FOR COORDINATION |
| DATE                     | No. |  |  |  | DESCRIPTION             |
| <b>REVISION SCHEDULE</b> |     |  |  |  |                         |

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f 9444 9522 127 HERDSMAN PDE  
e info@modus.net.au WEMBLEY 6014

ABN 27 121 224 459 PO BOX 222  
ACN 121 224 459 COMO WA 6952

## FLOOR PLAN

OPP&MAINTENANCE FACILITY -  
LOT 6315 TAMBELLUP WEST RD,  
LUMEAH: FLAT ROCKS WIND  
FARM, KOJONUP

GRE.EEC.D.99.AU.W.08691.12.269\_B

|          |              |
|----------|--------------|
| DESIGN   | CG           |
| DRAWN    | JP           |
| CHECKED  | CG           |
| SCALE    | 1 : 50       |
| DATE     | OCTOBER 2022 |
| REVISION | B            |

A1





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ABN 27 121 224 459 PO BOX 222  
ACN 121 224 459 COMO WA 6952

## ELEVATIONS &amp; SECTION

GRE.EEC.D.99.AU.W.08691.12.270\_B

A1



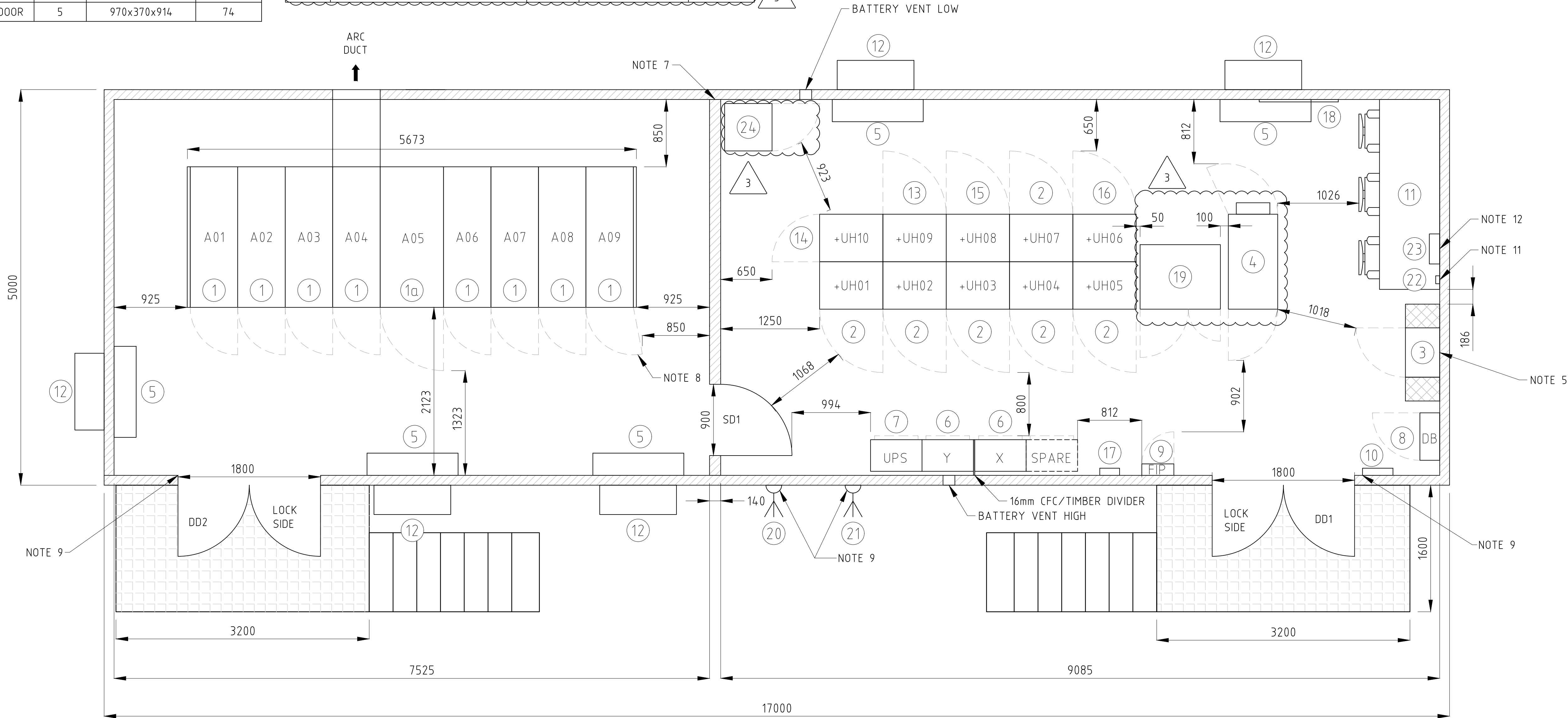


| EQUIPMENT LIST |                               |     |                    |             |
|----------------|-------------------------------|-----|--------------------|-------------|
| ITEM           | DESCRIPTION                   | QTY | DIMENSIONS (WDHmm) | WEIGHT (kg) |
| 1              | 33kV GIS SWITCHGEAR           | 8   | 600x1777X2500      | 1000        |
| 1a             | 33kV INCOMER, GIS SWITCHGEAR  | 1   | 800x1777X2500      | 1000        |
| 2              | PROTECTION PANELS             | 6   | 800x600x2200       | 200         |
| 3              | VESTAS PPC                    | 1   | 624x432x2040       | 200         |
| 4              | VESTAS VOB                    | 1   | 624x1345x2040      | 540         |
| 5              | 9.4kW SPLIT SYSTEM AC-INDOOR  | 5   | 1150x280x340       | 18.5        |
| 6              | 110VDC BATTERY RACKS          | 2   | 650x400x1200       | 800         |
| 7              | UPS BATTERY RACK              | 1   | 650x400x1200       | 800         |
| 8              | LV DISTRIBUTION BOARD         | 1   | 600x240x864        | 50          |
| 9              | FIRE INDICATION PANEL         | 1   | 405x150x500        | 50          |
| 10             | SECURITY PANEL                | 1   | 385x90x260         | 6           |
| 11             | DESK AND CHAIRS               | 1   | 2400x760x710       | 10          |
| 12             | 9.4kW SPLIT SYSTEM AC-OUTDOOR | 5   | 970x370x914        | 74          |

| EQUIPMENT LIST |                                 |     |                    |             |
|----------------|---------------------------------|-----|--------------------|-------------|
| ITEM           | DESCRIPTION                     | QTY | DIMENSIONS (WDHmm) | WEIGHT (kg) |
| 13             | DUAL 110V DC CHARGER PANEL      | 1   | 800x600x2200       | 270         |
| 14             | FIBRE AND COMMUNICATIONS RACK   | 1   | 800x600x2200       | 200         |
| 15             | UPS PANEL                       | 1   | 800x600x2200       | 200         |
| 16             | RTU                             | 1   | 800x600x2200       | 200         |
| 17             | EYE WASH STATION                | 1   | 250x90x200         | 5           |
| 18             | SAFETY BOARD                    | 1   | 1000x30x700        | 1           |
| 19             | SDI SCADA WPCMS PANEL (NOTE 13) | 1   | 815x1015x2238      | 350         |
| 20             | GPS ANTENNA                     | 1   | N/A                | N/A         |
| 21             | VESTAS ANTENNA                  | 1   | N/A                | N/A         |
| 22             | WPC VOIP PHONE (FREE ISSUED)    | 1   | -                  | 1           |
| 23             | WPC VOIP MEDIA CONVERTER        | 1   | 380x130x260        | 5           |
| 24             | EGP ICT & SCADA RACK (NOTE 13)  | 1   | 600x600xH          | TBA         |

NOTES:  
NOTE 1: CEILING HEIGHT 3350mm  
NOTE 2: COLUMN HEIGHT 1200mm  
NOTE 3: A/C OUTDOOR COMPRESSOR UNIT GROUND MOUNTED, INSTALLED ON SITE  
NOTE 4: 33kV SWITCHGEAR MANUFACTURE TO CONFIRM DIMENSIONS  
NOTE 5: ITEM #3, VESTAS PPC PANEL, TO HAVE 300mm CLEARANCE EITHER SIDE  
NOTE 6: IN-ROOM VESDA AND FIRE EXTINGUISHERS ALLOWED FOR IN SWITCHROOM, GAS SUPPRESSION SYSTEM NOT ALLOWED FOR AS PER SECTION 11.2.2.7 IN GRE.EEC.S.00.XX.A.00000.16.001.02 - TECHNICAL STANDARD - AIS HV SUBSTATIONS  
NOTE 7: INTERNAL PARTITION WALL TO BE LINED WITH 9mm CFC (INNER) + 16mm FIRE RATED SHEETING (OUTER) EACH SIDE.  
NOTE 8: STRAP TO BE ADDED TO DOOR OF A09 TO INHIBIT DOOR SWING OPENING BEYOND 100°  
NOTE 9: A/C WALL CONTROLLERS TO BE MOUNTED ABOVE LIGHT SWITCHES BY DOORS. ~1600mm  
NOTE 10: ANTENNAS TO BE MOUNTED ON GOOSENECK BRACKET, SPACED MIN. 1 METRE APART  
NOTE 11: VOIP PHONE INSTALLED BY OTHERS, MOUNTED ON WALL AT CENTRE HEIGHT 1500mm AFFL  
NOTE 12: MEDIA CONVERTER INSTALLED BY OTHERS, WALL MOUNT AT CENTRE HEIGHT 1500mm AFFL  
NOTE 13: ITEMS 19 AND 24 ARE FREE ISSUED PANELS

| 33kV SWITCHGEAR |                              |
|-----------------|------------------------------|
| TIER            | DESCRIPTION                  |
| A01             | CB111,                       |
| A02             | BUS VT                       |
| A03             | BUS EARTH SWITCH             |
| A04             | CB112, CG12 FEEDER           |
| A05             | CB110, INCOMER               |
| A06             | CB113, CG12 FEEDER           |
| A07             | CB114, CG13 FEEDER           |
| A08             | CB115, SPARE FEEDER          |
| A09             | CB116, REACTIVE PLANT FEEDER |




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| DRAWING NUMBER | DRAWING TITLE      |
|----------------|--------------------|
|                | REFERENCE DRAWINGS |

| REV | DATE     | DESCRIPTION                           | DRN. | CHK'D | C.E. | CLIENT |
|-----|----------|---------------------------------------|------|-------|------|--------|
| 3   | 09.01.23 | RESIZED/RENAMED PANEL, ADDED RACK     | SSK  | TNW   |      |        |
| 2   | 29.11.22 | ADDED WPC VOIP PHONE LOCATION         | SSK  | TNW   |      |        |
| 1   | 10.10.22 | UPDATED EQUIPMENT LAYOUT              | SSK  | TNW   |      |        |
| 0   | 09.09.22 | APPROVED FOR CONSTRUCTION             | ATH  | TNW   |      |        |
| B   | 15.08.22 | ADDED BARRIER BETWEEN X & Y BATTERIES | SSK  | TNW   |      |        |
| A   | 20.06.22 | PRELIMINARY                           | SSK  | TNW   |      |        |

| SCALE       | 1:30         |
|-------------|--------------|
| DRAWN       | SSK 20.06.22 |
| CHECKED     | TNW 20.06.22 |
| DESIGNED    | SSK 20.06.22 |
| RJE C.E.    |              |
| CLIENT C.E. |              |
| CLIENT P.E. |              |
| CLIENT M.E. |              |
| APPROVED    | DATE         |

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|  |                              |            |
|--|------------------------------|------------|
| CLIENT DOCUMENT No.<br>GRE.EEC.D.73.AU.W.08691.00.376                          |                              | SIZE<br>A1 |
| ENEL GREEN POWER   |                              |            |
| FLAT ROCK WIND FARM<br>33kV SWITCHROOM +Z01<br>EQUIPMENT ARRANGEMENT<br>LAYOUT |                              |            |
| PROJECT No.<br>1949  | DRAWING No.<br>1949-341-1001 | REV.<br>3  |



EQUIPMENT LIST

| ITEM | DESCRIPTION               | QTY | DIMENSIONS (WDHmm) | WEIGHT (kg) |
|------|---------------------------|-----|--------------------|-------------|
| 1    | 33kV RMU                  | 1   | 920x886x2180       | 550         |
| 2    | 400VAC DISTRIBUTION BOARD | 1   | 633x1181x2045      | 500         |
| 3    | PROTECTION/CONTROL PANEL  | 1   | 633x605x2045       | 250         |
| 4    | TRANSFORMER               | 1   | 1150x1500x1622     | 1700        |
| 5    | VENTILATION FAN           | 2   | 400x400x250        | 12          |
| 6    | GENERATOR                 | 1   | 3600x1416x2263     | 3900        |

NOTES:

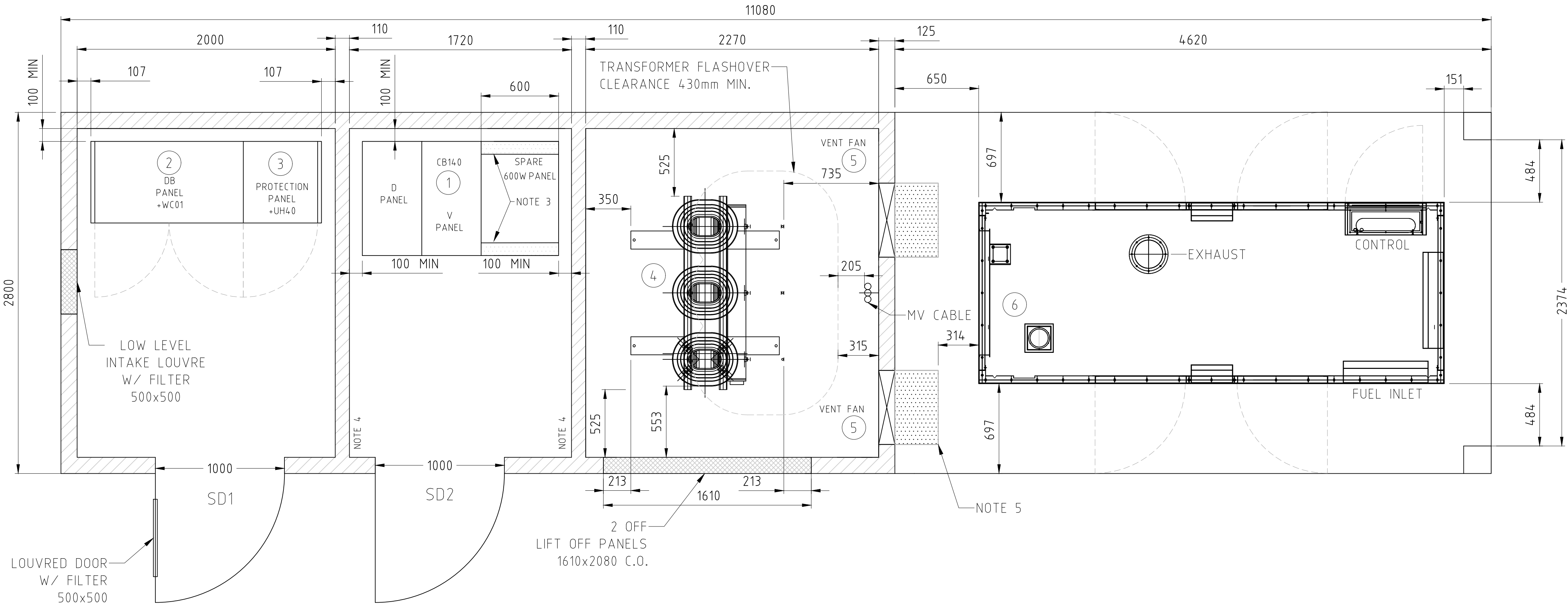
NOTE 1: CEILING HEIGHT 2581mm

NOTE 2: GROUND MOUNTED

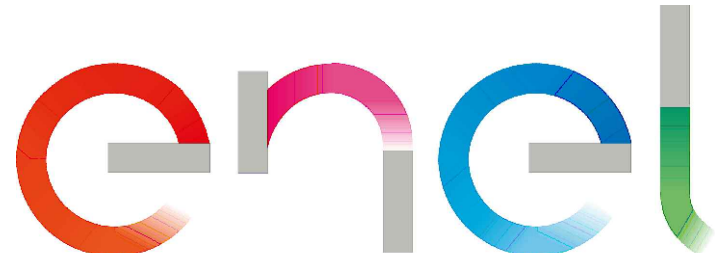
NOTE 3: 150mm MOUNTING PLINTH TO BE INSTALLED ONTO BASE FRAME, CHECKER PLATE COVER TO BE INSTALLED ON OPEN SPACE OF PLINTH

NOTE 4: INTERNAL WALLS TO BE NOT FULL HEIGHT 2METRES ( FOR VENTILATION )

NOTE 5: VENT FANS TO HAVE PERFORATED BOX FITTED TO OUTSIDE AND AN EGGRATE GRILLE FITTED INSIDE TO ACT AS MECHANICAL PROTECTION



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| DRAWING NUMBER | DRAWING TITLE      |
|----------------|--------------------|
|                | REFERENCE DRAWINGS |

| REV | DATE     | DESCRIPTION                         | DRN. | CHK'D | C.E. | CLIENT |
|-----|----------|-------------------------------------|------|-------|------|--------|
| 1   | 18.11.22 | AMENDED EQUIPMENT DIMENSIONS IN BOM | SSK  | TNW   |      |        |
| 0   | 14.10.22 | APPROVED FOR CONSTRUCTION           | SSK  | TNW   |      |        |
| B   | 29.08.22 | ADDRESSED CLIENT COMMENTS           | SSK  | TNW   |      |        |
| A   | 01.08.22 | PRELIMINARY                         | ATH  | TNW   |      |        |
| REV | DATE     | DESCRIPTION                         | DRN. | CHK'D | C.E. | CLIENT |

|             |     |          |
|-------------|-----|----------|
| SCALE       |     | 1:20     |
| DRAWN       | SSK | 18.07.22 |
| CHECKED     | TNW | 18.07.22 |
| DESIGNED    | SSK | 18.07.22 |
| RJE C.E.    |     |          |
| CLIENT C.E. |     |          |
| CLIENT P.E. |     |          |
| CLIENT M.E. |     |          |
| APPROVED    |     | DATE     |
| APPROVALS   |     |          |

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ACAD FILE:1\1949-Flat Rock Wind Farm\5-Design\5-RJE CAD\1-DWG

|   |                              |            |
|---|------------------------------|------------|
| CLIENT DOCUMENT No.<br>GRE.EEC.D.73.AU.W.08691.00.384                               |                              | SIZE<br>A1 |
| ENEL GREEN POWER  |                              |            |
| FLAT ROCK WIND FARM<br>AUXILIARY POWER UNIT +Z02<br>EQUIPMENT ARRANGEMENT<br>LAYOUT |                              |            |
| PROJECT No.<br>1949   | DRAWING No.<br>1949-341-4001 | REV.<br>1  |





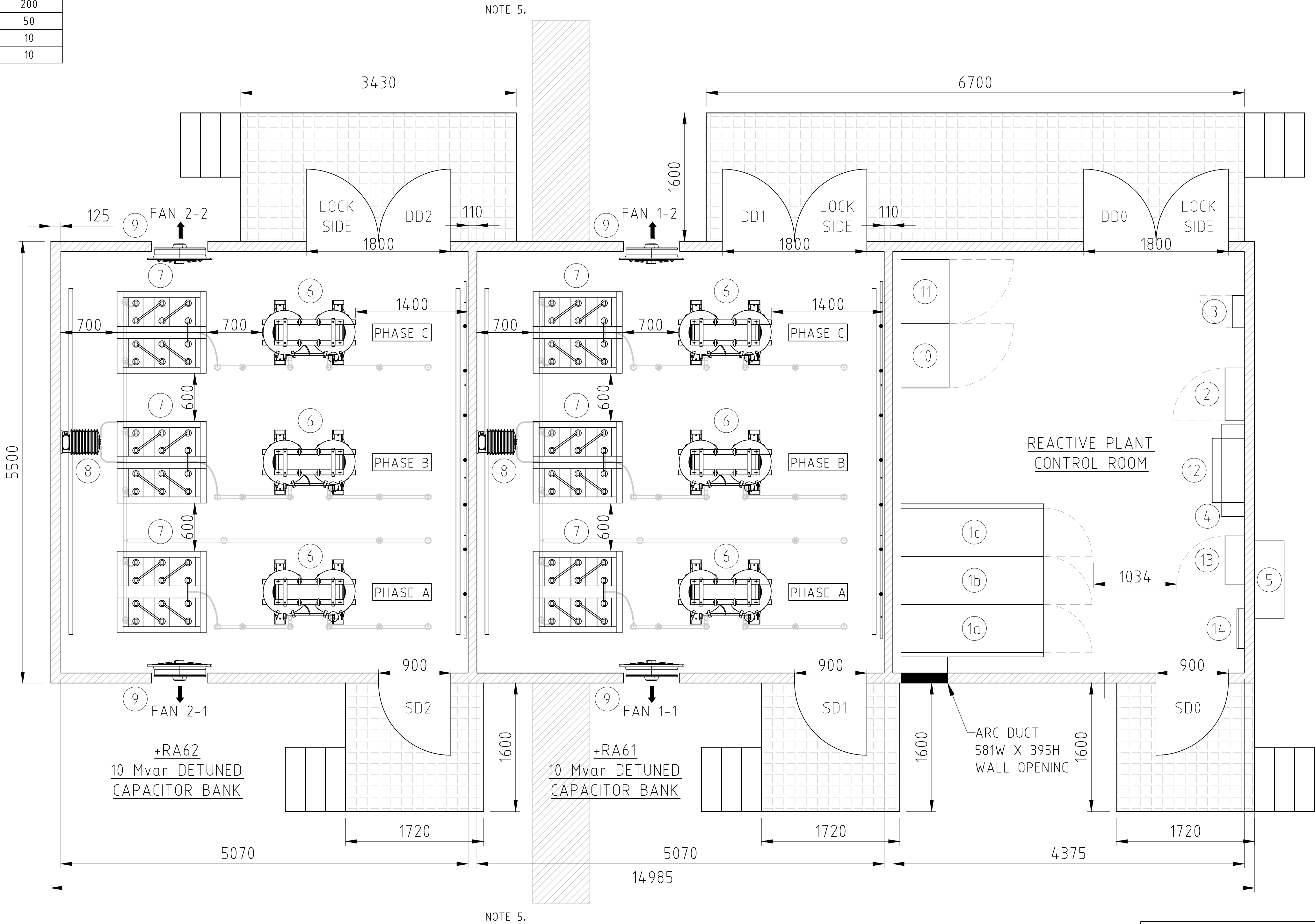
| EQUIPMENT LIST |                              |     |                    |             |
|----------------|------------------------------|-----|--------------------|-------------|
| ITEM           | DESCRIPTION                  | QTY | DIMENSIONS (WDHmm) | WEIGHT (kg) |
| 1 (a to c)     | RING MAIN UNIT (TAMCO)       | 3   | 600x1777x2485      | 1000        |
| 2              | 400V L&SP DISTRIBUTION BOARD | 1   | 650x240x864        | 50          |
| 3              | FIRE INDICATION PANEL        | 1   | 405x150x500        | 25          |
| 4              | 9.4kW SPLIT SYSTEM AC UNITS  | 1   | 1150x280x340       | 18.5        |
| 5              | A/C OUTDOOR UNIT             | 1   | 970x370x914        | 74          |
| 6              | FILTER REACTOR (16.4mH)      | 6   | 1160x800x2085      | 1261        |
| 7              | 10 Mvar CAPACITOR BANK       | 6   | 1110x1016x1576     | 700         |
| 8              | CURRENT TRANSFORMER          | 2   | 250X250X491        | 45          |
| 9              | VENTILATION FAN              | 4   | 400x400x251        | 31.7        |
| 10             | RP PROTECTION PANEL +UH60    | 1   | 800x600x2200       | 200         |
| 11             | RP MARSHALLING PANEL +UH61   | 1   | 800x600x2200       | 200         |
| 12             | STORAGE FOR EARTH STICKS     | 1   | 800X400X200        | 50          |
| 13             | UPS DISTRIBUTION BOARD       | 1   | 600x240x432        | 10          |
| 14             | DC LOAD CENTRE               | 1   | 600x240x432        | 10          |

NOTES:  
NOTE 1: CEILING HEIGHT 3350mm  
NOTE 2: PILE HEIGHT 571mm  
NOTE 3: A/C OUTDOOR COMPRESSOR UNIT GROUND MOUNTED, INSTALLED ON SITE  
NOTE 4: CT MOUNTED 2500MM FROM AFFL  
NOTE 5: ACCESS AREA FOR THE FILTER TRAY

CAPTIVE KEYS ARRANGEMENT:

KEY Aa FOR +RA61 ROOM SD1 D00R.  
KEY Ba FOR +RA61 ROOM DD1AB D00RS.  
KEY Ca FOR +RA62 ROOM SD2 D00R.  
KEY Da FOR +RA62 ROOM DD2AB D00RS.

| LEGEND |             |
|--------|-------------|
| NO.    | DESCRIPTION |
| 1a     | RMU -A01    |
| 1b     | RMU -A02    |
| 1c     | RMU -A03    |




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| DRAWING NUMBER        | DRAWING TITLE | REV                       | DATE | DESCRIPTION | JCR | CM | RAJ | DRN. | CHK'D | C.E. | CLIENT |
|-----------------------|---------------|---------------------------|------|-------------|-----|----|-----|------|-------|------|--------|
| 0                     | 14.12.22      | APPROVED FOR CONSTRUCTION | JCR  | CM          | RAJ |    |     |      |       |      |        |
| REFERENCE DRAWINGS    |               |                           |      |             |     |    |     |      |       |      |        |
| REVISIONS & APPROVALS |               |                           |      |             |     |    |     |      |       |      |        |

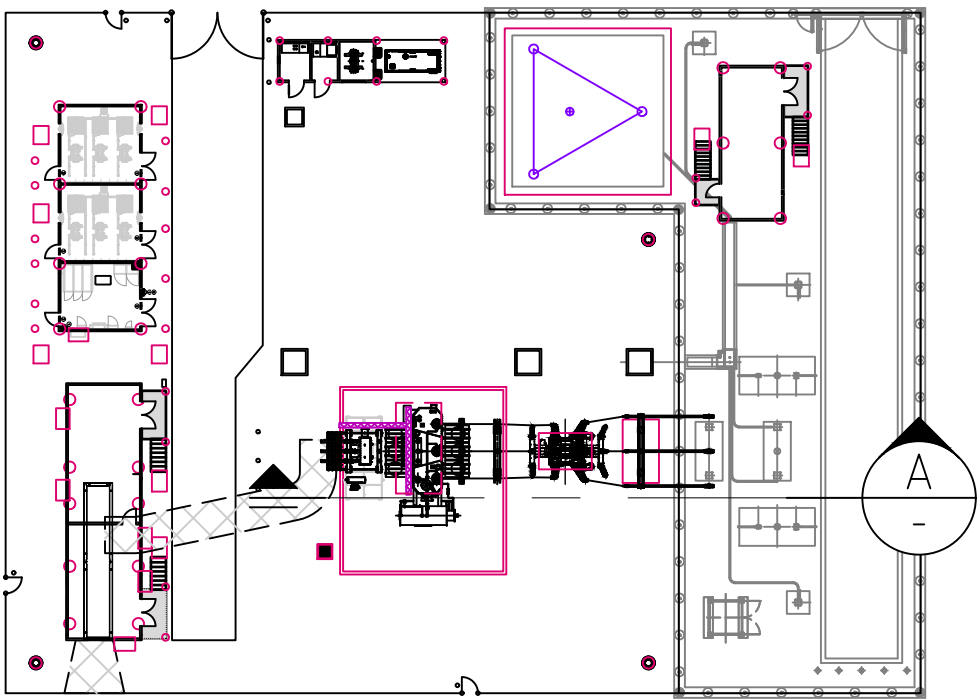
|             |     |          |
|-------------|-----|----------|
| SCALE       |     | 1:30     |
| DRAWN       | JCR | 11.08.22 |
| CHECKED     | TNW | 11.08.22 |
| DESIGNED    | JCR | 11.08.22 |
| RJE C.E.    | RAJ |          |
| CLIENT C.E. |     |          |
| CLIENT P.E. |     |          |
| CLIENT M.E. |     |          |
| APPROVED    |     | DATE     |
| APPROVALS   |     |          |

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ACAD FILE: 1949-341-6001

|  |                              |            |
|--|------------------------------|------------|
| CLIENT DOCUMENT No.<br>GRE.EEC.D.73.AU.W.08691.00.389                                  |                              | SIZE<br>A1 |
| ENEL GREEN POWER   |                              |            |
| FLAT ROCK WIND FARM<br>REACTIVE PLANT BUILDING +Z03<br>EQUIPMENT ARRANGEMENT<br>LAYOUT |                              |            |
| PROJECT No.<br>1949  | DRAWING No.<br>1949-341-6001 | REV.<br>0  |



PLAN VIEW  
SCALE 1:500

NOTES:

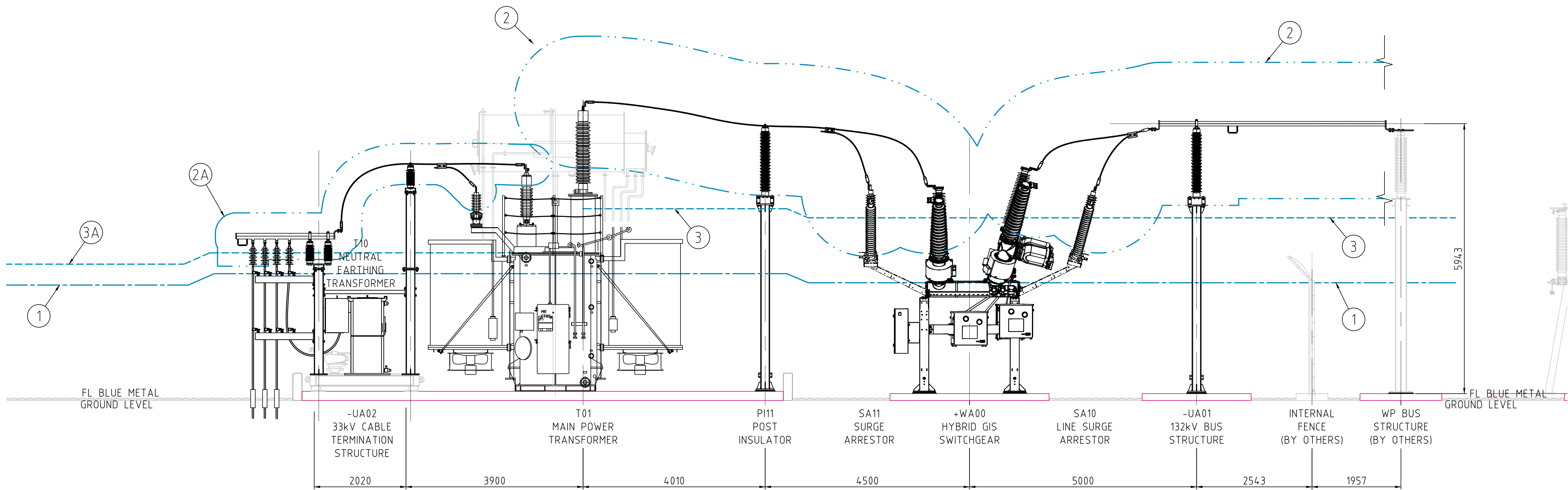
1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. THIS DRAWING IS REPRESENTATIVE OF THE LAYOUT 1949-321-1000.
3. DUE TO THE 2D REPRESENTATION OF STRUCTURES, THE CLEARANCE LINES CAN BE OBSCURED FROM THE ACTUAL GEOMETRY. DURING CONSTRUCTION THE MINIMUM CLEARANCE CRITERIA MUST BE ADHERED TO.

CLEARANCES

| CASE # | CASE  | MINIMUM CLEARANCE REQUIREMENT<br>mm (AS 2067) | COMMENTS  |
|--------|---|---|-----------|
| 1      | GROUND SAFETY CLEARANCE "G"                       | 2440  | COMPLIANT |
| 2      | AS 2067<br>NON-FLASHOVER<br>DISTANCE "N"          | 1430 (132kV)                                  | COMPLIANT |
| 2A     | AS 2067<br>NON-FLASHOVER<br>DISTANCE "N"          | 420 (33kV)                                    | COMPLIANT |
| 3      | SECTION SAFETY<br>CLEARANCE "S=N+G"<br>TO AS 2067 | 3870 (132kV)                                  | COMPLIANT |
| 3A     | SECTION SAFETY<br>CLEARANCE "S=N+G"<br>TO AS 2067 | 2860 (33kV)                                   | COMPLIANT |

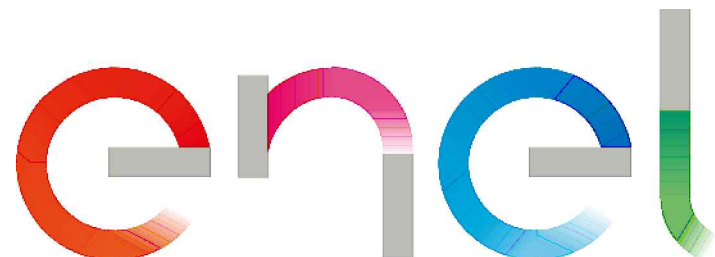
LEGEND

- GROUND SAFETY CLEARANCE "G"
- ... AS 2067 NON-FLASHOVER DISTANCE "N"
- AS 2067 SECTION SAFETY CLEARANCE "S=N+G"



SECTION A  
SCALE 1:50

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THAN THE MANUFACTURE OR CONSTRUCTION  
OF EQUIPMENT, OR IN THE DESIGN &  
INSTALLATION OF PLANT TO THE ORDER  
OF RJE GLOBAL PTY. LTD.

| 1949-321-1000      | 132/33kV SUBSTATION LAYOUT | 0   | 21.12.22 | APPROVED FOR CONSTRUCTION | MC | DW | DW | DRN.      | CHK'D | C.E. | CLIENT |
|--------------------|----------------------------|-----|----------|---------------------------|----|----|----|-----------|-------|------|--------|
| DRAWING NUMBER     | DRAWING TITLE              | REV | DATE     | DESCRIPTION               | MC | DW | DW | DRN.      | CHK'D | C.E. | CLIENT |
| REFERENCE DRAWINGS |                            |     |          | REVISIONS & APPROVALS     |    |    |    | APPROVALS |       |      |        |

|             |             |
|-------------|-------------|
| SCALE       | 1:50        |
| DRAWN       | MC 29.09.22 |
| CHECKED     | DW 21.12.22 |
| DESIGNED    | MC 29.09.22 |
| RJE C.E.    |             |
| CLIENT C.E. |             |
| CLIENT P.E. |             |
| CLIENT M.E. |             |
| APPROVED    | DATE        |

APPROVED FOR CONSTRUCTION



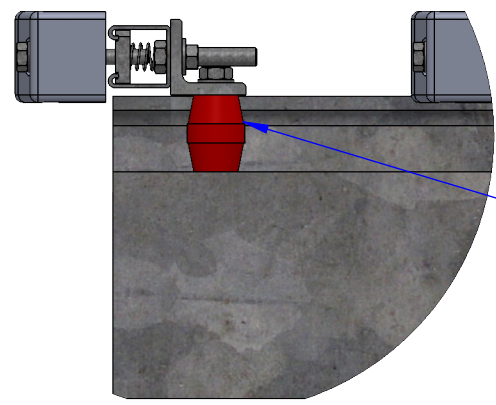
115 MORPHETT ROAD  
MORPHETTVILLE, SA 5043  
TEL +61 8 8300 9500  
FAX +61 8 8300 9501  
EMAIL enquiries@rjeglobal.com

ACAD FILE: \\1949-Flat Rock Wind Farm\\S-Design\\S-RJE CAD\\1-DWG

DOCUMENT No.  
GRE.EEC.L.73.AU.W.08691.00.099

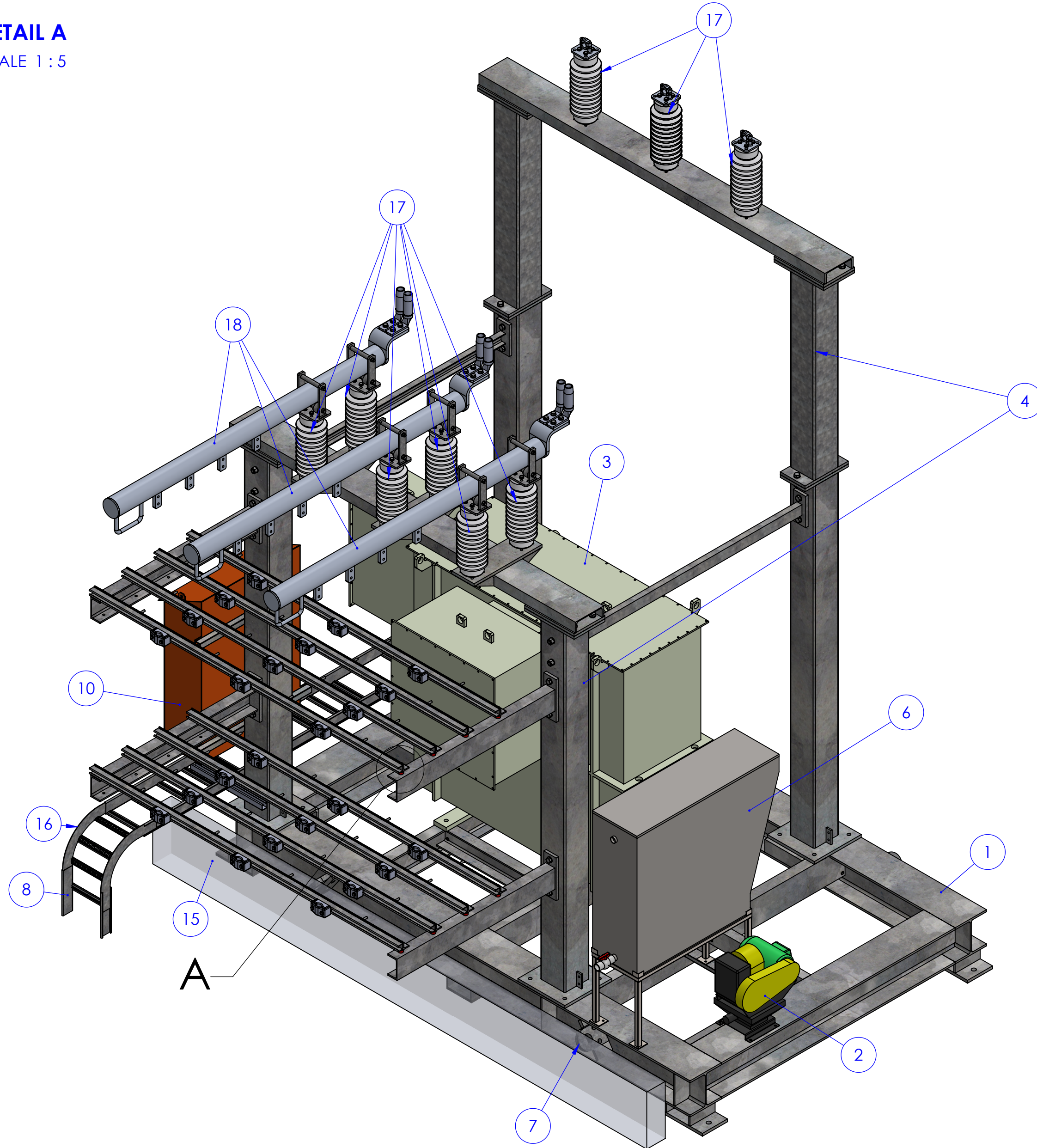
|   |                              |            |
|---|------------------------------|------------|
| ENEL GREEN POWER  |                              | SIZE<br>A1 |
| FLAT ROCK WIND FARM<br>132/33kV SUBSTATION<br>BAY 1 & BUS ELEVATION<br>LAYOUT |                              |            |
| PROJECT No.<br>1949   | DRAWING No.<br>1949-321-1001 | REV.<br>0  |





STANDOFF INSULATORS  
TO BE INSTALLED  
FOR EDDY CURRENT  
MITIGATION, PREVENTING  
INDUCTIVE HEATING

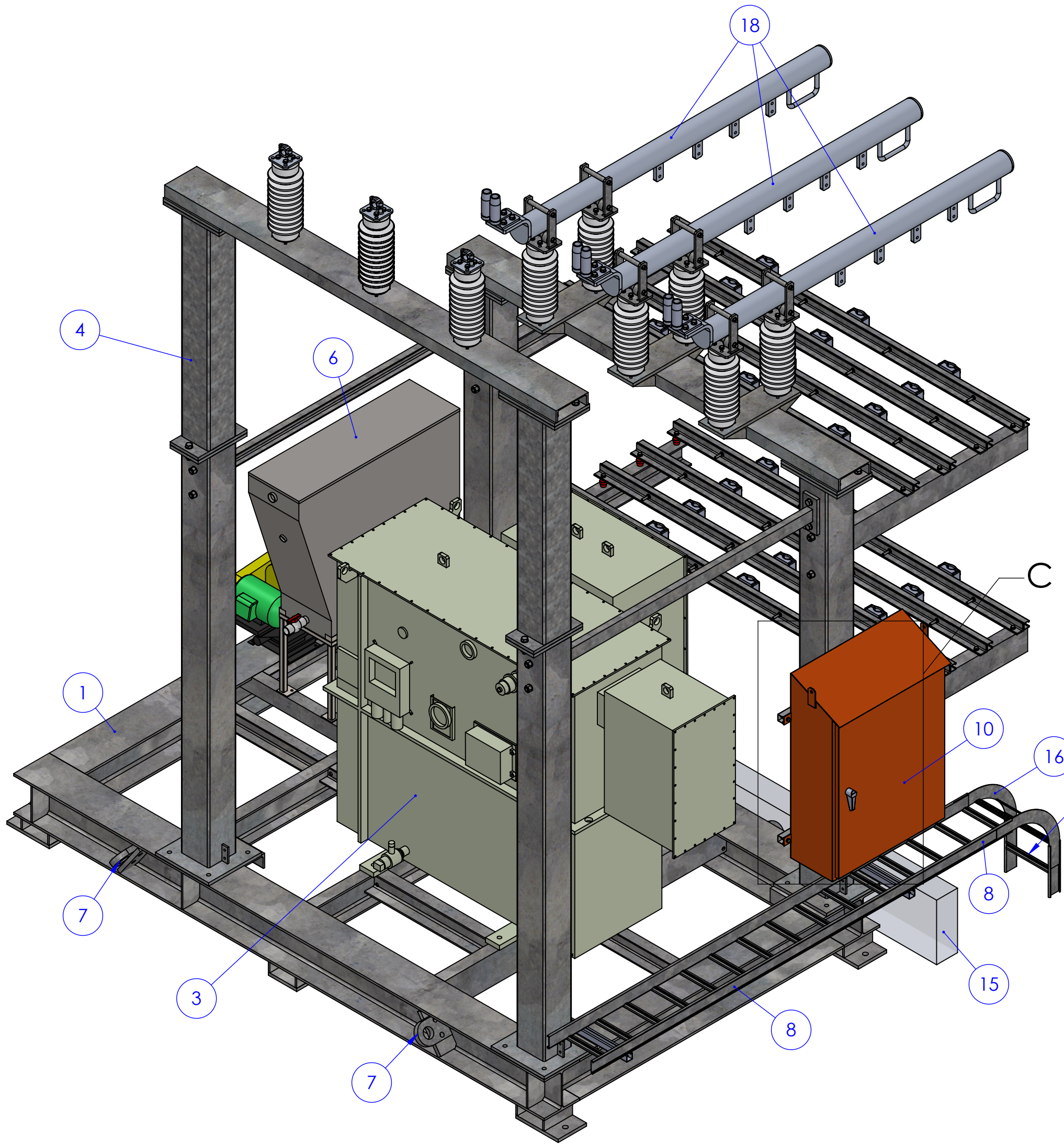
DETAIL A  
SCALE 1 : 5



ISOMETRIC VIEW FRONT

\*BUND WALL SHOWN FOR CLARITY

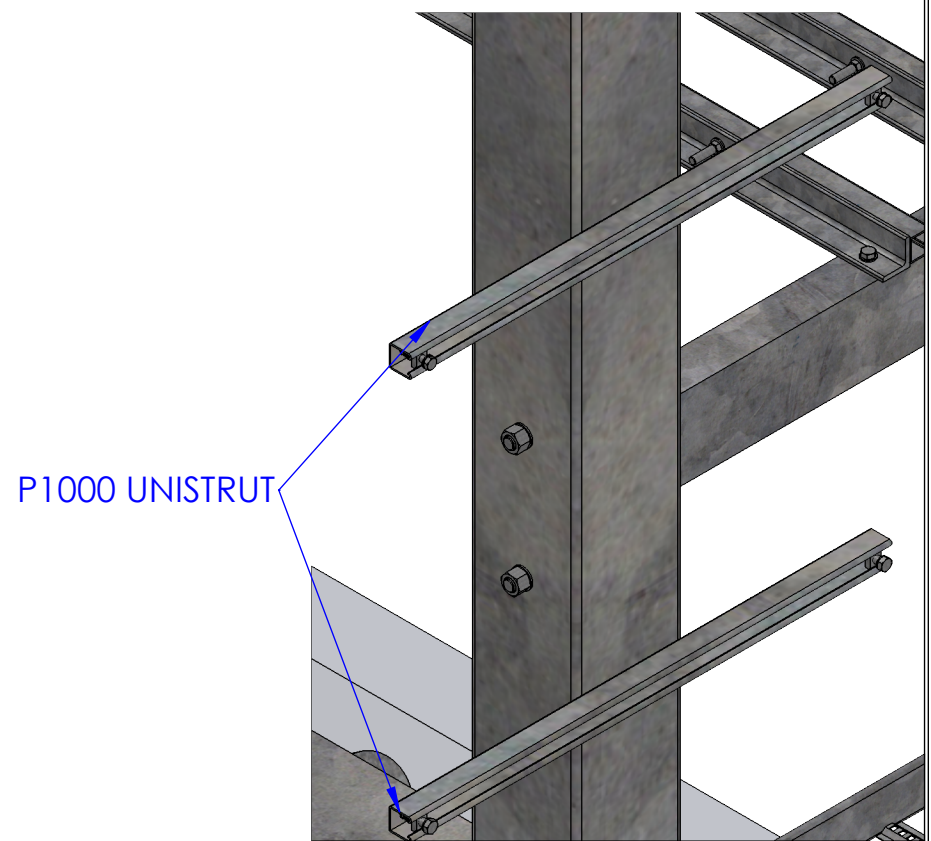
| ITEM NO. | DESCRIPTION                                     | QTY. |
|----------|---|------|
| 1        | BASEFRAME                                       | 1    |
| 2        | PUMP  | 1    |
| 3        | TRANSFORMER                                     | 1    |
| 4        | 33kV BUS STAND ASSEMBLY                         | 1    |
| 6        | COALESCING PLATE SEPARATOR                      | 1    |
| 7        | LIFTING LUG                                     | 4    |
| 8        | CABLE TRAY (N2L300H)                            | 2    |
| 10       | DB (NHP CTD360)                                 | 1    |
| 11       | CHANNEL NUT                                     | 4    |
| 12       | M10 WASHER                                      | 4    |
| 13       | M10x35 HEX BOLT                                 | 2    |
| 14       | M12x35 HEX BOLT                                 | 2    |
| 15       | BUND WALL (FOR CLARITY ONLY)                    | 1    |
| 16       | CABLE LADDER EXT. RISER (N2ER4504H)             | 1    |
| 17       | 33kV POST INSULATORS                            | 9    |
| 18       | AL BUS TUBE, 125mm OD 6mm WALL THK, 2500A @ 50° | 3    |





ISOMETRIC VIEW REAR

CABLE LADDER  
ACCESS TO CULVERT

DETAIL C  
SCALE 1 : 10  
(DB REMOVED TO DISPLAY MOUNT)



P1000 UNISTRUT

|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
|-------------|---|--|--|--|---------------|--|------------|--|---------------------------|--|-----------------------|--|--|--|---------------|--|------------|--|--|--|--|--|------------|
| © Copyright | <input checked="" type="checkbox"/> INSPECTION <input type="checkbox"/> REFERENCE                             |  | THIS DRAWING REMAINS THE PROPERTY OF<br>RJE GLOBAL PTY LTD   |  |               |  |            |  |                           |  |                       |  |  |  |               |  | SCALE 1:20 |  | APPROVED FOR CONSTRUCTION  |  | ENEL ENERGY  |  | SIZE<br>A1 |
|             | <br>THIRD ANGLE PROJECTION |  | IT IS SUBJECT TO RETURN UPON DEMAND AND<br>MAY NOT BE PASSED ON TO ANY THIRD<br>PARTY, OR USED DIRECTLY OR INDIRECTLY FOR<br>ANY OTHER PURPOSE THAN THE MANUFACTURE<br>OR CONSTRUCTION OF EQUIPMENT, OR IN THE<br>DESIGN AND INSTALLATION OF PLANT TO THE<br>ORDER OF RJE GLOBAL Pty. Ltd. |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  115 MORPHETT ROAD<br>MORPHETTVILLE, SA<br>TEL +61 8 8300 9500<br>FAX +61 8 8300 9501<br>EMAIL enquiries@rjeglobal.com.au |  | FLATROCK WIND FARM<br>132/33kV SUBSTATION<br>33kV CABLE TERMINATION STRUCTURE -UA11<br>ISOMETRIC DRAWING |  | REV.<br>0  |
|             |   |  | DRG NUMBER   |  | DRAWING TITLE |  | O 16.02.23 |  | APPROVED FOR CONSTRUCTION |  | NA SJW                |  |  |  | APPROVED DATE |  |            |  |  |  |  |  |            |
|             |   |  |  |  |               |  | REV DATE   |  | DESCRIPTION               |  | DRN CHK'D C.E. CLIENT |  |  |  |               |  |            |  |  |  |  |  |            |
|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
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|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
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|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
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|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
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|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
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|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
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|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
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|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
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|             |   |  |  |  |               |  |            |  |                           |  |                       |  |  |  |               |  |            |  |  |  |  |  |            |
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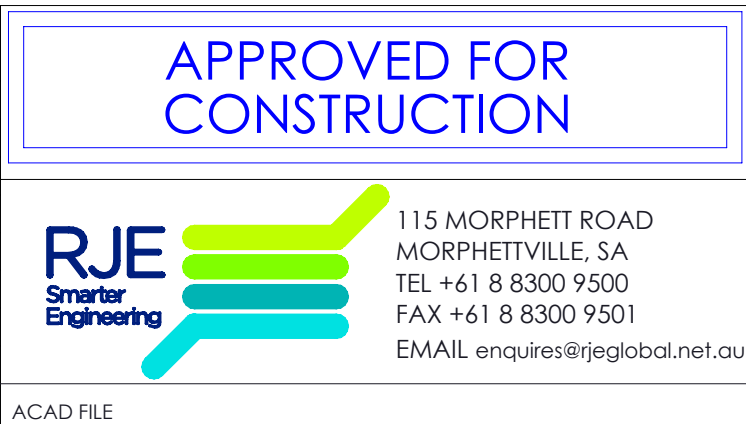


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OR CONSTRUCTION OF EQUIPMENT, OR IN THE  
DESIGN AND INSTALLATION OF PLANT TO THE  
ORDER OF RJE GLOBAL Pty. Ltd.

|                    |               |
|--------------------|---------------|
| DRG NUMBER         | DRAWING TITLE |
| REFERENCE DRAWINGS |               |

|                         |          |                           |    |
|-------------------------|----------|---------------------------|----|
| 0                       | 12.09.22 | APPROVED FOR CONSTRUCTION | SK |
| REV                     | DATE     | DESCRIPTION               | DR |
| REVISIONS AND APPROVALS |          |                           |    |

|             |          |          |
|-------------|----------|----------|
| SCALE 1:45  |          |          |
| DRAWN       | KW       | 12.04.19 |
| CHECKED     | SJW      | 12.04.19 |
| DESIGNED    |          |          |
| RJE C.E.    |          |          |
| CLIENT C.E. |          |          |
| CLIENT P.E. |          |          |
| CLIENT M.E. |          |          |
| NT          | APPROVED | DATE     |
| APPROVALS   |          |          |



# ENEL GREEN POWER

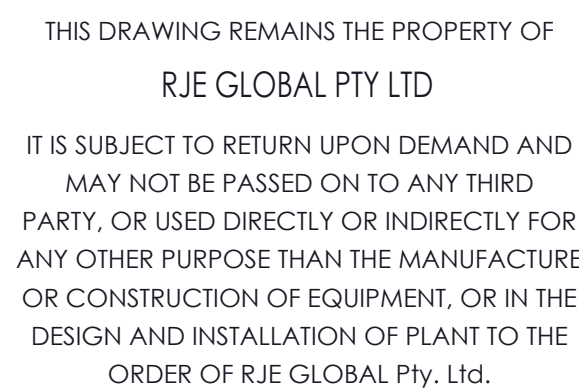
FLAT ROCK WIND FARM  
33kV SWITCHROOM +Z01  
ISOMETRIC VIEW  
LAYOUT DRAWING

|             |               |
|-------------|---------------|
| PROJECT No. | DRAWING No.   |
| 1949        | 1949-222-1002 |

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|             |     |          |
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| SCALE       |     | 1:30     |
| DRAWN       | SSK | 10.08.22 |
| CHECKED     | SJW | 10.08.22 |
| DESIGNED    |     |          |
| RJE C.E.    |     |          |
| CLIENT C.E. |     |          |
| CLIENT P.E. |     |          |
| CLIENT M.E. |     |          |
| APPROVED    |     | DATE     |
| APPROVALS   |     |          |



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FAX +61 8 8300 9501  
EMAIL [enquiries@rjeglobal.com](mailto:enquiries@rjeglobal.com)

|             |               |
|-------------|---------------|
| PROJECT No. | DRAWING No.   |
| 1949        | 1949-222-4002 |

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[illegible]

### REAR ISOMETRIC VIEW

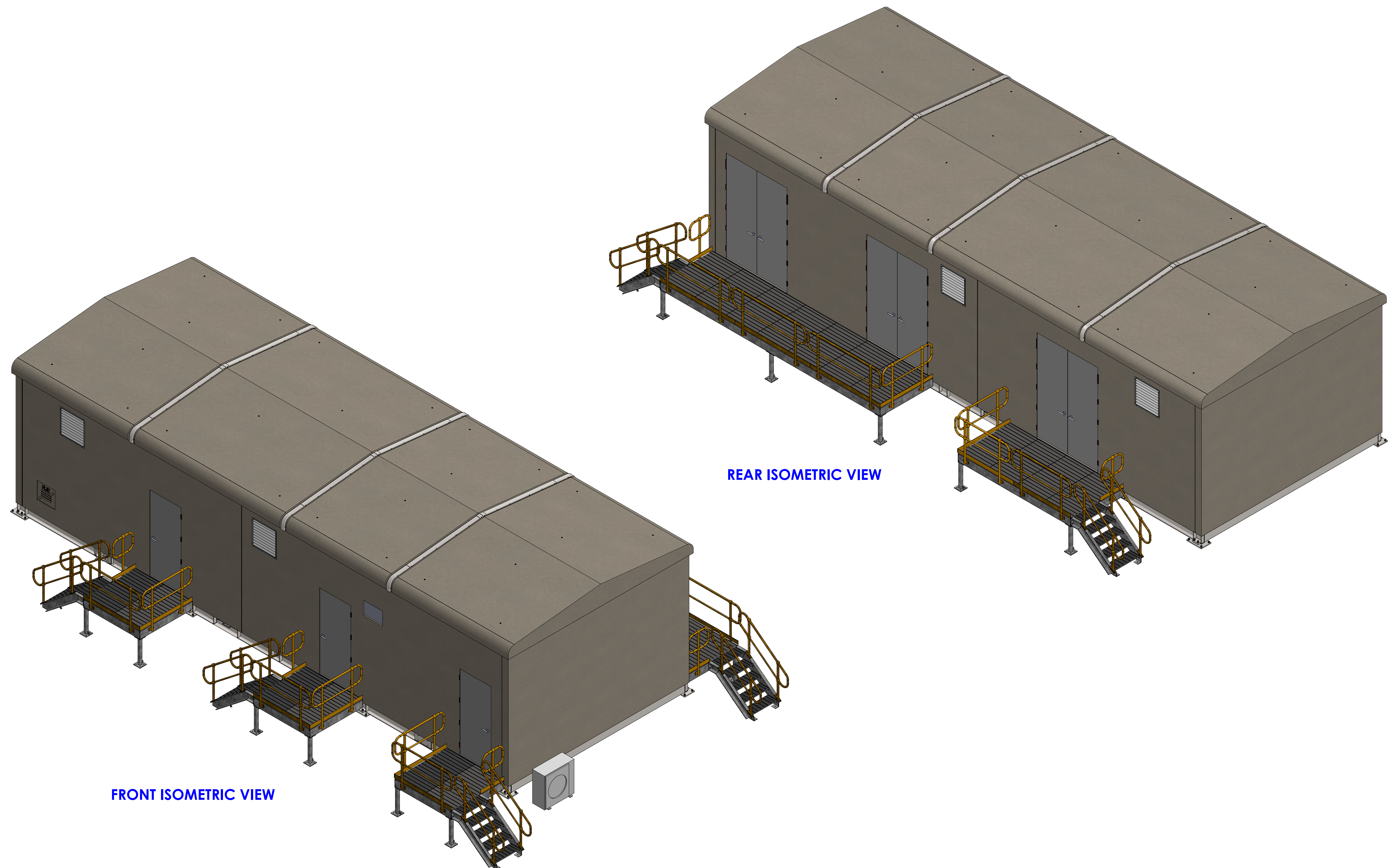
### FRONT ISOMETRIC VIEW



REAR ISOMETRIC VIEW

## REAR ISOMETRIC VIEW





### REAR ISOMETRIC VIEW

### FRONT ISOMETRIC VIEW

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OR CONSTRUCTION OF EQUIPMENT, OR IN THE  
DESIGN AND INSTALLATION OF PLANT TO THE  
ORDER OF RJE GLOBAL Pty. Ltd.

[illegible]

|            |
|------------|
| SCALE 1:45 |
|------------|

|             |     |          |
|-------------|-----|----------|
| DRAWN       | KW  | 14.11.22 |
| CHECKED     | SJW | 14.11.22 |
| DESIGNED    |     |          |
| RJE C.E.    |     |          |
| CLIENT C.E. |     |          |
| CLIENT P.E. |     |          |
| CLIENT M.E. |     |          |

APPROVALS

|  |           |
|--|-----------|
|  | ACAD FILE |
|--|-----------|

APPROVED FOR  
CONSTRUCTION



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MORPHETTVILLE, SA  
TEL +61 8 8300 9500  
FAX +61 8 8300 9501  
EMAIL [enquiries@rjglobal.com](mailto:enquiries@rjglobal.com)

CLIENT DOCUMENT No.

GRE.EEC.L.73.AU.W.08691.00.055

# ENEL GREEN POWER

FLAT ROCK WIND FARM  
REACTIVE PLANT BUILDING +Z03  
ISOMETRIC VIEW  
LAYOUT DRAWING

|             |      |
|-------------|------|
| PROJECT No. | 1949 |
|-------------|------|

DRAWING No.  
1949-222-6002

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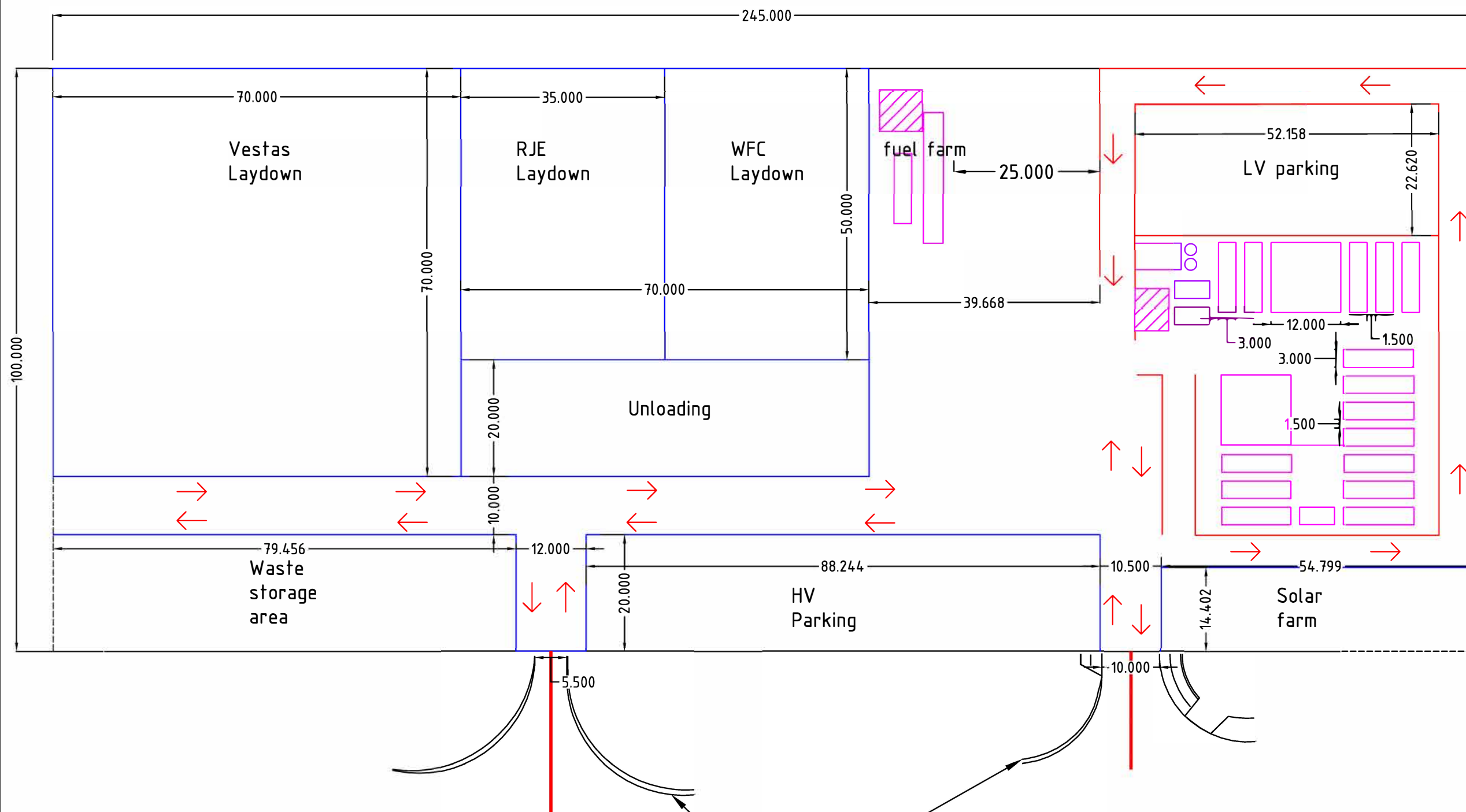






Terminology/Laydown Layout  
Lot 5614 Warrenup Rd, Broomehill West

| DEPARTMENT OF PLANNING, LANDS<br>AND HERITAGE |             |
|---|-------------|
| DATE  | FILE        |
| 24-Apr-2023                                   | SDAU-060-23 |



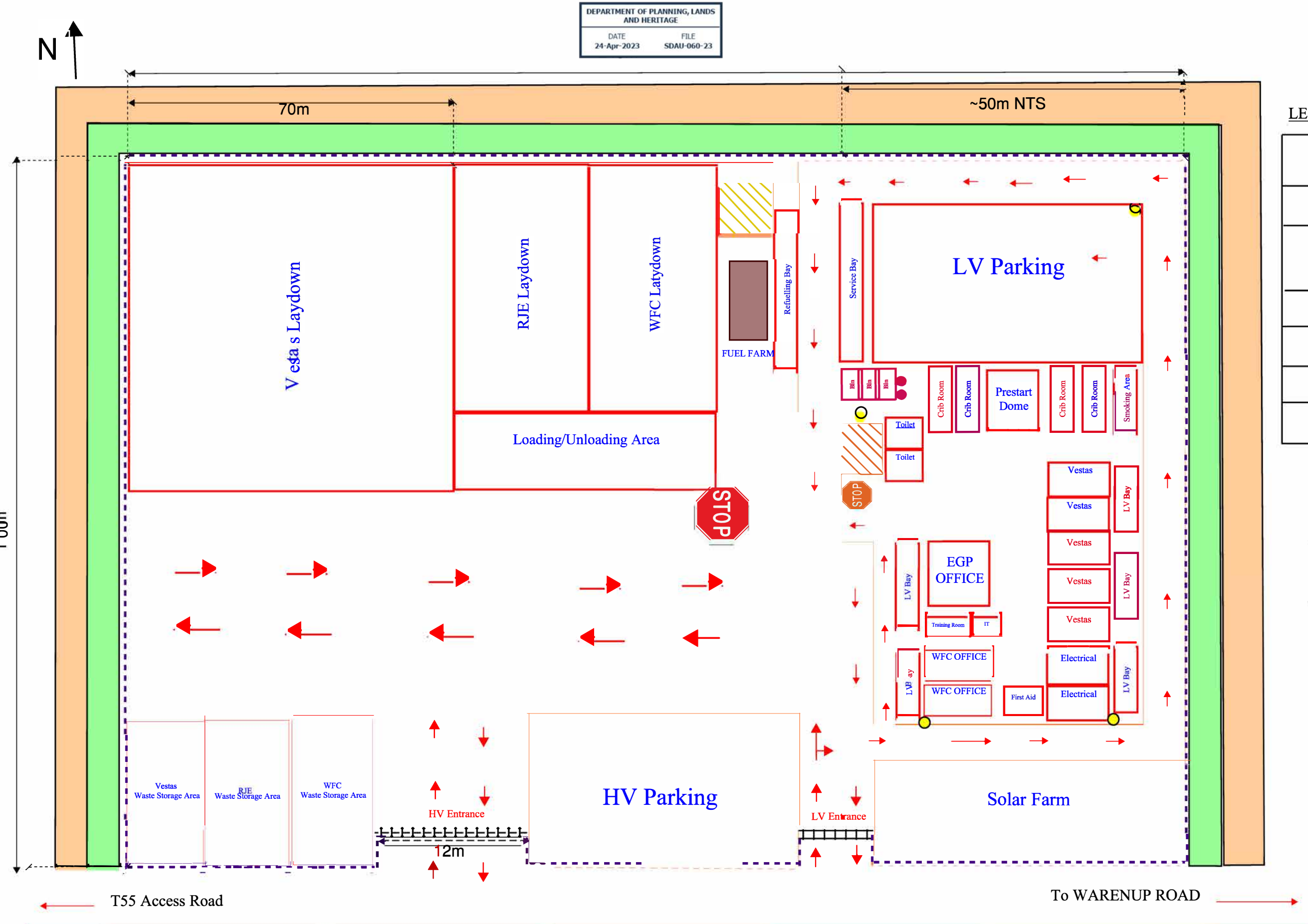
- Notes:
- 1) Layout has been digitised from reference provided by Westforce Construction.
  - 2) Dimensions shown in metres unless noted otherwise.
  - 3) Cross section similar to GRE.EEC.D.99.AU.W.086 91.12.133 with 150mm of pavement material and bearing capacity of 250kPa

**Handley**  
SURVEYS

PERTH (HEAD OFFICE)  
3/524 Abernethy Road, KEWDALE, WA 6105  
(08) 9353 2622  
ABN: 59 100 410 384  
admin@handleysurveys.com.au

Job Code: C4670  
Survey Request No.: 0002  
Surveyor: B. O'Byrne  
Date of Survey: N/A  
Date Drawn: 13/10/2022  
File Reference: GRE.EECR.99.AU.W.08691.12.016  
Sheet: 1/1





LEGEND

|                                  |  |
|----------------------------------|--|
| 65000Ltrs Fuel Tank (12x2.4x2.6) |  |
| Lighting                         |  |
| Security Gate                    |  |
| Water Tank                       |  |
| 5m Topsoil                       |  |
| Fencing                          |  |
| 25m APZ Clearance                |  |

Project:

ENEL Flat Rocks Wind Farm

Title:

Site Facilities General Arrangement



CROSS SECTION OF PAD

SIMILAR TO "TYPICAL

ROAD SECTION IN

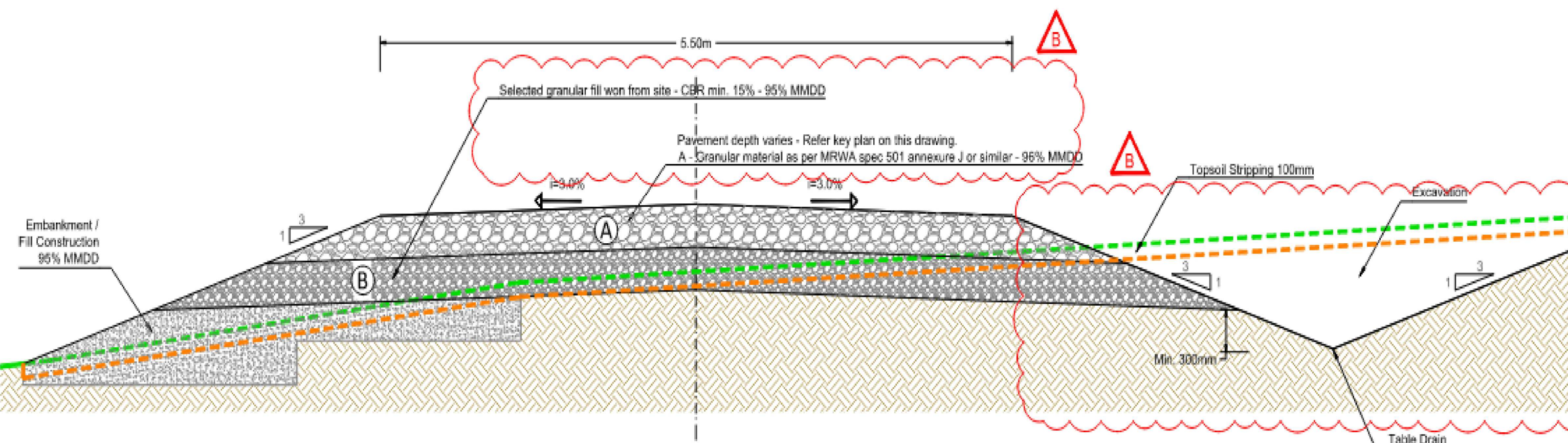
CUT/AND FILL"

1 LAYER OF ROADBASE

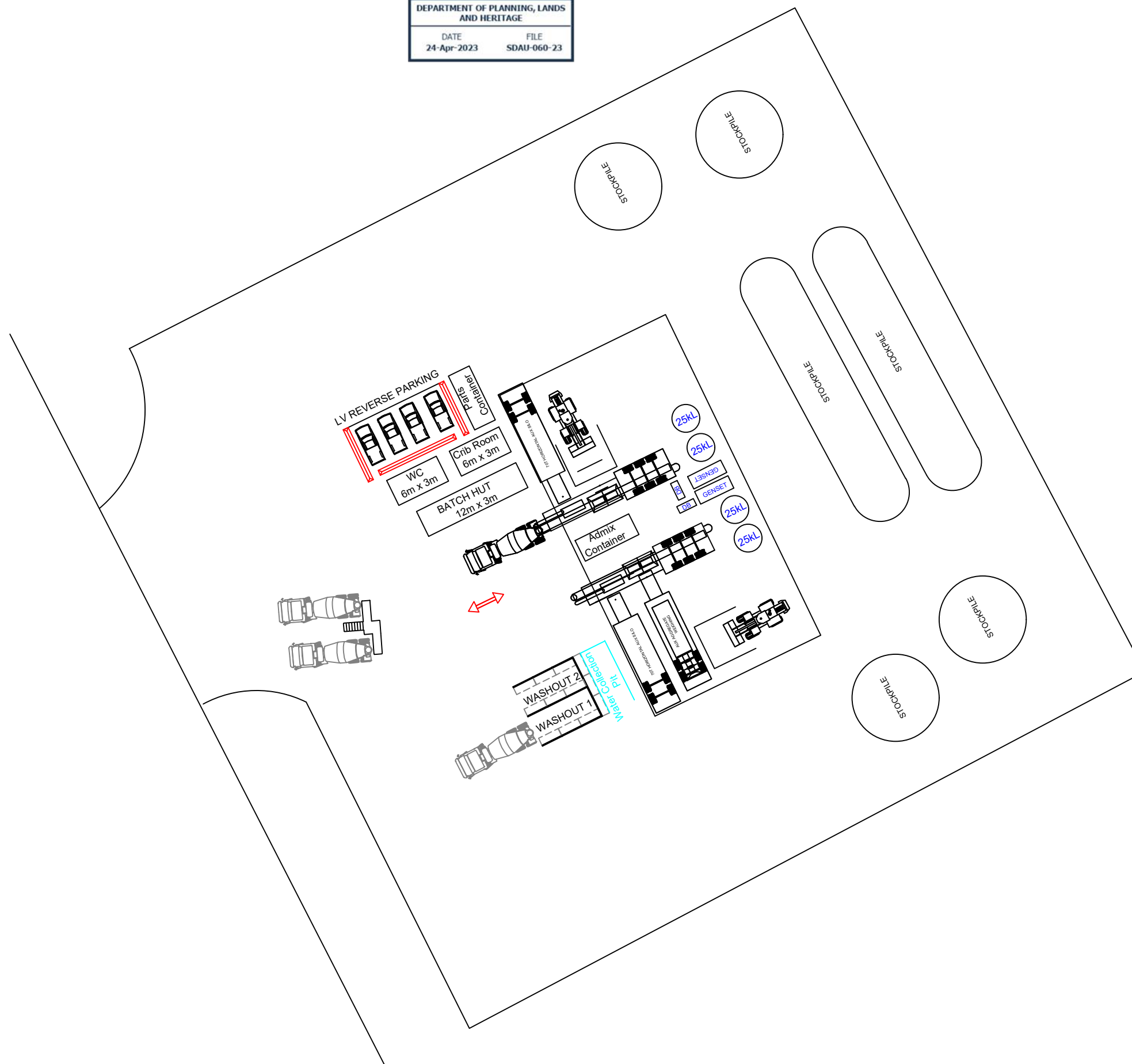
150mm

Temp Site Facility/Laydown Layout

Lot 5614 Warrenup Rd, Broomehill West

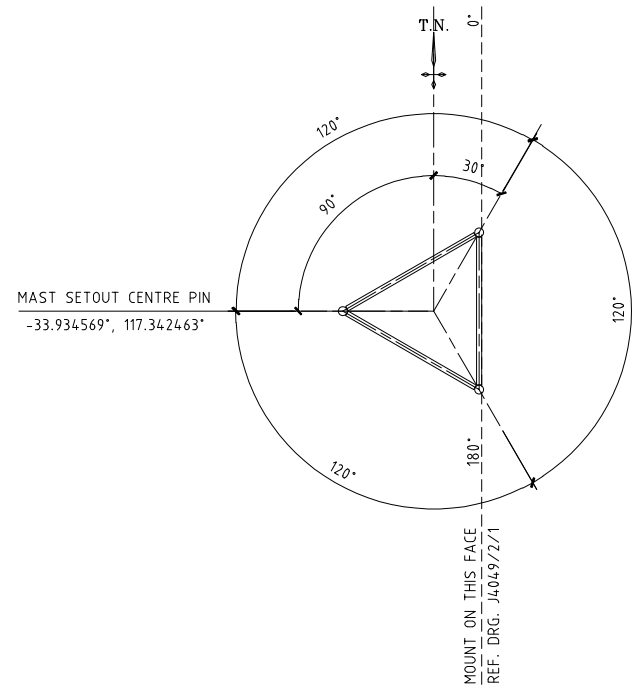
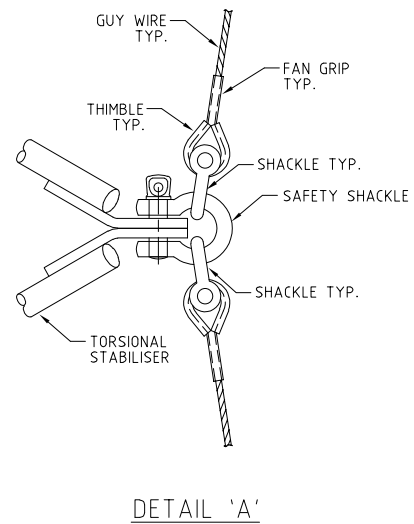
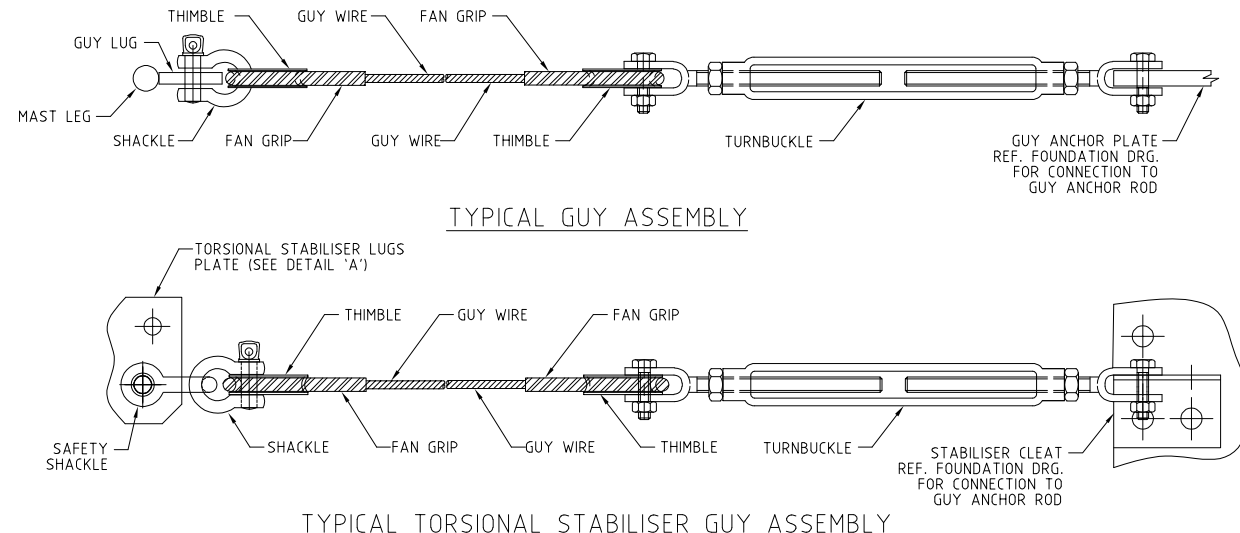
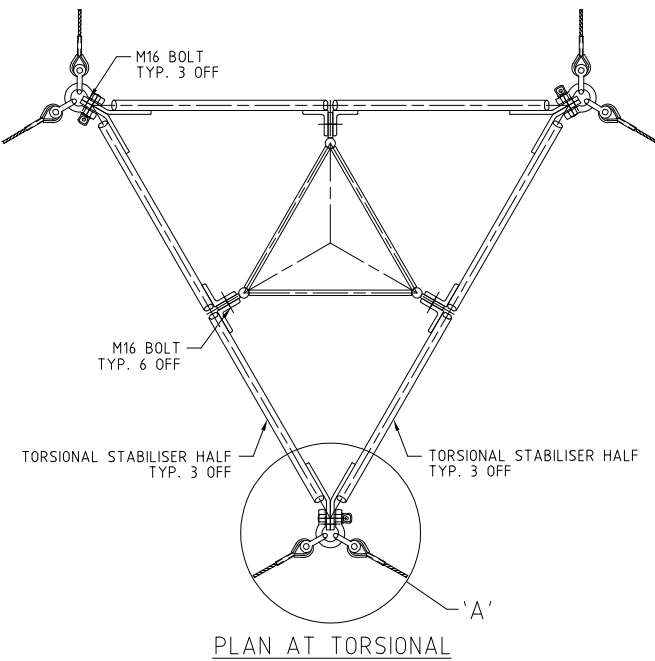
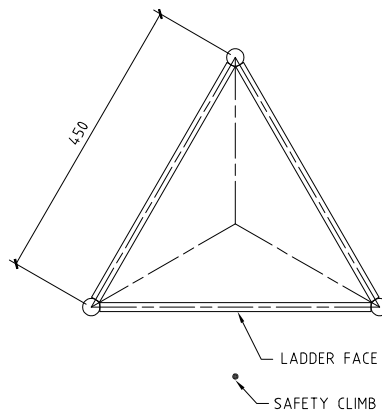
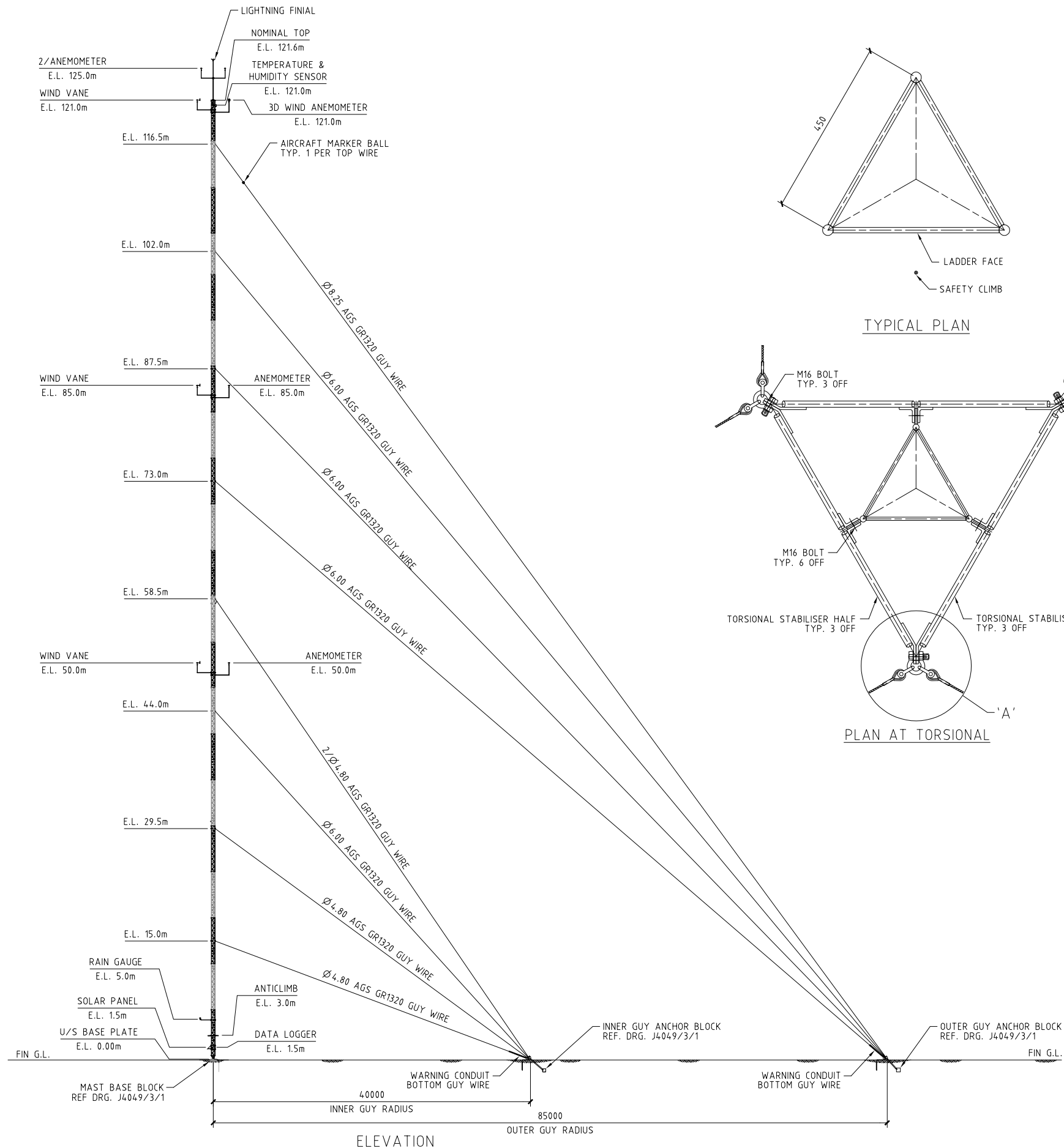


**TYPICAL ROAD SECTION IN CUT AND FILL**  
Scale 1:25



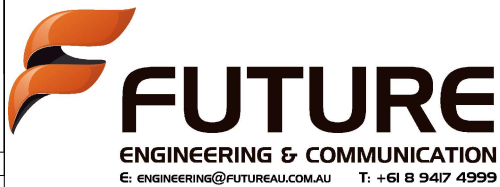


TM16A  
N  
M1A  
M5A  
M1A  
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MODULES



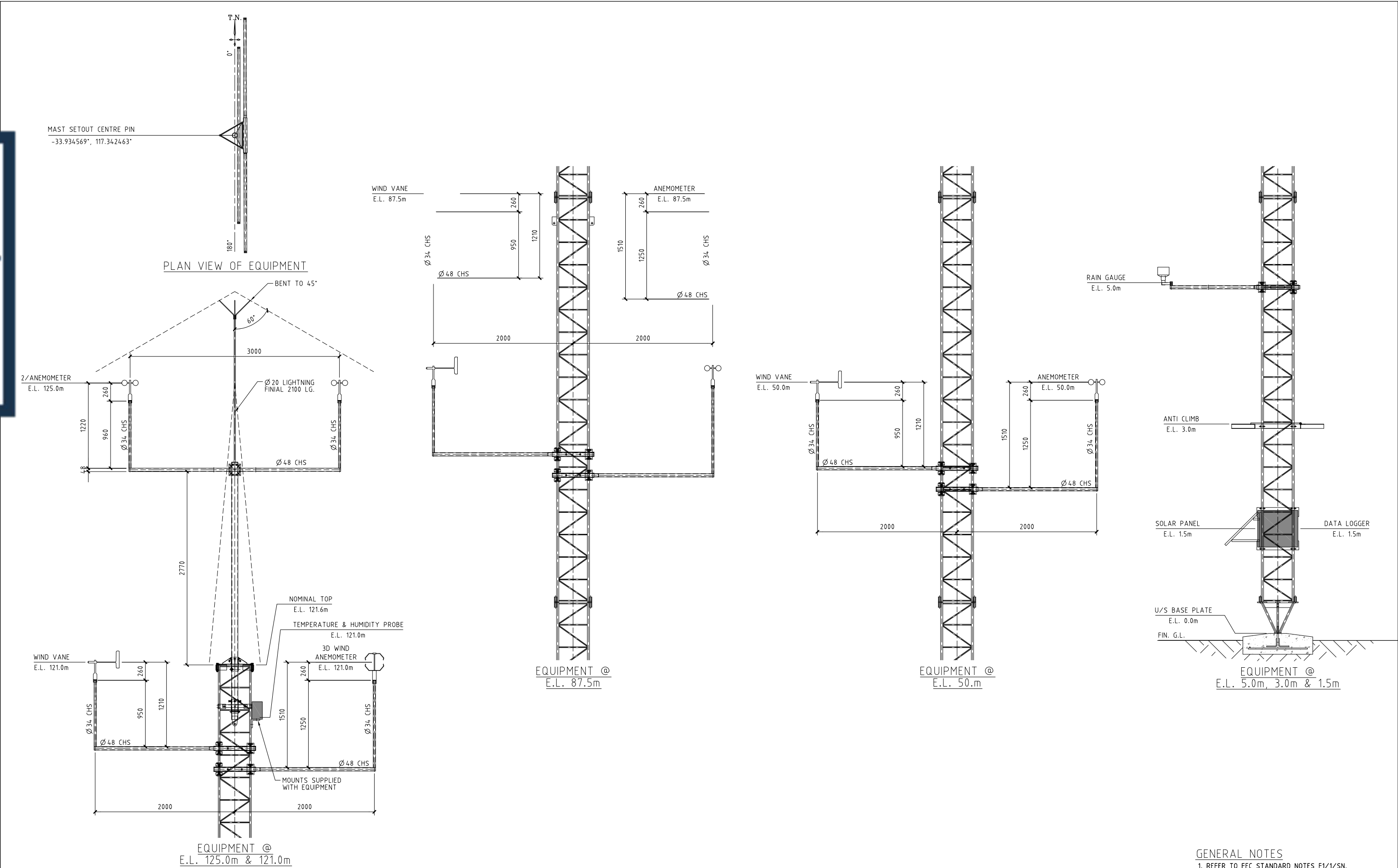
- GENERAL NOTES
1. REFER TO FEC STANDARD NOTES F1/1/SN.
  2. SPLICE BOLTS : MODULE TO MODULE - M16 BOLT (3 OFF)  
MODULE TO TAPERED BASE - M16 BOLT (3 OFF)
  3. GUY RADII GIVEN ARE BASED ON LEVEL GROUND
  4. REFER TO DRAWING J4049/2/1 FOR EQUIPMENT MOUNT ARRANGEMENT.

| J4049/3/1<br>J4049/2/1<br>F1/1/SN | FOUNDATION DETAILS<br>EQUIPMENT MOUNT DETAILS<br>FEC STANDARD NOTES |             |             |             |             |           |             |      |       |
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| DRAWING No.                       | DESCRIPTION   | DRAWING No. | DESCRIPTION | DRAWING No. | DESCRIPTION | REF       | DESCRIPTION | DATE | APPV. |
| REFERENCE DRAWINGS                |   |             |             |             |             | REVISIONS |             |      |       |




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| DRAWN: MP     | ENG.:     | DNV - FLAT ROCKS WIND FARM<br>PERMANENT RM1415              |                    |      |  |  |  |  |  |
| CHECKED:      | APPV.:    | 125m HUB F450 METEOROLOGY<br>GUYED MAST GENERAL ARRANGEMENT |                    |      |  |  |  |  |  |
| DATE: 6/12/22 | SHEET: A1 | SCALE: NTS  | DWG No.: J4049/1/1 | REV: |  |  |  |  |  |



GENERAL NOTES  
1. REFER TO FEC STANDARD NOTES F1/1/SN.

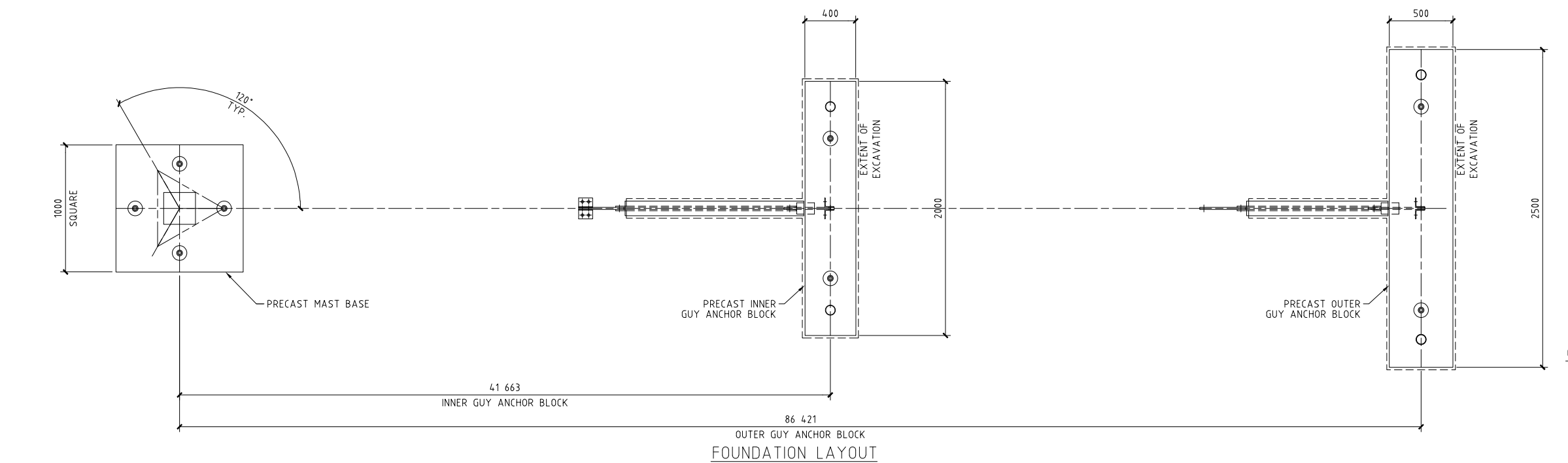
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| DRAWING No.        | DESCRIPTION        | DRAWING No. | DESCRIPTION | DRAWING No. | DESCRIPTION | REF | DESCRIPTION | DATE | APPV. |
| REFERENCE DRAWINGS |                    |             | REVISIONS   |             |             |     |             |      |       |

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| CHECKED:         | APPV.:       | 125m HUB F450 MET. GUYED MAST<br>EQUIPMENT MOUNT ARRANGEMENT |                        |  |  |      |
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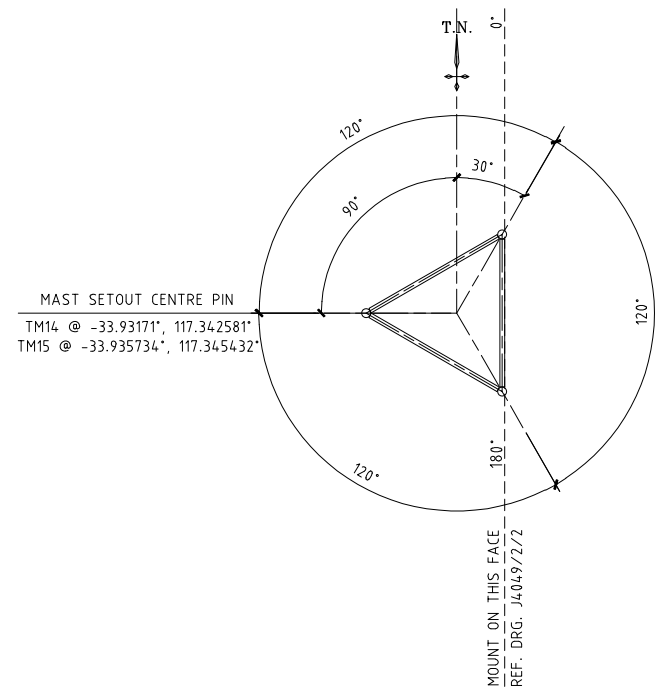
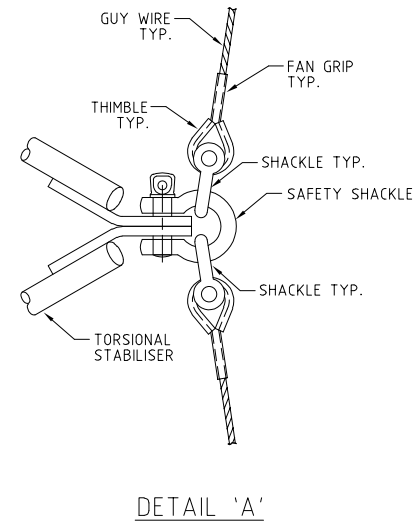
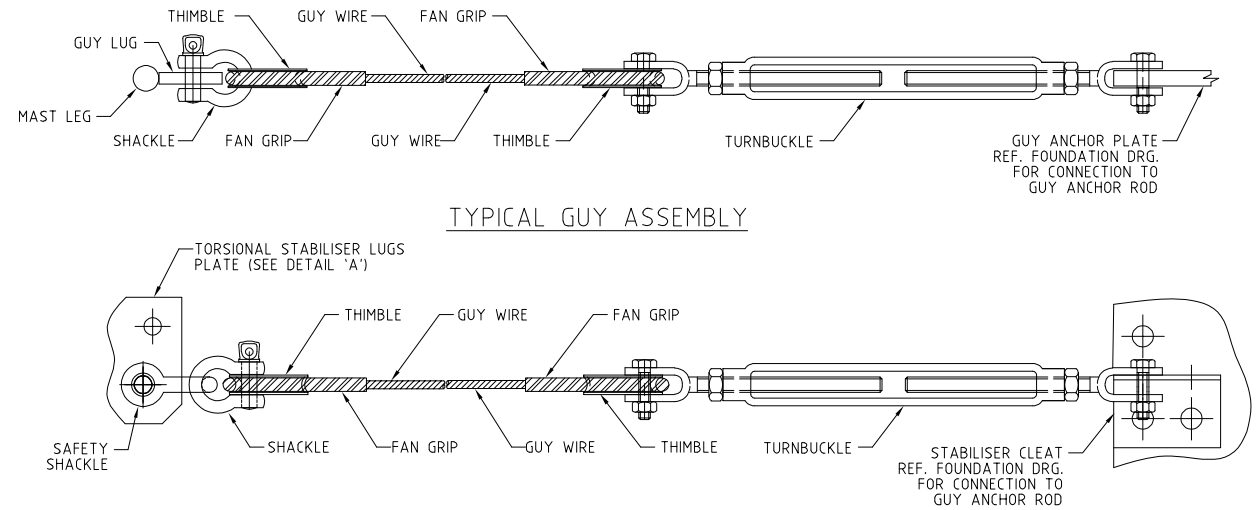
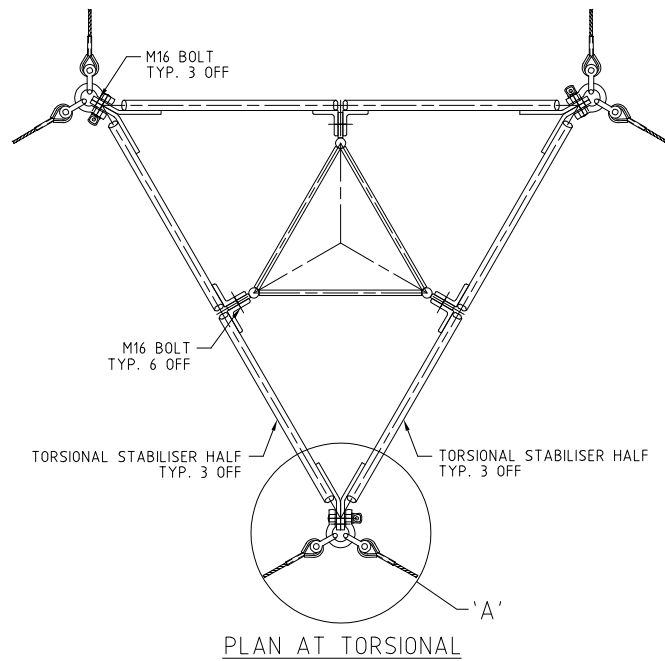
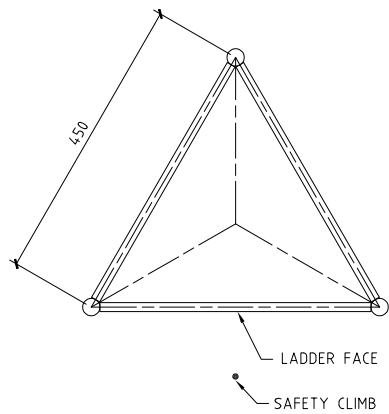
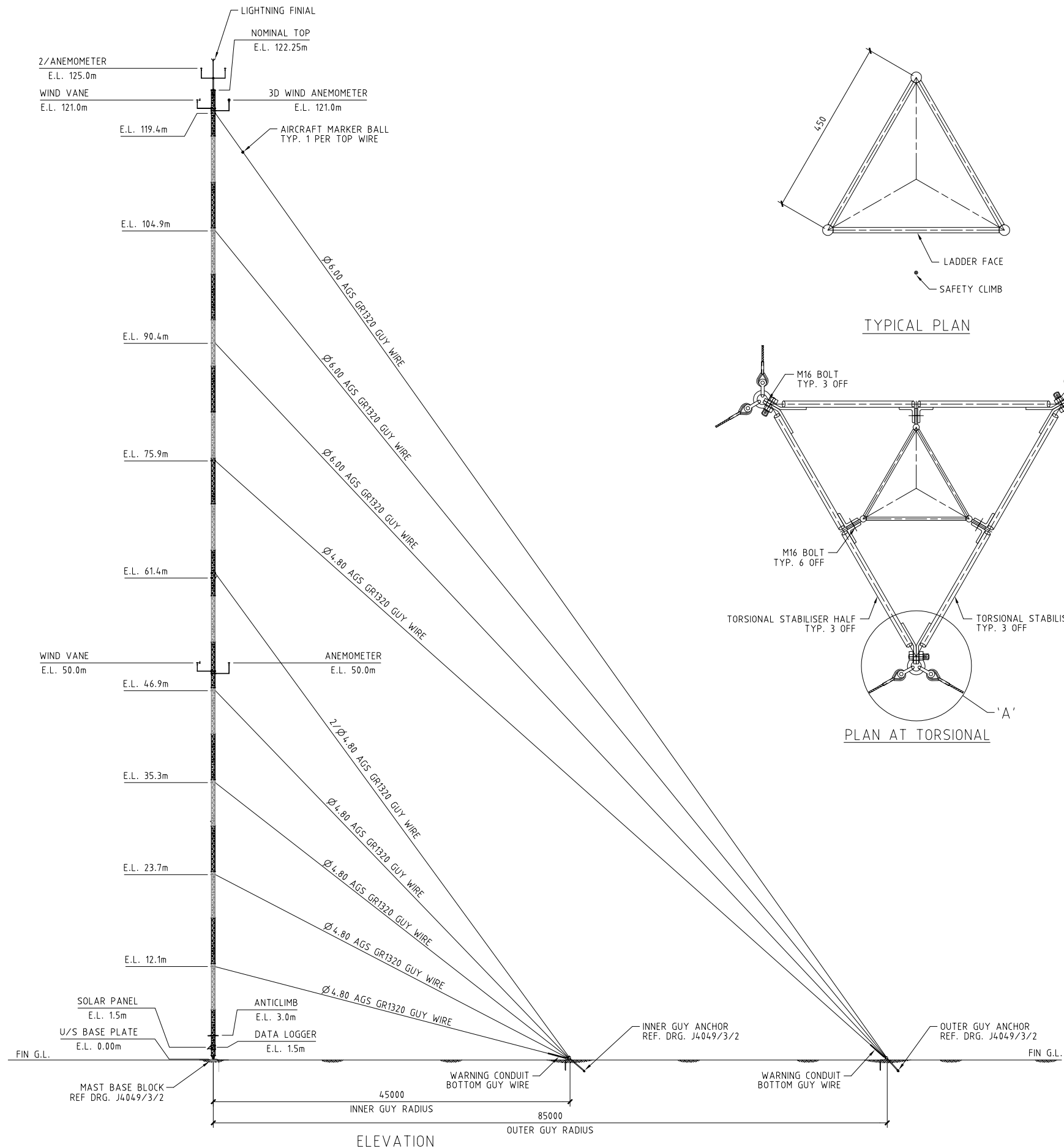


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| ENG.:   | DNV - FLAT ROCKS WIND FARM<br>PERMANENT RM1415       |               |                        |       |
| APPV.:  | 125m HUB F450 METEOROLOGY MAST<br>FOUNDATION DETAILS |               |                        |       |
| 3-12-22 | SHEET:<br>A1   | SCALE:<br>NTS | DWG No. :<br>J4049/3/1 | REV.: |

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| F1/1/SN            | FEC STANDARD NOTES |             |             |             |             |           |             |      |       |
| DRAWING No.        | DESCRIPTION        | DRAWING No. | DESCRIPTION | DRAWING No. | DESCRIPTION | REF       | DESCRIPTION | DATE | APPV. |
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|   |   | DATE:<br>13-12-22 | SHEET:<br>A1 | SCALE:<br>NTS  | DWG No. :<br>J4049/3/1 | REV.: |  |

M3D  
N  
M6D  
M1D  
M1D  
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MODULES



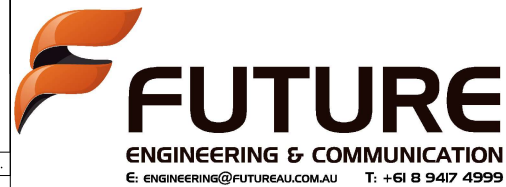
#### GENERAL NOTES

1. REFER TO FEC STANDARD NOTES F1/1/SN.
2. SPLICE BOLTS : MODULE TO MODULE - M16 BOLT (3 OFF)  
MODULE TO TAPERED BASE - M16 BOLT (3 OFF)
3. GUY RADII GIVEN ARE BASED ON LEVEL GROUND
4. REFER TO DRAWING J4049/2/2 FOR EQUIPMENT MOUNT ARRANGEMENT.

J4049/3/2  
J4049/2/2  
F1/1/SN

FOUNDATION DETAILS  
EQUIPMENT MOUNT DETAILS  
FEC STANDARD NOTES

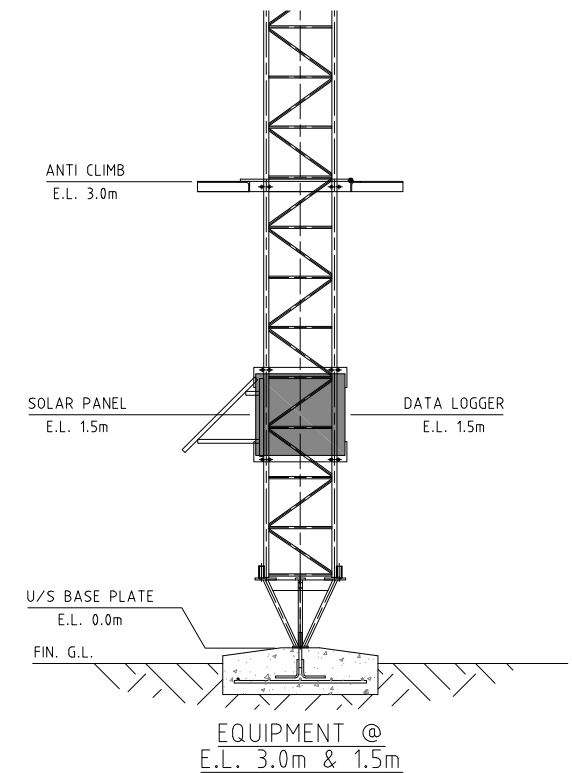
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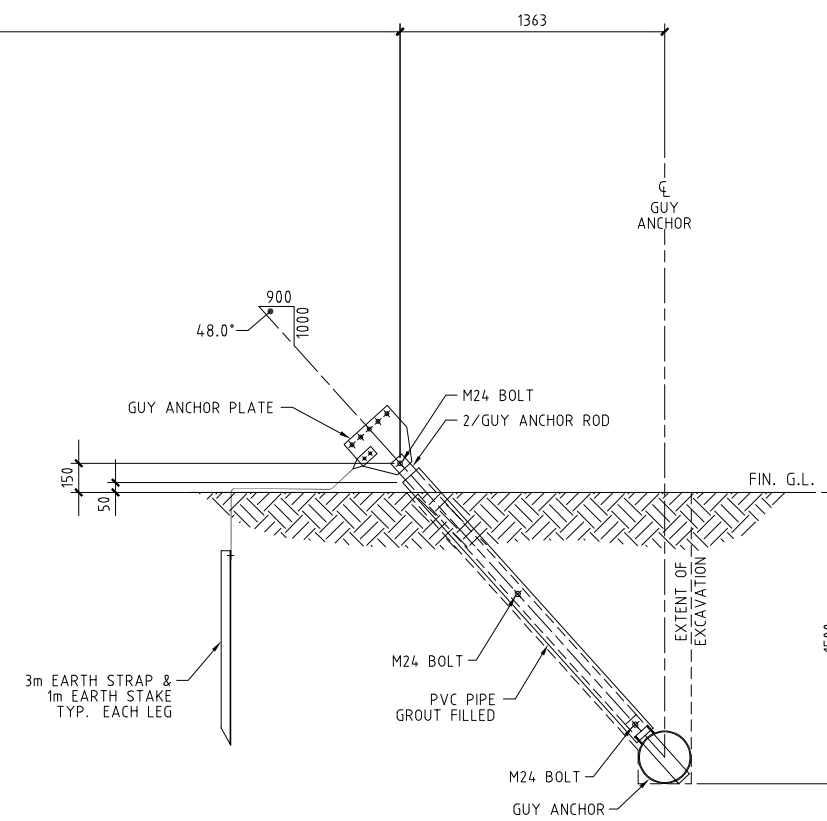
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| DRAWN: MP     | ENG.      | DNV - FLAT ROCKS WIND FARM<br>TEMPORARY TM14 & TM15<br>125m HUB F450 METEOROLOGY<br>GUYED MAST GENERAL ARRANGEMENT |                    |  |  | REV. |
| CHECKED:      | APPV.:    |  |                    |  |  |      |
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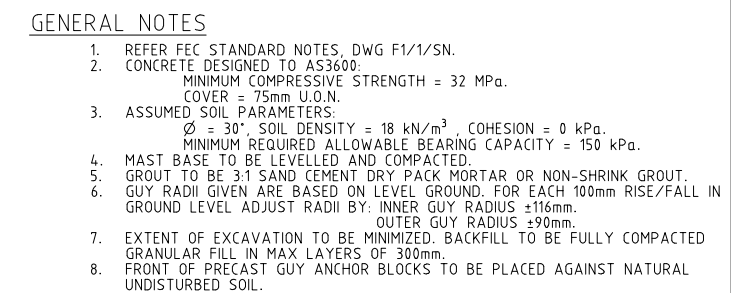





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| CHECKED:         | APPV.: |   |               |                        |       |
| DATE:<br>6/12/22 |        | SHEET:<br>A1  | SCALE:<br>NTS | DWG No. :<br>J4049/2/2 | REV.: |



OUTER ANCHOR BLOCK



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| F1/1/SN            | FEC STANDARD NOTES |             |             |             |             |     |             |      |       | <div><p><b>FUTURE</b><br/>ENGINEERING &amp; COMMUNICATION<br/>E: <a href="mailto:ENGINEERING@FUTUREAU.COM.AU">ENGINEERING@FUTUREAU.COM.AU</a> T: +61 8 9417 4999</p></div> <div>This design or drawing is not sold but lent. It remains the property of this company and is subject to recall. Its contents must not be communicated to any person whatsoever without the written consent of FEC.</div> | DRAWN: MP | ENG.:    | DNV - FLAT ROCKS WIND FARM<br>TEMPORARY TM14 & TM15  |            |                     |      |
|                    |                    |             |             |             |             |     |             |      |       |  | CHECKED:  | APPV.:   | 125m HUB F450 METEOROLOGY MAST<br>FOUNDATION DETAILS |            |                     |      |
|                    |                    |             |             |             |             |     |             |      |       |  | DATE:     | 14-12-22 | SHEET: A1  | SCALE: NTS | DWG No. : J4049/3/2 | REV: |
| REFERENCE DRAWINGS |                    |             |             |             |             |     |             |      |       |  | REVISIONS |          |  |            |                     |      |
| DRAWING No.        | DESCRIPTION        | DRAWING No. | DESCRIPTION | DRAWING No. | DESCRIPTION | REF | DESCRIPTION | DATE | APPV. |  |           |          |  |            |                     |      |



# Bushfire Management Plan



# Kojonup

*One community, many choices*

Our Ref: DB.BDA.8

Dr Sarah Rankin – Managing Director

Moonies Hill Energy Pty Ltd

5 Barnfield Road

CLAREMONT WA 6010

Dear Sarah,

MOONIES HILL ENERGY PTY LTD, CONSTRUCTION MANAGEMENT PLAN,  
BUSHFIRE MANAGEMENT PLAN, TRAFFIC MANAGEMENT PLAN APPROVALS  
ASSOCIATED WITH FLATROCKS WIND FARM.

The Shire of Kojonup Council at its 13<sup>th</sup> of September 2022 meeting approved the following motion:

**“That Council:**

**1) Approve the following management plans for Moonies Hill Energy Pty Ltd for the Flat Rocks Wind Farm as outlined in Attachments 9.4.1.2 to 9.4.1.6:**

- **Construction Management Plan (Condition 18) except for Appendix A (Development Layout Plan) within the Construction Management Plan. See point 2 below for the approval of Development Layout Plan;**
- **Fire Management Plan - Bushfire Management Plan incorporating the Emergency Management Plan (Condition 19) – amended as follows:**
  - **incorporate changes from a 1000 litre fire appliance (slip on unit) to a minimum 2,400 litre unit; and**
  - **the 2,400 litre fire appliance unit be retained at the operations building and maintenance compound to attend maintenance site works during operation at all times; and**
  - **That fire units, with a minimum capacity of 1000 litres of water, be added as a requirement at all hot worksites (that is; one per hot worksite) located in the Shire of Kojonup during the fire season, with**

**the 2,400 litre fire unit on standby at the main compound for all worksites located within the Shire of Kojonup during the fire season; and**

- **Traffic Management Plan - incorporating the Pre-Construction Road Condition Report and the Route Study. This is subject to addressing Main Roads Western Australia advice and modifying the Traffic Management Plan to the satisfaction of the Shire's Chief Executive Officer (Condition 20).**

**2) While noting point 1, it is highlighted that approval of the management plans:**

- **Does not include the Development Layout Plan included with the documents; and**
- **Does not override the need to obtain any relevant approvals that may be separately required from other agencies.**

**Advice Notes:**

**1) Advise the Shire of Broomehill-Tambellup of the decision."**

Please note the changes required to the Bushfire Management Plan.

I also confirm that Enel is keen to progress construction works. Although Council has approved the Construction Management Plan (CMP), it is important that I point out that the Shire has not at this stage approved the Development Layout Plan (DLP) or the Noise Impact Mitigation Management Plan (NIMMP).

It follows from the fact that the CMP has been approved but not the DLP at this stage (as per Condition 17), that although Enel can commence some preparation works, it should not commence major construction works to the extent that those works rely on the turbines being micro-sited in the locations identified on the DLP.

The same comment applies to so much of the other infrastructure as is reliant on the turbines being located as per the DLP (Condition 17). This is also due to the point about the wording of condition 29 explained in previous correspondence.



The Shire's approval of the CMP is in no way a representation that the micro-siting of the locations of the turbines or their associated infrastructure are or will be acceptable.

If you have any questions regarding this matter, please do not hesitate to contact Grant Thompson (Chief Executive Officer) or Robert Jehu (Manager of Regulatory Services) through the Shire Office on (08) 9831 2400.

Regards,



Grant Thompson

**Chief Executive Officer**

14/09/2022

# Bushfire Management Plan

Flat Rock Wind Farm

September 2022



## LIMITATIONS STATEMENT

This Bushfire Management Plan ('BMP') has been solely prepared for Enel Green Power Australia on behalf of Moonies Hill Energy Pty Ltd for the Stage 1 Flat Rock Wind Farm southeast of Kojonup across a 40 km<sup>2</sup> area within both the Shire of Kojonup and the Shire of Broomehill Tambellup.

### Envision Bushfire Protection

ABN: 90958370365

P.O. Box 7209 SHENTON PARK WA 6008

P: 0428 066 147

Email: admin@envisionbp.com.au

### Version Control

| Stage 1 Flat Rocks Wind Farm |                   |              |  |
|------------------------------|-------------------|--------------|--|
| Version                      | Date              | Author       |  |
| V1                           | 13 June 2022      | Anthony Rowe | Draft  |
| V2                           | 2 July 2022       | Anthony Rowe | Client revisions                                 |
| V3                           | 14 July 2022      | Anthony Rowe | Submission                                       |
| V4b                          | 28 September 2022 | Anthony Rowe | Revised tanker requirements at the Shire request |

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### Disclaimer

In undertaking this work, the authors have made every effort to accurately apply the available information at the time of writing following the instructions of the regulatory authorities and applying best practice as described by the Fire Protection Association Australia. Any conclusions drawn or recommendations made in the report are made in good faith, and the consultants take no responsibility for how this information and the report are subsequently used.

Envision Bushfire Protection accepts no liability for a third party's use of, or reliance upon, this specific report.

Envision Bushfire Protection accepts no liability for the inaction of the owner to provide or maintain the bushfire protection measures identified in this report. Vegetation is dynamic, building materials may distort, and the accumulation and the location of flammable materials near the building may affect the potential for damage or loss of a building to occur.

Failure to maintain the property and/or building to these standards may compromise an insurance policy if currently covering any of your assets or those of any third party that may be consequentially affected due such failure. If not insured, and if you are seeking insurance, this report may not influence the decision of any insurer not to offer cover.

Importantly the measures contained in this report cannot guarantee human safety or an absence of harm or that the building will not be damaged or would survive a bushfire event on every occasion. This is due to the unpredictable nature of fire behaviour (knowledge in this field continues to develop) and the unpredictable nature of extreme weather conditions.



### Client relationship

I was engaged to provide expert bushfire safety and planning advice. My relationship with the client is a standard commercial contract, and no private, personal, or other matter has influenced the content of the BMP or my findings.

STATEMENT OF CONFORMITY – PLANNING AND DEVELOPMENT ACT 2005



**Anthony Rowe Level 3 - BPAD36690**

Principal



## EXECUTIVE SUMMARY

### Preface

This Bushfire Management Plan ('BMP') has been solely prepared for Enel Green Power Australia for the Stage 1 Flat Rocks Wind Farm, to be located south east of Kojonup in an area within the Shire of Kojonup and the Shire of Broomehill Tambellup.

The wind farm at Stage 1 comprises 18 individually sited turbines within a 40 km<sup>2</sup> area.

The site is within a declared bushfire prone area. Accordingly, the proposal is to be assessed for compliance with State Planning Policy 3.7 *Planning in Bushfire Prone Areas* ('SPP 3.7') "to preserve life and reduce the impact of bushfire on property and infrastructure" in meeting the supporting elements described in the Guidelines for Planning in Bushfire Prone Areas V1.4 (the Guidelines).

The area in which the turbines are located is pasture, with isolated pockets of remnant forest vegetation. It is gently undulating with slopes of 2.0<sup>0</sup> – 3.0<sup>0</sup>. The windfarm will be hosted by individual landowners and the operation of the windfarm will be managed by Enel Green Power Australia. Agricultural operations will continue around the windfarm assets.

The development of the wind farm comprises a construction phase and an operational phase, the elements of which are described following:

#### Construction

- Construction compound
  - Construction site office and amenities
  - Concrete batching plant
  - Workshop and vehicle service
  - Fuel stores
- Access roads (making)
- Trenching and installing reticulated power; and
- Turbine assembly compounds at each site

#### Post construction

- 18 Turbine installations (site assembly compounds removed);
- Substation
- Operations compound (control building and workshop);
- Access roads

The windfarm has been conditionally approved by Shire of Kojonup and the Shire of Broomehill Tambellup. One of the conditions of approval (condition 19) requires the provision of a Bushfire Management Plan addressing the following:

- “(a) Identification and clear mapping of firebreaks, emergency ingress and egress points, water points, turnaround areas for fire trucks, water sources, on site fire-fighting equipment;
- (b) Identification of on-site tracks for access by emergency fire vehicles, and the requirement for these tracks to be maintained to a trafficable standard at all times;”
- “(c) Emergency procedures and personnel contacts;
- (d) Consideration of activities on fire ban days;
- (e) Notification for other agencies.”

*Items (a) and (b) have been addressed in the risk register and illustrated spatially on Figures 1a-1g and Items (c), (d) and (e) have been addressed in the Emergency Management Plan contained in this Plan*

## Risk Assessment

Following the requirements of SPP3.7 a risk assessment has been undertaken as a basis for identifying the risk treatments to satisfy the intent of condition 19.

The intent of SPP3.7 is a risk based arrangement and has been affirmed by the West Australian State Administrative Tribunal.

*SPP 3.7 is not a prohibition, that risk SPP 3.7 does not require that there be no increase at all in the threat of bushfire to people property or infrastructure. The intention of the policy is to 'implement effective, risk based land use planning and development to preserve life and reduce the impact of bushfire on property and infrastructure'<sup>1</sup>.*

This BMP has applied the risk management methodology described in AS/ISO 31000:2018 and the National Emergency Risk Assessment Guidelines (NERAG 2020) to methodically identify the risks and provide corresponding practical risk treatments.

As Low as Reasonably Practical (ALARP) has been applied to determine the risk treatment measures, for both a fire arriving at the site and for a fire ignited and spreading from the site.

The objective, outcome sought, followed Objective 5.1 from SPP 3.7

*To avoid any increase in the threat of bushfire to people, property and infrastructure. The preservation of life and the management of bushfire impact are paramount.*

This assessment of the Flat Rocks Wind farm has involved an extensive literature review on the subject of bushfires affecting wind farms and the ignition of bushfires from wind farms.

The Australian Fire and Emergency Service Authorities Council (AFAC) *wind farms and bushfire operations - Guideline 2018*, found wind farms are not expected to adversely affect bushfire behaviour, including as a hazard to low flying firefighting aircraft, but the turbines should be shut down to reduce turbulence.

International studies find a typical wind farm with 150 turbines may experience one or two fires during 20 years of operation.<sup>2</sup> The nacelle is provided with heat monitoring and fire suppression systems. If these are overwhelmed a nacelle fire is uncontrollable due to its height. The focus therefore is to ensure there is no fire spread or spotting ignitions allowed to develop downwind of the turbine.

A nacelle fire does introduce a different fire dynamic to that of traditional grassland fires. The height of the nacelle creates a potential for downwind spotting and can create dangerous conditions underneath necessitating an exclusion zone. For a grassfire the focus is mostly upon suppressing the fire line; in the event of a nacelle fire resources may need to be split to attend to the fire line as well as addressing any downwind spot fires.

A risk level is a combination of the likelihood and consequence.

The consequence was identified as moderate: if a fire occurs it has the potential to cause loss of a year's earnings due to the destruction of a crop. This is considered in the context of existing controls that should include following the directions of the annual fire break notice to reduce the vulnerability of buildings and assets to grassfire. Establishment of separation areas will reduce the consequence of damage to asset; the consequence is therefore the loss of a crop.

The residual risk after treatments as identified in the attached emergency management plan is 'medium' and comparable to the existing risk level characteristic of pastoral activities.

It is acknowledged that the wind farm introduces a new dynamic to firefighting in the locality; a turbine fire has the potential for spotting downwind. Measures have been applied to minimise the occurrence and provision of flexible firefighting equipment will assist to chase down small fires before they can develop.

---

<sup>1</sup> HARMANIS HOLDINGS NO. 2 PTY LTD and WESTERN AUSTRALIAN PLANNING COMMISSION [2019] WASAT 43 (25 June 2019)

<sup>2</sup> Firetrace international 2020 citing studies into the frequency of turbine ignitions  
[https://www.firetrace.com/hubfs/\\_img/reports/Firetrace-Report-In-The-Line-Of-Fire.pdf](https://www.firetrace.com/hubfs/_img/reports/Firetrace-Report-In-The-Line-Of-Fire.pdf)

## Risk Treatment

This BMP has addressed a condition of a planning authorisation made under the Planning and Development Act 2005. As such it is also subject to the requirements of State planning Policy 3.7 which is a risk management arrangement. It requires the identification of risk and prescribes that the risk treatments should follow four elements identified in the bushfire protection criteria. The four criteria being location, siting and design, vehicle access and water.

### Location

The location is predominantly grassland and classed as a moderate bushfire hazard level, a level that is suitable for development. Areas of extreme bushfire hazard (predominantly forest) are to be avoided

### Siting and design.

Siting and design requires suitable setback from classified vegetation can be established in order to preserve life and reduce the impact upon property and infrastructure. The setback distances are identified as a risk treatment and are based upon a potential separation from grassland that is below a level of serious harm.

The following Asset Protection Zones apply

- Around the site camp (construction compound) a 30 m wide area of grass maintained at less than 100 mm and no grass within the compound.
- Around the turbine construction compound a 30 m wide area of grass maintained at less than 100 mm and no grass within the compound.
- Around the base of the turbine (operational) a 20 m diameter area of compacted limestone or equivalent, and a 40 m diameter area of grass maintained at less than 100 mm.
- Around the substation a 30 m wide area of grass maintained at less than 100 mm and no grass within the substation area
- Around the operations building and maintenance compound a 21 m wide area of grass maintained at less than 100 mm and no grass within the maintenance compound. The operational building is to be constructed and maintained to the BAL 29 standard.
- Access route easements are 20 m wide.

### Access

The access roads will be constructed to 21 tonnes with a 20 m reserve to be maintained as low threat. The construction standard is determined by the heavy vehicles that will be used for construction and service of the turbines.

The turbines will provide an area at their base to facilitate the turnaround of service vehicles. The access routes are predominantly through grassland with gentle slopes affording extended view to the location of a fire and the opportunity to take avoidance action.

The windfarm will utilise public roads and access to the turbines will be gated (see figures 1a – 1g).

The gates will be light (with light locks to enable push through), they are not intended as barriers. Each access will have Emergency cannisters (see attached) installed with emergency information inside them, including emergency contact details and maps of the site.

The turbines will be hosted on agricultural production sites. The existing Shire firebreak requirements will apply.



### Water supply

The site does not have access to a reticulated water supply. Within the area of the windfarm there are a number of dams, but these may not be a reliable source of water in a period of extended drought. A distribution of water tanks is proposed within the windfarm as a convenient point to replenish firefighting appliances.

A 50 000 L standalone water tanks is proposed to be located at the commencement of each stage (stage groupings shown):

- Inside of the access gate to WTGs 13,14,15,17
- Inside of the access gate to WTGs 1,2,3,4,5,6,7,55
- Inside of the access gate to WTGs 8,9,10,11,16

A 50 000 L water tank will be provided at the Construction Compound to replenish infield firefighting.

A 3 000 litre fire appliance (slip on unit) and high capacity output pump will accompany each working area during the construction phase.

A 50 000 L water tank will be provided and maintained at the Maintenance Compound and a 3000 L firefighting appliance (slip on unit) will be stationed at the Maintenance Compound to attend maintenance site works during operation and be available for use by trained personnel and turbine host landowners in a bushfire event.

All vehicles entering the windfarm area will be required to be equipped with a fire extinguisher, to provide an early response to any grassland ignition. Fire extinguisher will be available from the Maintenance Compound prior to entering the Windfarm.

Additional treatments are identified as management measures in the Emergency Management Plan continued in Appendix 2. It follows an Emergency Management System approach: *Prevention (Planning), Preparation, Response and Recovery*. It identifies the emergency procedures and personnel contacts, responsibilities and notification in a bushfire event and operational practices of total fire ban and harvest and vehicle movement restrictions.

In summary the Emergency Management Plan responds to two event types. The event of a turbine nacelle fire, and the event of a grassfire approaching the site.

#### **Nacelle Fire**

##### **Report fire**

- Shut down turbines, Y position and head to wind if possible
- Alert adjoining residents (SMS contact/WhatsApp)
- Alert the Shire/ Brigade for attendance

##### **Landowner response**

- Set up an exclusion zone no closer than 75 m from the base
- Provide the immediate suppression to the fire line outside the exclusion area
- Monitor the area downwind from the turbine for spot fires.
- Monitor the area until the nacelle fire is exhausted and an all clear has been given.

##### **Brigade response**

- Attend to the fire line outside the exclusion area.
- Alert areas down wind of the turbine, up to 5 km.
- Monitor for, and attend to, spot fires downwind from the turbine.

#### **A fire approaching the site**

- Shut down turbines, lock in Y position and head to wind if possible.
- Determine the severity of the fire. If there is potential endangerment to the site:
  - Workers at a turbine (if not safe to evacuate) should park vehicles at the base of the turbine at the lee side of the approaching fire
  - Guide personnel at risk to safety (evacuate or take shelter)
  - All personnel not directly involved in the fire response are to evacuate the site to a safe location as directed by the management team in coordination with public emergency services.
  - The Chief Warden (operations manager), and designated personnel, will ensure the evacuation of personnel has been successfully completed and that all personnel are accounted for.

The risk treatments identified in this BMP have followed the emergency management system approach Prevention (Planning) Preparation, Response and Recovery.

The risk assessment has identified treatments (physical works) as part of Prevention (planning) and Preparation, (described in the Risk Register) and the Response and Recovery described in the Emergency Management Plan (in Appendix 1). Combined these represent an As Low as Reasonably Practical outcome.

## Table of Contents

|  |           |
|--|-----------|
| <b>1. PROPOSAL DETAILS .....</b>             | <b>1</b>  |
| 1.1 Introduction.....                        | 1         |
| 1.2 Development Proposal.....                | 2         |
| Construction compound .....                  | 2         |
| Substation .....                             | 3         |
| Turbines .....                               | 3         |
| Access roads/Power reticulation .....        | 4         |
| 1.3 Regulatory Compliance Requirements ..... | 12        |
| 1.4 Environment Considerations .....         | 13        |
| <b>2. BUSHFIRE RISK ASSESSMENT .....</b>     | <b>15</b> |
| 2.1 Context Objective And Scope.....         | 15        |
| 2.2 Risk Identification.....                 | 15        |
| Bushfire Attack Level Inputs .....           | 20        |
| Bushfire History .....                       | 22        |
| Residential proximity .....                  | 24        |
| Risk identification.....                     | 25        |
| 2.3 Risk Analysis .....                      | 27        |
| Existing controls.....                       | 27        |
| Consequence Criteria.....                    | 30        |
| External Consequence Assessment .....        | 31        |
| Likelihood Level .....                       | 34        |
| Risk Level.....                              | 34        |
| 2.4 Risk Evaluation .....                    | 35        |
| 2.5 Risk Treatment .....                     | 35        |
| Risk Register and Residual Risk .....        | 36        |

APPENDIX 1 - EMERGENCY MANAGEMENT PLAN

APPENDIX 2 - VEGETATION CLASSIFICATION

APPENDIX 3 – SCENARIO RESPONSE PLAN

APPENDIX 4 – NACELLE SUPPRESSION SYSTEMS

APPENDIX 5 – REFERENCES

# 1. PROPOSAL DETAILS

## 1.1 Introduction

This Bushfire Management Plan ('BMP') has been prepared for Enel Green Power Australia on behalf of Moonies Hill Energy Pty Ltd for the Flat Rocks Stage 1 wind farm to be located within the Shire of Kojonup and the Shire of Broomehill Tambellup.

The site is located in a 40 km<sup>2</sup> area south of the township of Kojonup (**Plate 2**) and is classed as overall being located within a bushfire prone area (OBRM 2021) as shown on **Plate 3**. Some development elements are outside the area shaded as bushfire prone, but the development is comprised of dependent elements within the area shaded as bushfire prone, the development as a whole is treated as within bushfire prone land.

Development, which includes buildings and land use, where located within a bushfire prone area, is required to demonstrate compliance with the requirements of State Planning Policy 3.7.

The policy intent is **to preserve life and reduce the impact of bushfire on property and infrastructure**. Compliance is achieved where a proposal incorporates the Acceptable Solutions as described under each Element in the Bushfire Protection Criteria or can satisfy the intent of each Element by performance principle and the Precautionary Principle.

*SPP 3.7 is not a prohibition; SPP 3.7 does not require that there be no increase at all in the threat of bushfire to people property or infrastructure. Rather, as is seen in cl 2 of SPP 3.7, the intention of the policy is to 'implement effective, risk based land use planning and development to preserve life and reduce the impact of bushfire on property and infrastructure'.*

### Background

The proposed development represents Stage 1 of a wind farm concept for 18 turbines, the site area straddling the Shire of Kojonup and the Shire of Broomehill Tambellup.

The Shire of Kojonup at its meeting 28 September 2021 resolved to conditionally approve Stage 1. Condition 19 of the approval as provided:

*"Prior to commencing any works, the Applicant is to lodge a Fire Management Plan for approval by the local government. The Fire Management Plan shall be prepared by a suitably qualified consultant and in the context of the construction and operational phases of the development address the following matters -*

- (a) Identification and clear mapping of firebreaks, emergency ingress and egress points, water points, turnaround areas for fire trucks, water sources, on site fire-fighting equipment;*
- (b) Identification of on-site tracks for access by emergency fire vehicles, and the requirement for these tracks to be maintained to a trafficable standard at all times;*
- (c) Emergency procedures and personnel contacts;*
- (d) Consideration of activities on fire ban days;*
- (e) Notification for other agencies."*

This Shire decision follows the conditional approval of the Great Southern Joint Development Assessment Panel made on 27 July 2013 – condition 10.

This (Bushfire Management Plan (contemporary terminology for a Fire Management Plan) has been prepared following condition 19 in the Shire approval.

The Bushfire Management Plan has followed the contemporary procedures for the identification of risk determination and risk management measures as required for a power generating land use.



## 1.2 Development Proposal

The foundation investigations supporting the approved windfarm were summarised in the Environmental Impact Report 2010, which included:

- Flora, Vegetation and Fauna Assessment: prepared by: Mattiske Consulting Pty Ltd 2010
- Ethnographical Survey Report: prepared by R and E O'Connor Pty Ltd Sept 2010
- Archaeological Survey Report: prepared by John B. Cecchi Sept 2010
- Background Monitoring Report: prepared by Herring Storer Acoustics May 2011
- Noise Impact Assessment: prepared by Herring Storer Acoustics June 2011
- Landscape and Visual Impact Assessment: prepared by William James Landscape Architects July 2011
- Zones of Visual Influence: prepared by GL Garrad Hassan May 2011
- Shadow Flicker Report: prepared by GL Garrad Hassan May 2011

Key components of the wind farm Stage 1 comprise:

- Construction compound (temporary)
- Construction site office building and amenities
- Concrete batching plant
- Workshop and vehicle service
- Fuel stores
- Substation and operations building;
- 18 Turbine installations;
- Access roads and reticulated power; and
- Fire management.

### **Construction compound**

A single construction compound will be established to service the installation of the turbines. It will occupy 4 ha and include site offices, machinery parking, concrete batching plant and laydown/staging areas. The construction compound will also include fuel and oil stores required for the vehicles servicing the construction. On site storage will be in accordance with:

- *Dangerous Goods Safety Act 2004* and Dangerous Goods Safety (Storage and Handling of Non-Explosives) Regulations 2007 (managed by Department of Mines, Industry Regulation and Safety).
- *Occupational Safety and Health Act 1984*
- *Environmental Protection (Controlled Waste) Regulations 2004* (managed by Department of Water and Environmental Regulation)
- Department of Water and Environment Regulation policy Water Quality Protection Note 58 Tanks for Temporary Elevated Fuels and Chemical Storage 2018.

The site works at the construction compound are expected to provide a base for 100 – 120 persons during the construction phase.

Upon completion of the wind farm the construction compound will be reduced in size and function. An Operations Building / control centre and maintenance centre will be retained to provide supervision of the operating wind farm. The building will include all amenities and a workshop for the storage of tools and spare parts and provide a base for attending technicians and the undertaking of routine maintenance.

### **Substation**

The electrical substation will be constructed to house transformers required to feed the wind farms output into the grid as well as metering, control and circuit protection. The transformers and oil supplies will be bunded to contain any oil spill.

### **Turbines**

The Stage 1 proposal is 18 wind turbine compounds. Each turbine compound will comprise a single turbine (rotor, nacelle, tower, and crane hardstand). The hub height is 125 m with the rotor comprising three blades 73 m each. The tip height from ground is 200 m and a radius of 150 m. (see plate 5)



Plate 1: Typical turbine (photo courtesy of Western Power), a clear base within open land (pasture), retained crane pad and access track.

At construction, each turbine site will have an extended low threat space to be occupied by the laydown for large components, tower sections, nacelle and rotor blades and temporary office, lunchroom, and ablutions buildings to support the assembling workforce. Firefighting facilities will be provided at each construction site to suppress any ignitions that may inadvertently occur at the site. This includes a 50 000 L water tank to support suppression operations from the site.

Each turbine site will consist of a pile anchored foundation for the wind turbine (17 m foundation diameter) and a hardstand pad 20 m x 35 m to support a crane for installation and maintenance.

The turbines incorporate fire risk management systems, which are sealed systems for electrical fires.

The system includes arc detector technology, the lightning protection system, and the smoke/heat detection sensors package that can trigger the fire suppression system.

All high voltage electrical works are contained to, and within, the pylon. The fire hazard zones are as follows:

- Nacelle controller cabinet
- Converter cabinet
- Transformer room

The Fire Suppression System uses a non-conductive 3M Novec 1230 fire protection fluid. The fluid extinguishes principally by the removal of heat from the fire (to break the combustion cycle). Novec 1230 is environmentally safe and has the highest heat capacity of any available Halon alternative; requiring lower extinguishing concentrations for a given fuel.

Novec 1230 also leaves no residue for clean-up in the event of a false suppression event; minimising any wind turbine downtime, and the service cost of an alarm.

Agricultural production can occur up to the Asset Protection Zone (APZ) that is established around the base of the turbine.

At the end of the turbine life, if not replaced, the land will be restored to as close as practical pre-construction condition that will permit a return to broad acre farming. Access tracks will be removed if not retained as a benefit for farming.

#### **Access roads/Power reticulation**

The existing road network will be used to access the wind farm site. Within the wind farm area a dedicated network of gravel (all weather roads) will be established to provide access for the construction of the wind farm and year round access to the turbines for servicing and maintenance.

The access ways have been designed to minimise the clearing of any regulated vegetation and minimise disruption to farming operations by siting in cleared paddocks.

The substation will be connected to the turbines by an underground reticulation network (condition of planning approval) that will follow the access roads. The reticulation network will be buried at a depth to permit the continued economic use of the land above.

#### **Fire Management**

Each turbine is provided with a fire suppression system in the nacelle for electrical fires, and each turbine is monitored. The base of each turbine, pylon, is non combustible



Plate 2: Site Locality, and state road network



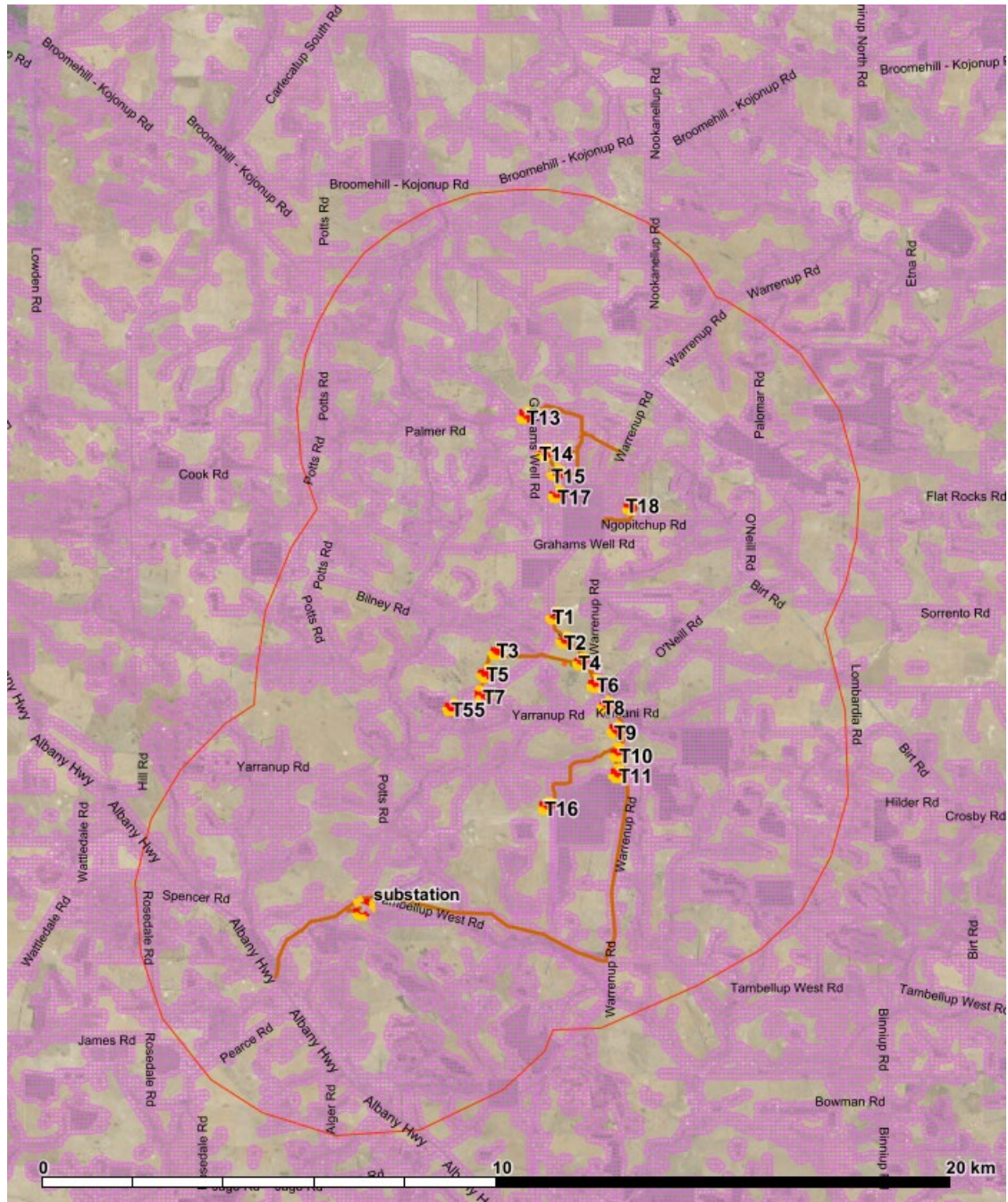


Plate 3: OBRM Bushfire Prone Area (pink). The red boundary represents a 5 km separation from each asset.



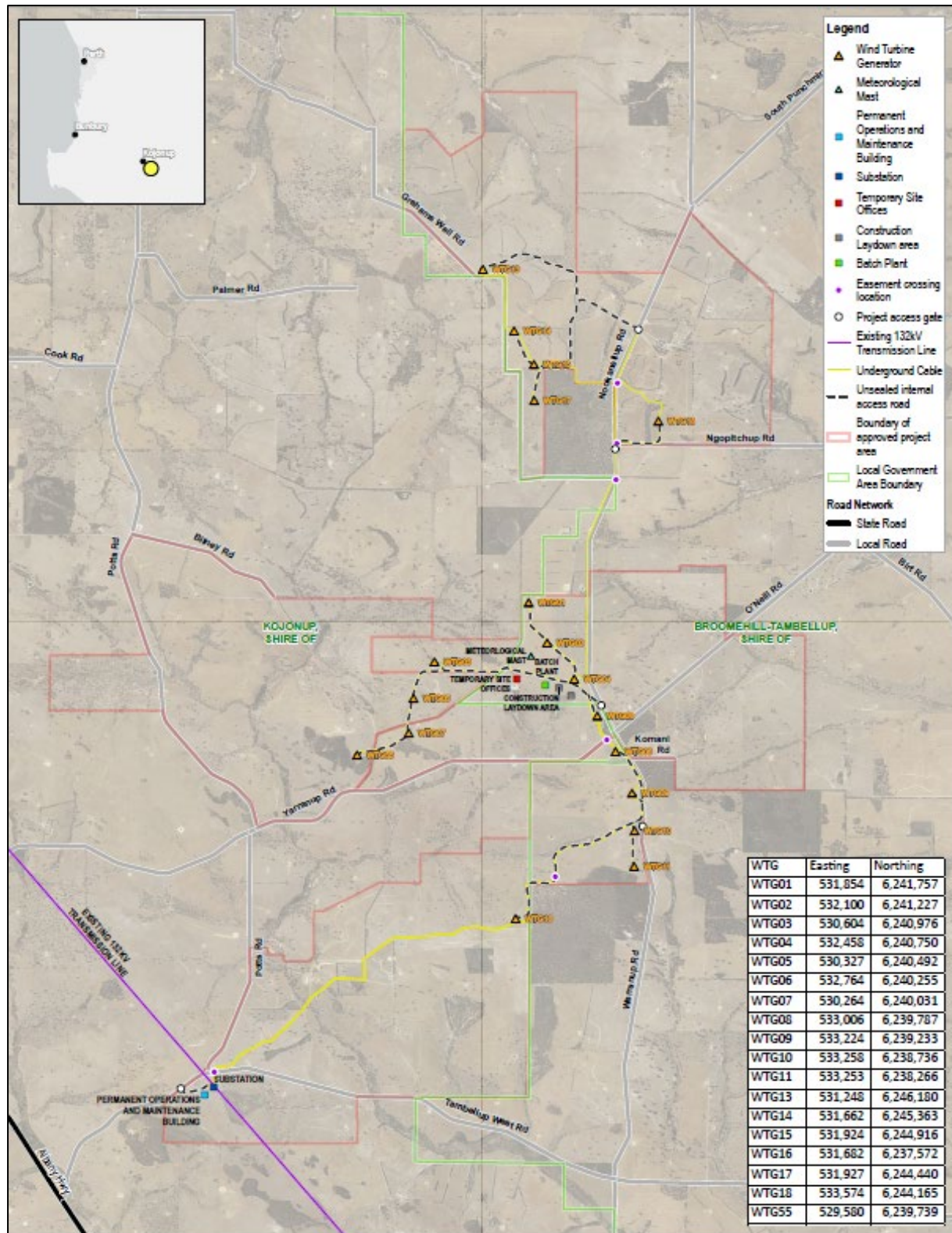


Plate 4: Site Plan

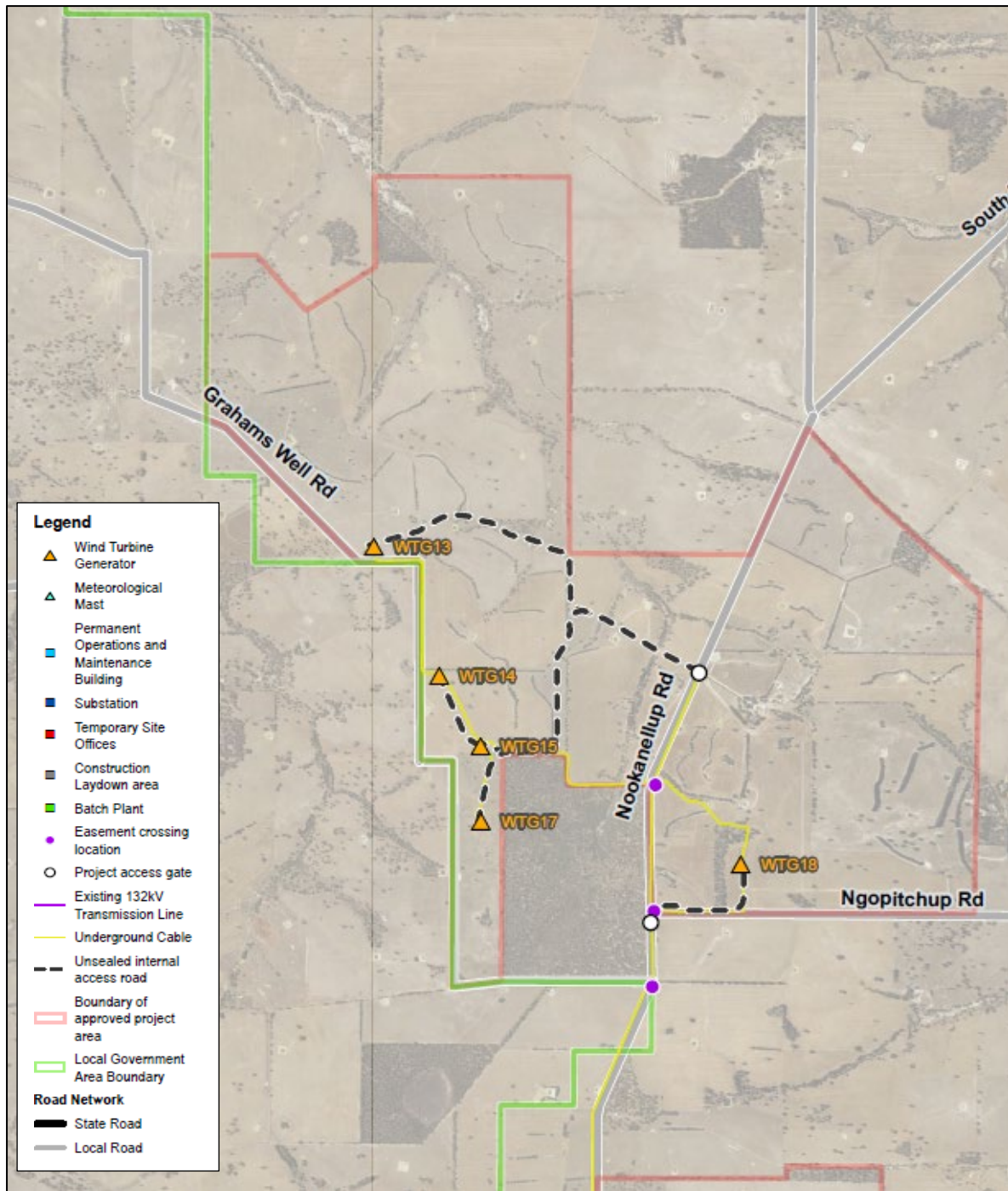


Plate 4a: Site Plan (enlarged north)



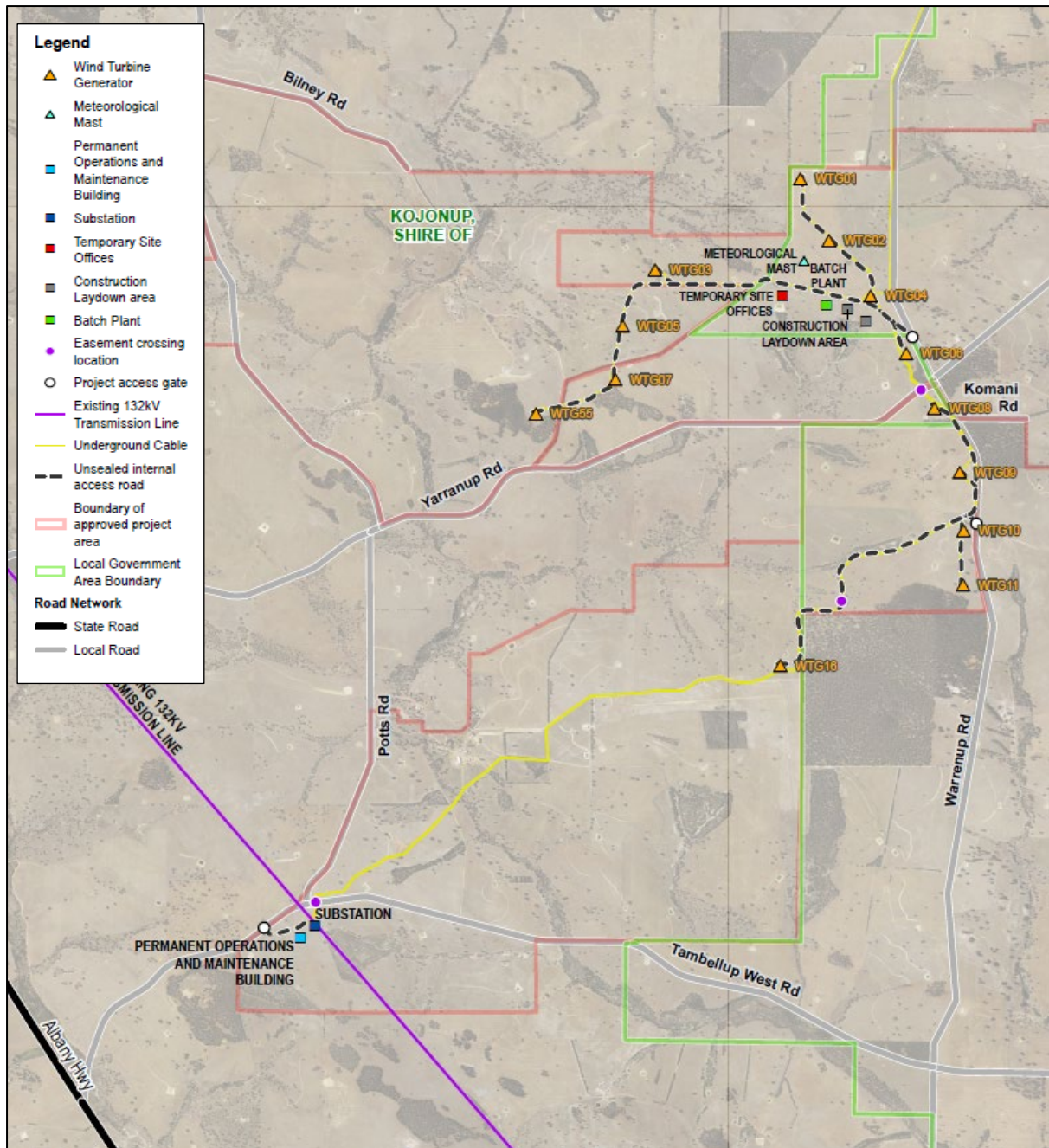


Plate 4b: Site Plan (enlarged south))

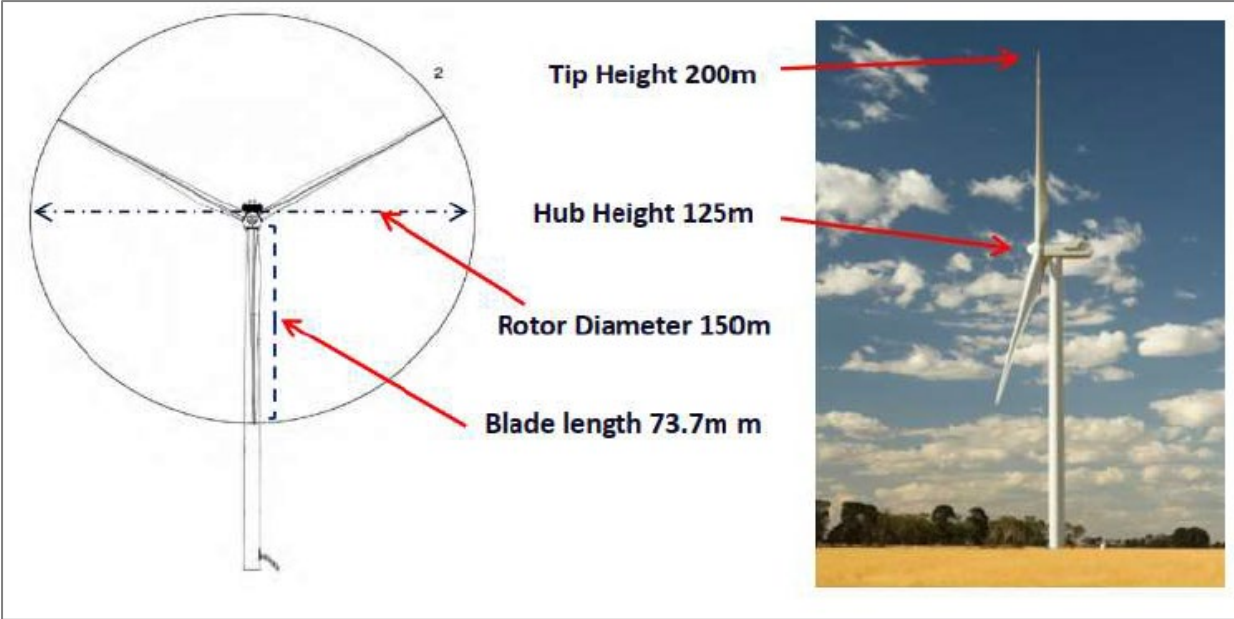


Plate 5: Turbine

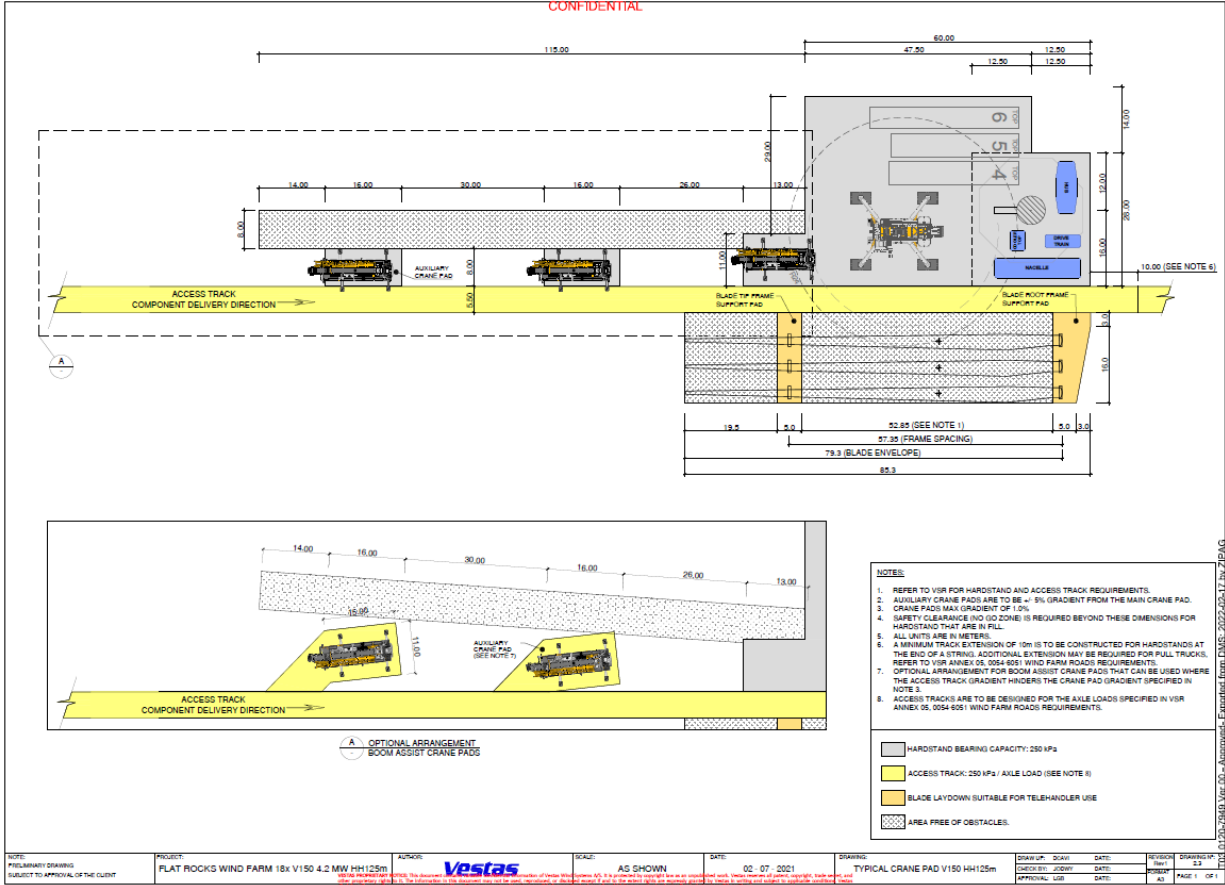


Plate 6: Turbine construction compound

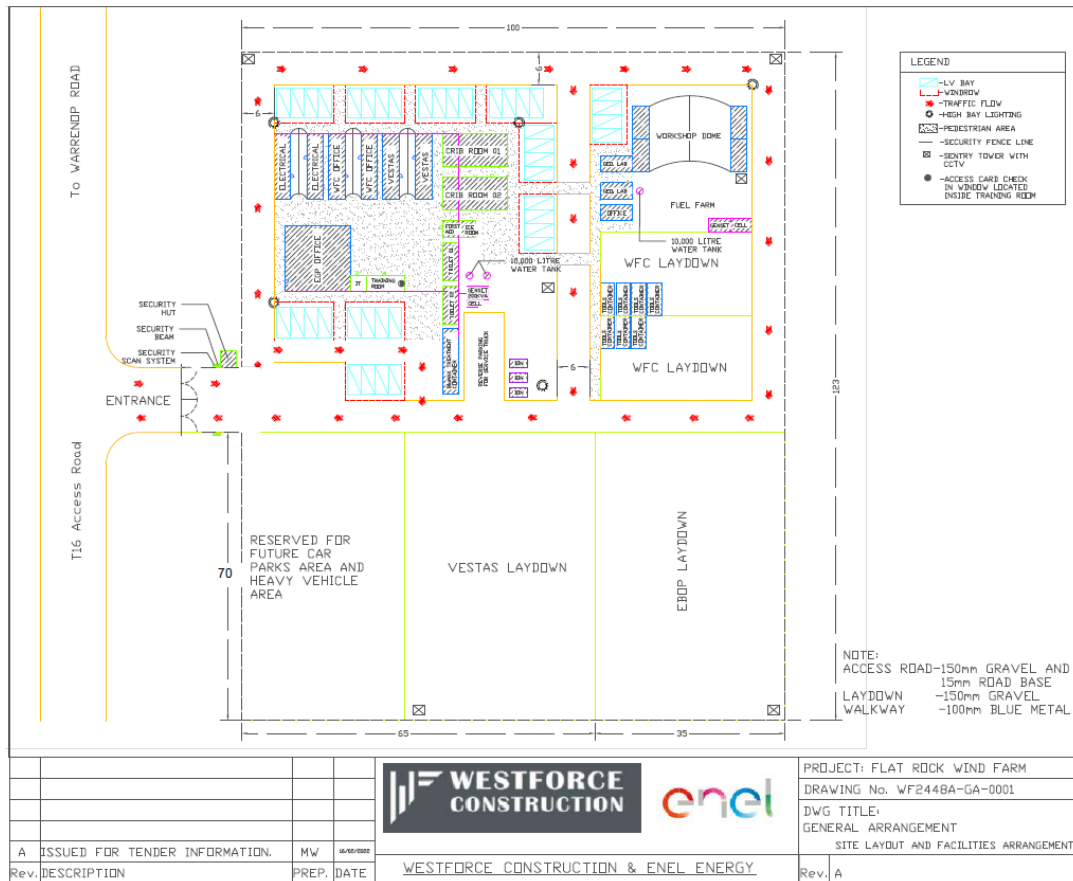


Plate 7: Indicative construction camp

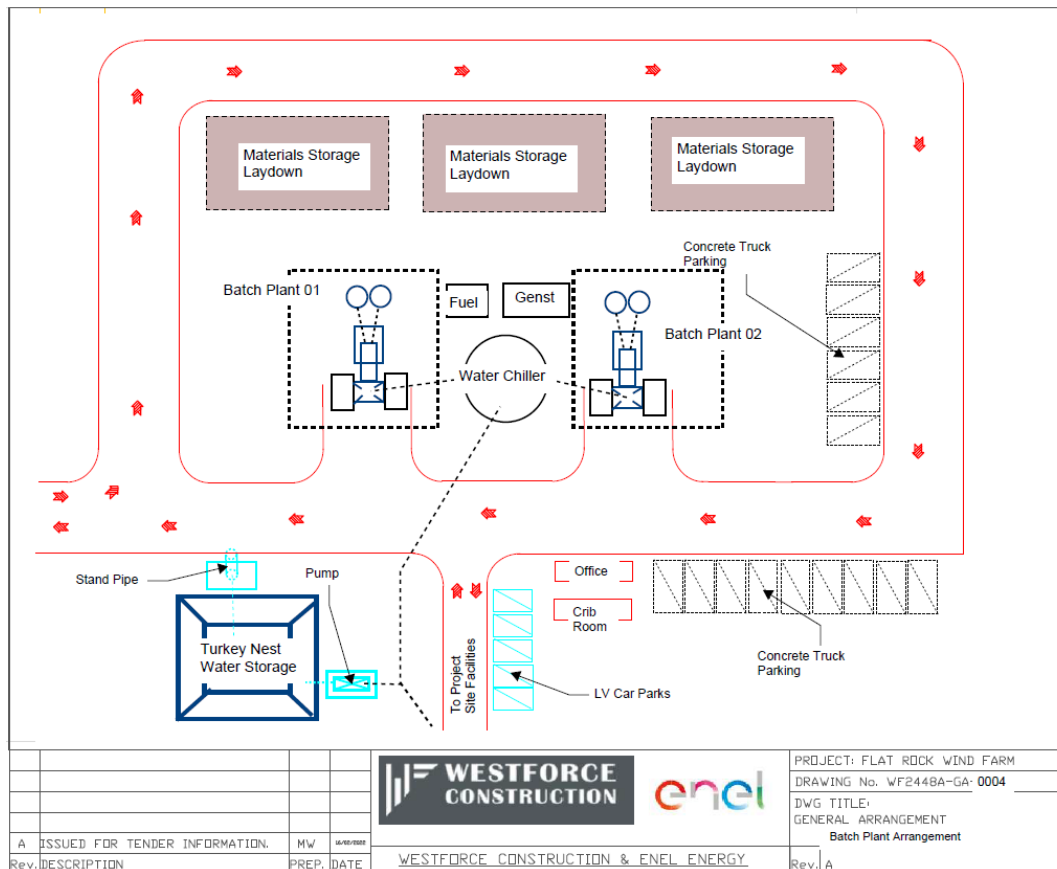


Plate 8: indicative Batching Plant



### 1.3 Regulatory Compliance Requirements

The following regulations have been applied to this assessment.

#### ***Planning and Development Act 2005 - SPP 3.7***

On 7 December 2015, the State Government introduced a state map of Bushfire Prone Areas by order under the *Fire and Emergency Services Act 1998* and introduced development controls in Bushfire Prone Areas through the *Planning and Development Act 2005*. These controls were authorised by State Planning Policy 3.7 (Planning in Bushfire Prone Areas) regulations introduced under Part 10A Schedule 2 of the *Planning and Development (Local Planning Scheme) Regulations 2015* and guided by the *Guidelines for Planning in Bushfire Prone Areas*.

The State Planning Policy, Regulations, and Guidelines now form the foundation for fire risk management planning in WA at a community and land development level. The Policy Intent of SPP 3.7 is a risk-based land-use planning and development **to preserve life and reduce the impact of bushfire on property and infrastructure**.

#### ***SPP 3.7 . Policy Objectives***

*5.1 Avoid any increase in the threat of bushfire to people, property and infrastructure. The preservation of life and the management of bushfire impact are paramount.*

*Examples of increasing a threat of bushfire may include a high-frequency ignition (increased likelihood) or converting a low bushfire hazard to an extreme bushfire hazard (converting pasture to forest).*

*5.2 Reduce vulnerability to bushfire through the identification and consideration of bushfire risks in decision-making at all stages of the planning and development process.*

*Reducing vulnerability may include facilitating safe evacuation and ensure the building performance (by setback or construction standards) can exceed the bushfire impact.*

#### **Clause 6.6 Vulnerable or High-Risk land uses (Guidelines for Planning in Bushfire Prone Areas cl.5.5.1**

The proposal is a power generating landuse which is development type listed as high risk in the Guidelines.

SPP 3.7 recognises that vegetation is not necessarily the only fuel in a bushfire event and that certain land uses may potentially ignite a bushfire, prolong its duration, or increase its intensity. Such uses may also expose the community, firefighters, and the environment to dangerous, uncontrolled substances during a bushfire event. High risk landuse may include, but are not limited to: service stations, landfill sites, bulk storage of hazardous materials, fuel depots and certain heavy industries as well as military bases, power generating land uses, saw-mills, highways and railways, among other uses meeting the definition.”<sup>3</sup>

Proposals for high-risk land uses in bushfire-prone areas are to be supported by a risk management plan that addresses bushfire risk management measures for any flammable on-site hazards such as the storage and location of flammable material to reduce the threat, among other considerations

There are a range of specific regulations that apply to the storage and handling of hazardous products, including petroleum products, that also include a design and licensing requirement. These are principally based upon a fire in a building (structural) fire.

It is not the role of SPP 3.7 to direct specific regulation in this regard. The role of SPP 3.7 is to consider the consequence of bushfire, either by the proposal igniting a bushfire or a bushfire arriving at the site.

Associated legislation acknowledged but not addressed in this BMP includes:

- Dangerous Goods Safety Act 2007
- Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007 (bulk >500 L)
- Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007
- Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007

<sup>3</sup> Guidelines for Planning In Bushfire Prone Areas V1.3 page 34 under cl.5.6



DMIRS Accredited Compliance Consultant WA Dangerous Goods Storage and Handling Licensing assessment are responsible for the facility design and submission of applications for licencing.

This will apply to the bulk storage of fuels used for electricity generation, and the service of vehicles. It will also include the management of oils and flammable substances to be used at the substation.

#### **Bush Fires Act 1954**

Section 33 of the *Bush Fires Act 1954* recognises the responsibility of all land holders to prevent the spread of bushfire. Local government, at any time, may give notice in writing to an owner or occupier of land within the district of the local government. The Notice may specify works to be undertaken, including the management of grasses on the property usually to be maintained at less than 10cm during the fire season. It also provides that the identified works can be undertaken as a separate operation or in coordination with the neighbouring land.

The *Bush Fires Act 1954* also provides the basis for the declaration and enforcement of total fire ban days.

### **1.4 Environment Considerations**

#### ***Environment Protection Act 1986 and Environmental Protection (clearing native vegetation) Regulation 2004***

It is an offence to clear native vegetation without the authority of a permit or an exemption. The act of clearing native vegetation, requires a permit from either the Department of Water and Environmental Regulation (DWER) or the Department of Mines, Industry Regulation and Safety (DMIRS), unless an exemption applies.

Exemptions include:

##### *Environment Protection Act 1986*

- Clearing of regulated vegetation required by local Government Section 33 *Bushfire Act 1954*.
- Clearing of regulated vegetation in accordance with the terms of a subdivision approval.
- Clearing of regulated vegetation in accordance with a permit (for prescribed burning) under the *Bushfires Act 1954*.

*Environmental Protection (clearing native vegetation) Regulation 2004* (exemptions do not apply in Environmentally Sensitive Areas, and clearing > than 5ha)

<https://www.der.wa.gov.au/your-environment/environmentally-sensitive-areas>

- Clearing of regulated vegetation to the extent necessary to construct an approved building.
- Clearing of regulated vegetation that is for fire hazard reduction burning.
- Clearing of regulated vegetation to maintain an area cleared in the last ten years.

#### ***(WA) Biodiversity Conservation Act 2016 and Bio-diversity Conservation Regulations 2018***

The *Biodiversity Conservation Act, 2016*, replaces the *Wildlife Conservation Act, 1950*, and the *Sandalwood Act, 1929*, it became operational with the *Bio-diversity Conservation Regulations 2018*, on 1 January 2019.

The Act provides for listing species, threatened ecological communities (TECs), key threatening processes and critical habitats. It introduces criteria for listing species' 'endangered', 'critically endangered' or 'vulnerable', to align with the Environment Conservation and Biodiversity Conservation Act 1999 (Cth).

The subject land is not presently affected by a TEC.

#### ***Commonwealth Environment Protection Biodiversity Conservation Act 1999***

The Commonwealth Environment Protection Biodiversity Conservation Act 1999 provides for the protection of [matters of national environmental significance](#). National environment law does not generally regulate fire prevention measures taken by state and territory governments, but no specific exemptions are provided.



## **Bushfire Treatment and Environment Conservation**

A fundamental consideration in determining the treatments for a given risk is to avoid conflict with biodiversity management measures, which may limit the treatment options.

In accordance with the Department of Planning Lands and Heritage template (BMP template to support a BAL Contour Assessment) a review of the listed databases has been undertaken as part of this assessment to identify whether restrictions or other specific considerations may apply that would affect the implementation of any bushfire protection initiatives that may otherwise be identified.

Table 2: Ecology datasets

| Is the land affected by:   | Affected by the proposal | If yes - describe |
|--|--------------------------|-------------------|
| Conservation Wetland or buffer (DBCA-019 DBCA-017)                     | No                       |                   |
| RAMSAR Wetland (DBCA-010)  | No                       |                   |
| Threatened and Priority Flora (DBCA-036)                               | No                       |                   |
| Threatened and Priority Fauna (DBCA-037)                               | No                       |                   |
| Threatened Ecological Communities (DBCA-038)                           | No                       |                   |
| Bush Forever (COP-071)   | No                       |                   |
| Environmentally Sensitive Area (DWER-046)                              | No                       |                   |
| Regionally Significant Natural Areas (DWER-070)                        | No                       |                   |
| Conservation Covenant (DPIRD-023)                                      | No                       |                   |
| South West Ecological Linkages   | No                       |                   |
| <b>Does the proposal require the removal of restricted vegetation?</b> |                          | <b>No</b>         |

The proposed development does not require the displacement of vegetation other than pasture grasses.

During construction each turbine site will require an expanded area for the storage and assembly of the turbines. Following completion of construction the expanded construction area will be removed, and pasture returned up to the extent determined for the APZ.



## 2. BUSHFIRE RISK ASSESSMENT

### 2.1 Context Objective And Scope

#### Context

The land is gently undulating with slopes of 2.0° - 3.0°. The land is suitable for broadacre farming and historically cleared of native vegetation to provide for pasture production. Consequently, only a few isolated pockets of remnant native vegetation remain.

The locality is sparsely populated comprising primarily single dwellings on rural production holdings. The approximate ratio is 1 dwelling per 100 km<sup>2</sup>.

Various outbuildings are located within the area associated with agricultural production.

Public roads are separated by large distances. The site is located between Albany Highway, and the Great Southern Highway. The turbines are arranged along Warrenup Road which connects north to Broomehill Kojonup Road and south to Tambellup West Road. Both Broomehill Kojonup Road and Tambellup West Road are sealed roads that connect with Albany Highway, and the Great Southern Highway.

#### Objective

The relevant objective from SPP3.7 is:

*To avoid any increase in the threat of bushfire to people, property and infrastructure. The preservation of life and the management of bushfire impact are paramount.*

The attainment is the application of As Low as Reasonably Practical (ALARP) risk treatment measures.

This is to be recognised in context with the present risk that applies to the locality.

#### Scope

The scope defines the evidence and data that will be followed in determining the treatments that satisfy the objective.

- Determined risk to be assessed by AS 3959:2018 (site topography, fuels and fire danger index)
- Bureau of Meteorology climate data to verify the applicable FDI and prevailing wind directions
- DBCA bushfire History
- Literature review, wind farm fire incidents and bushfire impacts.
- A review of existing risk controls and strengths
- The identification of risk treatment following emergency management principles.

### 2.2 Risk Identification

Bushfire behaviour is the primary determinant of the bushfire risk and the design fire as a basis for identifying appropriate treatments. Bushfire behaviour is affected by three factors;

- Topography (slope of the ground, aspect, and wind influences) – fire travels faster uphill, the flame length is increased uphill (x 2 for every 10°), landforms can channel and increase local windspeed and create turbulence. They are measured as 0.0° or in 5° increments downslope in AS 3959 (Method 1).
- Climate (drought and season) & weather (temperature, humidity, wind, atmospheric instability) – determines the intensity of a fire, the speed and direction, and potential for advanced spotting. It is measured as an FDI (FFDI or GFDI) in AS 3959.
- Vegetation (horizontal and vertical structure, flammability, mass, and availability). It is measured as a vegetation classification, or an exclusion, in AS 3959 (Method 1).

It is assumed that a bushfire will achieve a steady-state and be fully developed to maximum intensity over a 100 m (minimum fire run).

Grassfires travel faster (GFDI) than a forest canopy fire, but a forest canopy fire can eject a higher level of embers and also eject them over a greater distance.

The arrangement of fuel has a greater effect upon the intensity of the fire than just its mass; its exposure to oxygen is referred to as its availability in a bushfire.

## Climate

The climate, using data from Kojonup Weather Station, can be described as Mediterranean with wet winters and warm summers from December through to March.

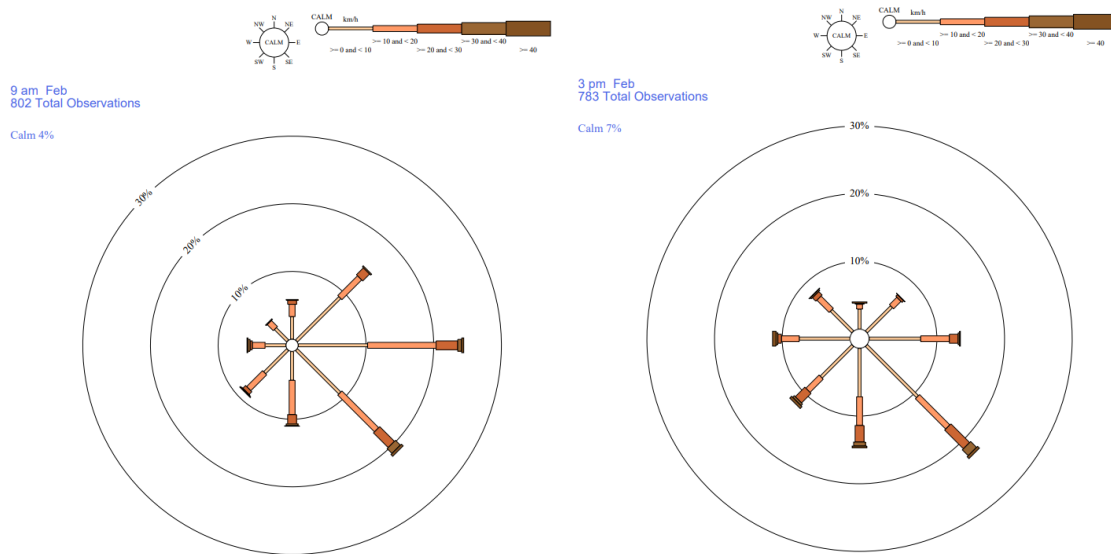


Plate 9: Wind roses (February 9 am and 3 pm), Bureau of Meteorology, Kojonup.

Bushfires generally travel in the direction of the prevailing wind. Prevailing wind conditions are most likely to be extreme in the afternoon in December to March (February is representative and selected below). The direction of the prevailing wind, conditions, strength, and direction, can help anticipate the direction, the fuels present, the effect of topography from that direction and the fire intensity. Whilst a fire can come from any direction an uncontrolled fire at some time is likely to be influenced by the common prevailing winds.

The prevailing winds shows a bias to the eastern hemisphere, in the morning but it is noted that afternoon winds are distributed through the southern hemisphere.

## Fire Danger Weather

The FFDI is calculated from temperature, wind speed, relative humidity, drought factor (time since last rain) and Keetch-Byram Drought Index (soil moisture) index which is a measure of soil moisture



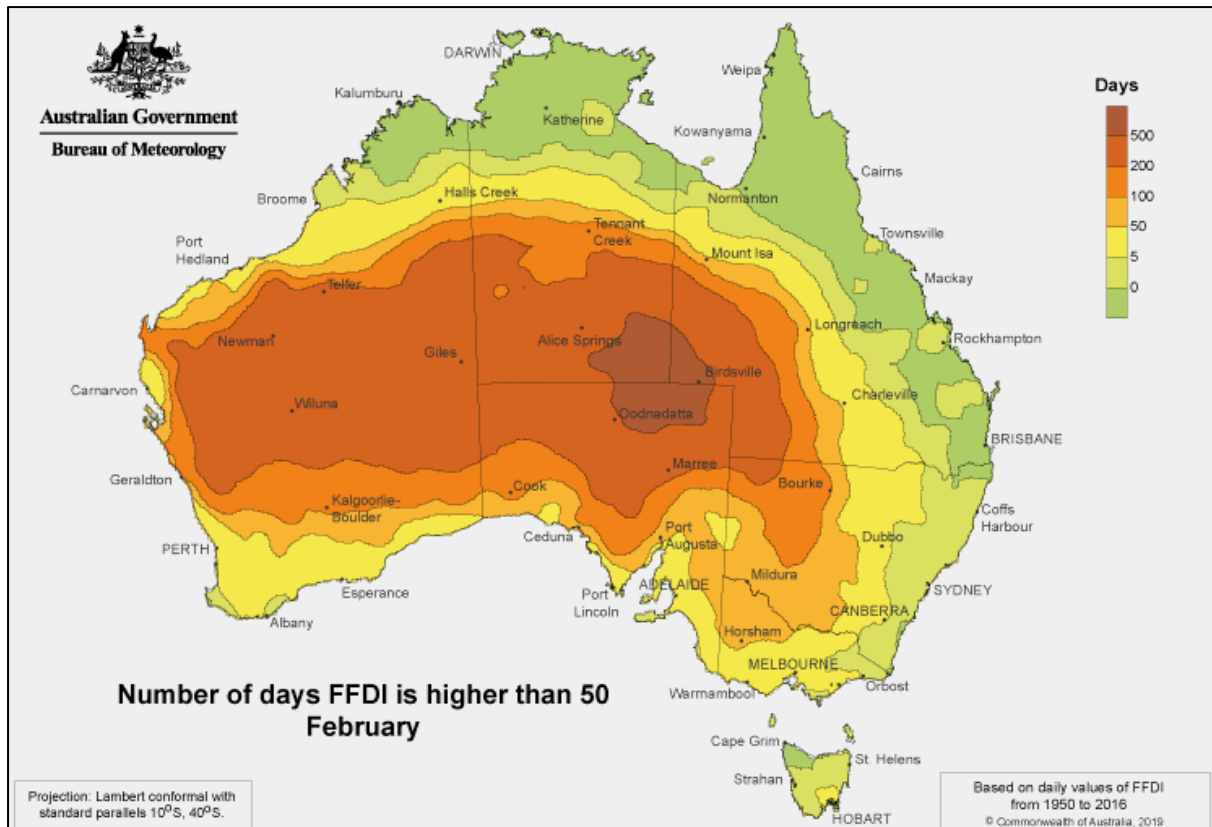


Plate 10: BoM national FFDI map, February illustrates the site is within the same band as Metropolitan Perth.

An assessment of the BoM national FFDI maps suggests a FFDI 50+ can occur in November through to March, at Kojonup (Plate 10), with February the highest frequency.

Days with an FFDI of 50 or over represent conditions where a fire may not be controlled, although grassfires over flat land whilst fast moving are more responsive to suppression efforts compared to a forest fire which has a higher intensity and has the complexity of distant spotting.

The map suggests Kojonup has a similar number of days above FDI 50 as the FDI for the Perth CBD. The Perth CBD corresponds to the nominal FFDI of 80 which is used across Western Australia for Bushfire Attack Level assessment purposes. Whilst it is possible to apply a higher or lesser FFDI than 80 if justified by climate data, in regard to the development site an FFDI of 80 is appropriate.

## Topography

The topography can influence the direction and speed of a bushfire and the predictability of its behaviour. It can also determine the accessibility for firefighting purposes.

The topography and open pasture land presents few limitations for access through the pasture fields in order to undertake fire suppression.

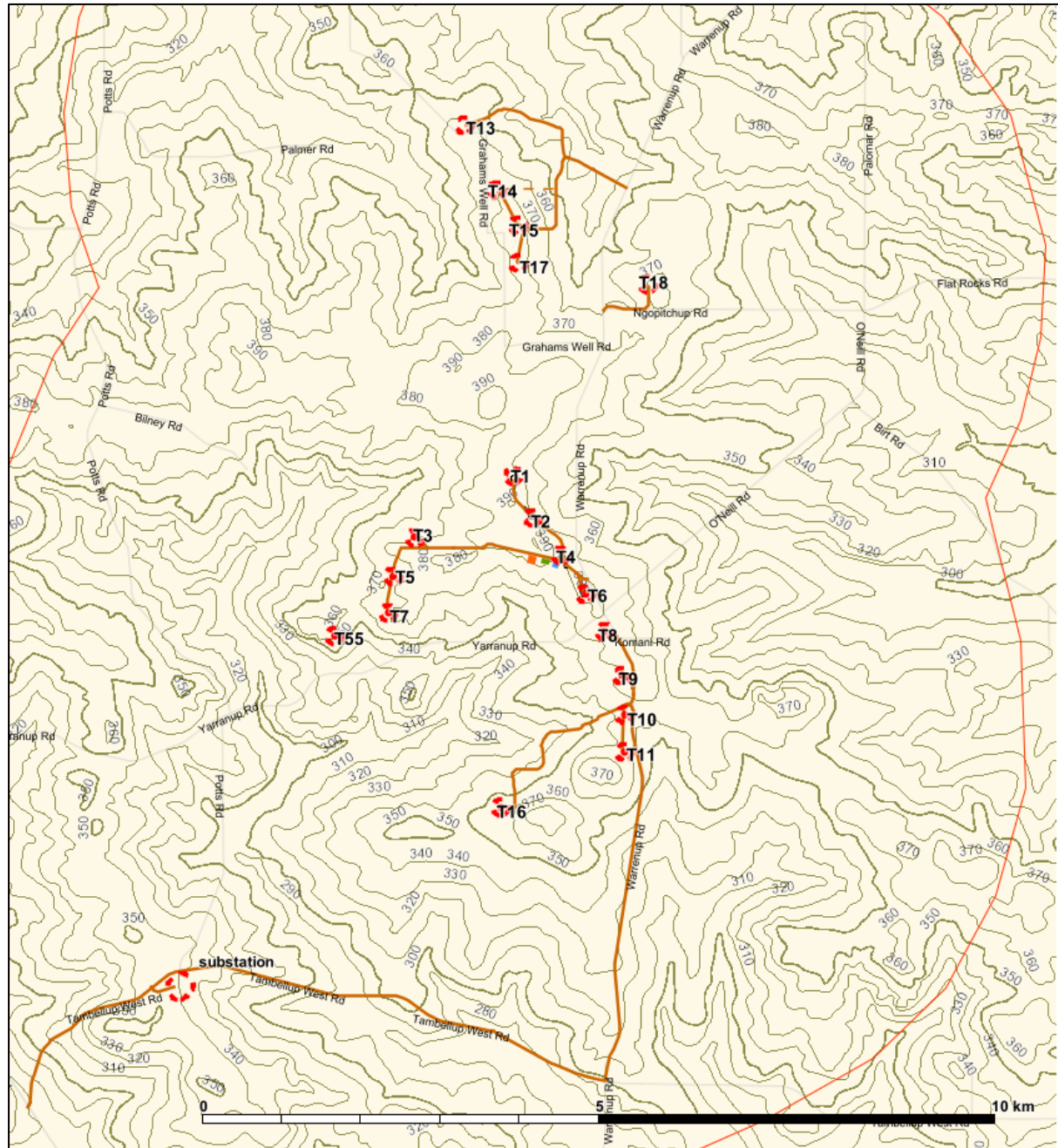


Plate 11: Topography illustrates the slope ranges of  $0.0^{\circ}$  –  $3.0^{\circ}$  is uniform across the site and characterised as gently undulating.

The turbines have been located upon the highest elevation, consequently the vegetation on the approaching slope toward the turbine is classed as downslope from the turbine. A bushfire approaching the turbine will be running up hill and a fire escaping a turbine site would be running downhill. For Bushfire Attack Level assessment purposes a slope of  $0.5.0^{\circ}$  has been applied as a conservative measure.



## Vegetation

The following vegetation descriptions from the Environmental Impact Statement (2010) have been applied to the following vegetation groupings in AS 3959:2018.

**Grassland:** Agriculture production pasture grasses

**Woodland:** Open Woodland of *Eucalyptus rudis* subsp. *rudis* *Melaleuca raphiophylla* over *Acacia saligna*, *Acacia acuminata*, *Jacksonia sternbergiana* over *Ficinia nodosa* and introduced grasses on sandy-loams and clay-loams on fringes of creek lines.

**Forest:** Woodland of *Eucalyptus astringens* subsp. *astringens* *Eucalyptus wandoo* on sandy-loam and some *Eucalyptus marginata* subsp. *marginata* over subshrubs and introduced grasses on sandy-loams on slopes.

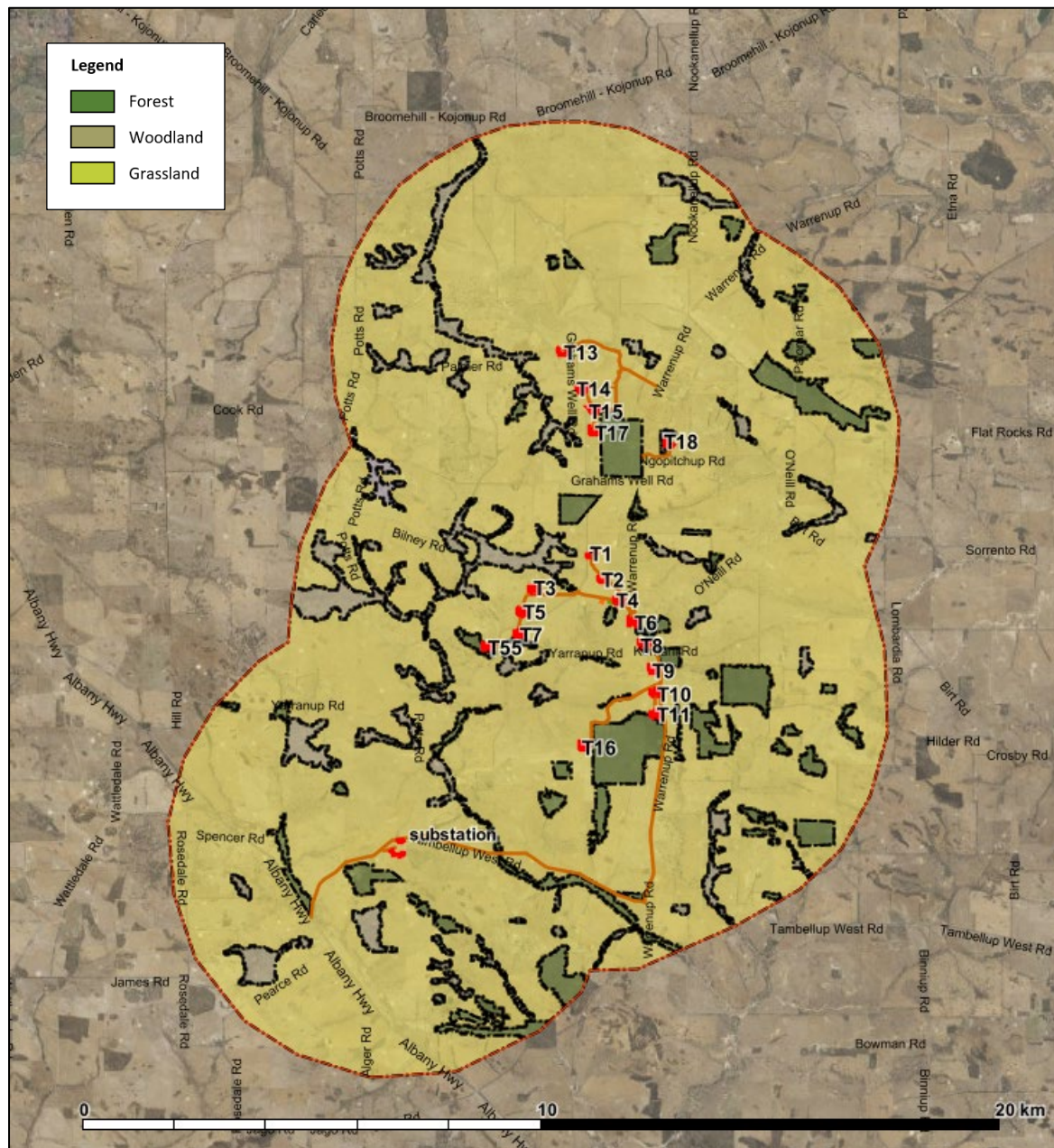


Plate 12: Landscape context 5 Km from assets.

Plate 12 illustrates the arrangement of classified vegetation within 5 km of the Stage 1 Flat Rocks Wind Farm assets.

All turbines are located no closer than 100 m to any other vegetation classification. Grassland has the most influential radiant heat impact at each site. Risk treatment to address the BAL at the site can be made in consideration of grassland.

An enlargement of the vegetation classifications at each Turbine location is shown in APPENDIX 2 (figures 1a - 1g) to provide the detail and photographic verification of the vegetation within 150 m of each Turbine location.

### **Bushfire Attack Level Inputs**

The Bushfire Attack Level Assessment has been undertaken in accordance with the methodologies described in AS 3959:2018 and in accordance with the Guidelines, and the Fire Protection Association accredited practitioner methodology.

The BAL has followed:

All vegetation within 150 m (**context**) of an asset has been classified (AS 3959:2018 Clause 2.2.3) to determine the Bushfire Hazard Level at the locality;

The BAL rating has been determined through site inspection and assessment of the following parameters:

- Fire Danger Index (FDI) rating; assumed to be FDI - 80 for Western Australia; *Note for the purpose of planning for a shelter an FFDI with 1:200 APE is used. This equates to an FFDI of 100.*
- A separation distance between the building and the classified vegetation source(s) within 100 m (for BAL impact) the separation distance is measured from the wall face (receiver) to the unmanaged understory rather than the canopy edge (dripline) *see plate 6*; and
- Slope of the land under the classified vegetation.

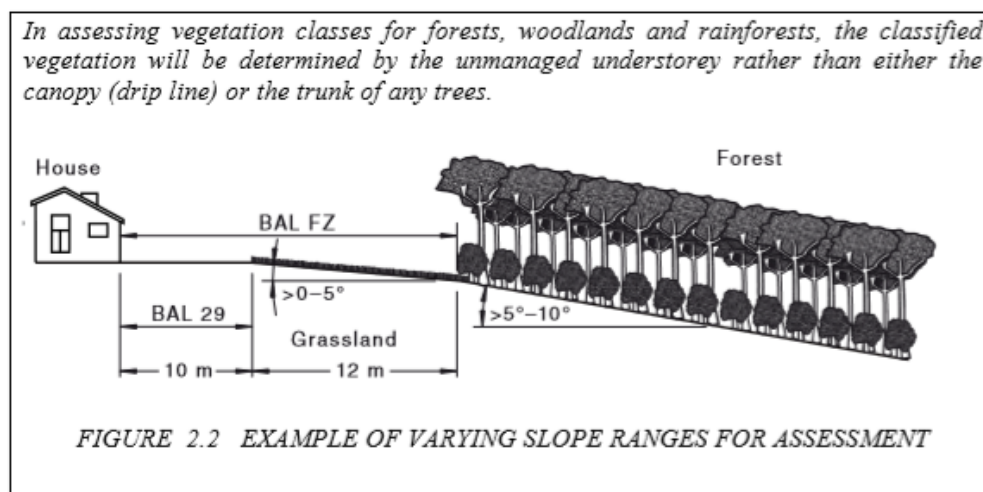


Plate 13: Arrangement of inputs for the determination of a BAL.



### Determine bushfire Attack Level at each turbine location

There is no restriction upon clearing grassland to achieve the desired Bushfire Attack Level.

The bushfire attack level available at the Turbines, the construction compound and the substation and operations building will be determined by the clearing of grass.

The BAL level at the nominated receiver is dependent upon the separation (APZ) indicated as follows based upon a downslope of 5.0°

| Vegetation classification | Effective slope (degrees) | Separation Distance<br>(AS 3959:2018 Table 2.5) | BAL      |
|---------------------------|---------------------------|---|----------|
| Grassland                 | 0-5                       | < 7 m   | BAL-FZ   |
|                           |                           | 7 - < 9 m                                       | BAL-40   |
|                           |                           | 9 - < 14 m                                      | BAL-29   |
|                           |                           | 14- < 20 m                                      | BAL-19   |
|                           |                           | 20- < 50 m                                      | BAL-12.5 |
|                           |                           | > 50 m  | BAL-LOW  |

As an explanation, if pasture grasses were restricted to 9 m from the base of the pylon the BAL rating at the pylon would be BAL-29; if pasture grasses were restricted to 20 m from the base of the pylon the BAL rating at the pylon would be BAL-19.

| Asset                 | APZ  | BAL         | Purpose   |
|-----------------------|------|-------------|---|
| Construction compound | 30 m | <BAL - 12.5 | This equates to 7 kWm <sup>2</sup> which is a maximum operating level for a fire fighter to short term exposure corresponding to a grassfire. It would permit the perimeter to be defended and the defence of open stored assets. |
| Turbine Base          | 30 m | <BAL - 12.5 | This equates to 7 kWm <sup>2</sup> . It will enable shelter at the lee side of a turbine base, and a parking of a vehicle at the base would be less than 10 kWm <sup>2</sup> to provide tenability                                |
| Substation            | 50 m | BAL - Low   | To provide a standoff position to suppress a bushfire from penetrating or escaping.   |
| Operations building   | 20 m | BAL - 12.5  | Provides resilience to the passage of the fire front  |
| Operations compound   | 20 m | BAL - 12.5  | Provides resilience to the passage of the fire front and the suppression of external fires (external stores) after the passing of the fire front  |

## Bushfire History

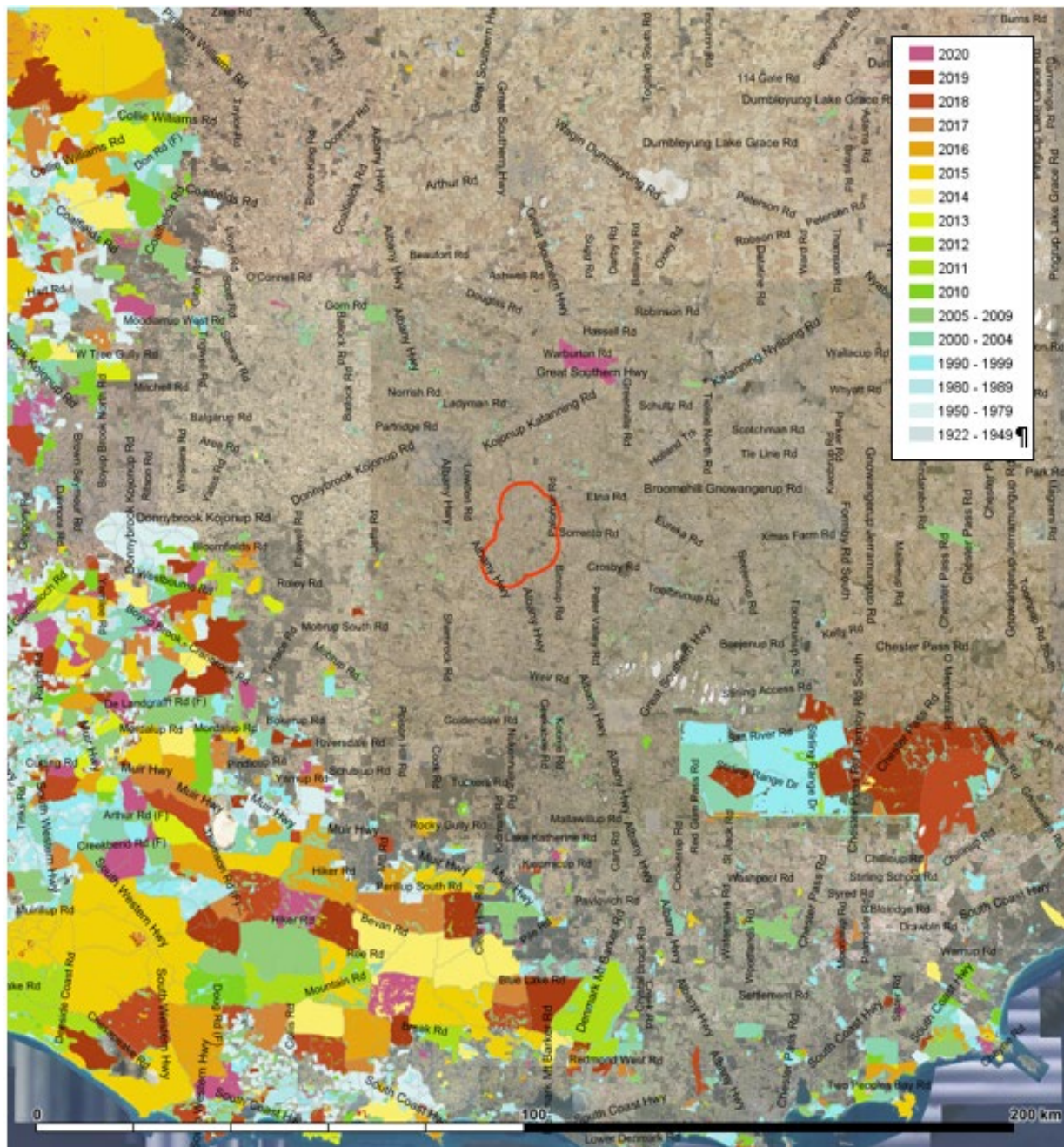


Plate 14: Recorded fire history within 100 Km of the site



## Fire history within site area

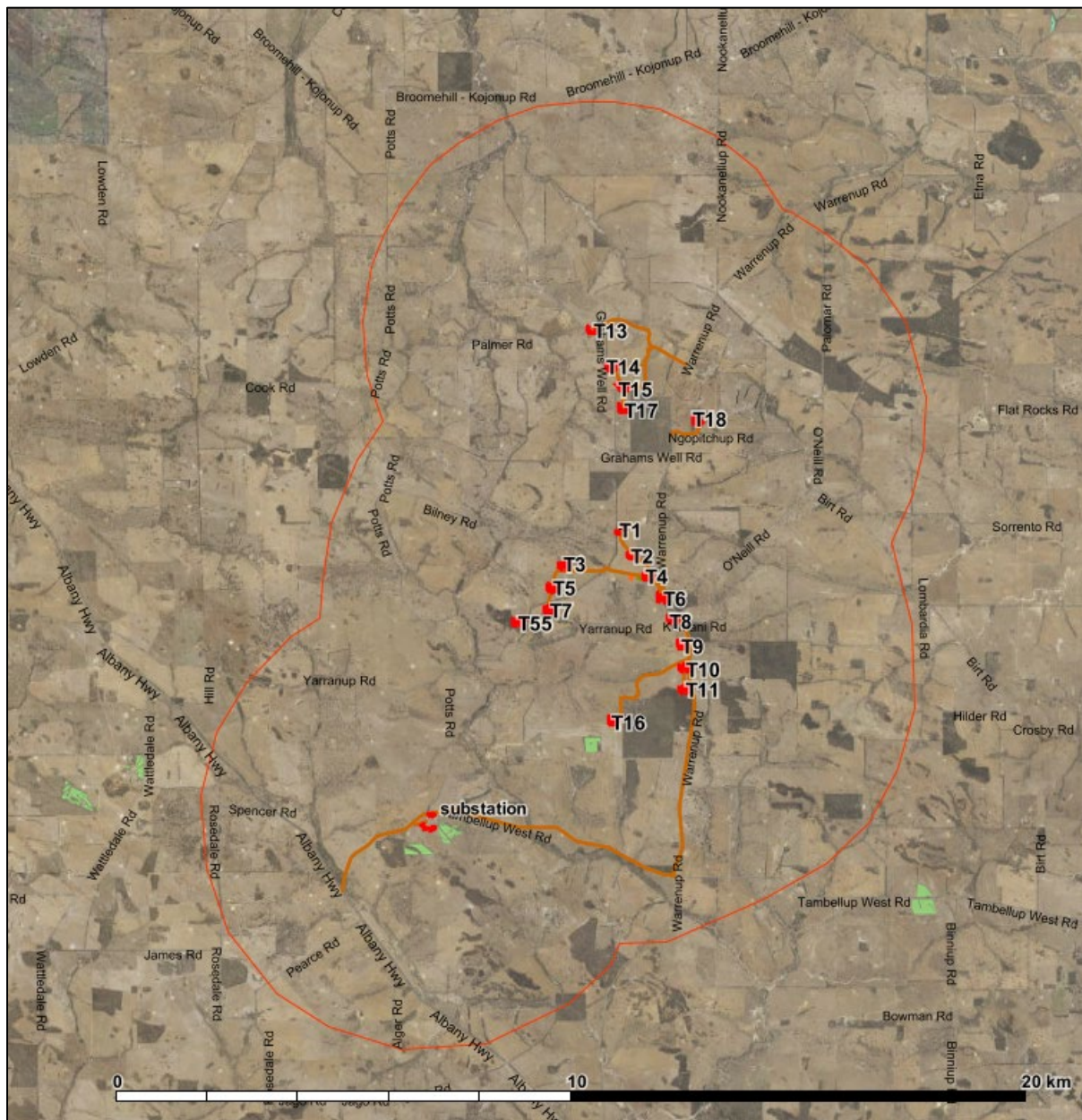


Plate 15: Fire history within 5 km of the site assets

The Department of Biodiversity Conservation and Attraction (DBCA) bushfire data identifies no landscape fires (> 20 ha) within the area of the site since 1922.

BoM data identifies that Kojonup has a similar frequency of lightning strike as the City of Perth. In wheatbelt areas lightning is a major source of natural ignitions which account for 6-10% of bushfire ignitions, suspicious and deliberate ignitions account for up to 50%, and the remainder are accidental. The vast majority of ignitions are attributed to human activities which include machinery failure, electric fences and powerlines, and outdoor works<sup>4</sup>.

A landscape-scale bushfire based upon similarities with other wheatbelt areas occurs at a rate of 1-10 in every ten years; it is a measure of potential notwithstanding one has not occurred within the area of the site. This may be attributed to the effectiveness of local suppression or due to a lack of reporting because the ignitions have been suppressed early.

<sup>4</sup> ABC Science Wednesday 20 November 2019



## Residential proximity

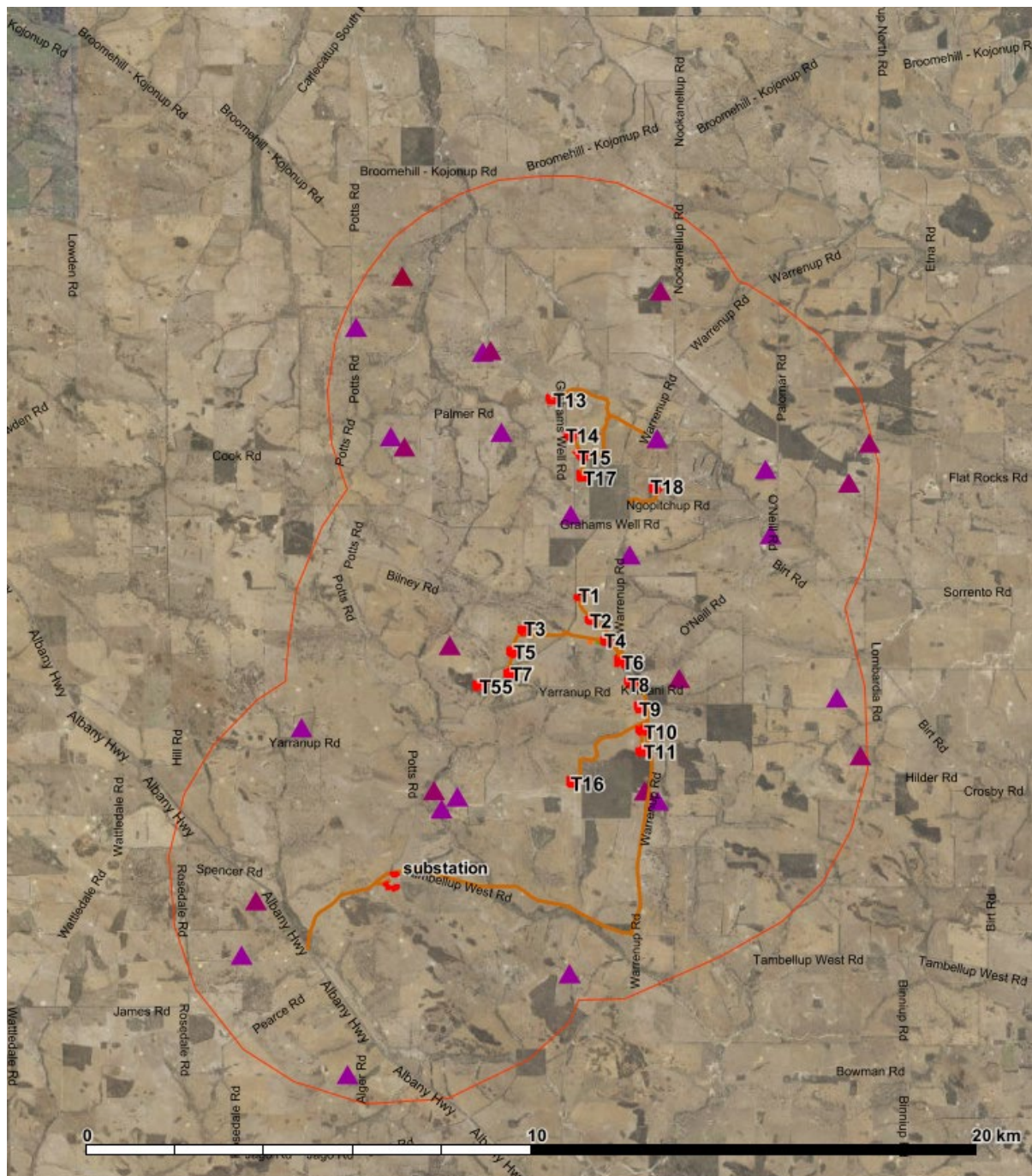


Plate 16: Residential dwelling locations (purple triangles) within 5 km of the site assets

Plate 16 illustrates the location of the dwellings within 5 km of site assets. The turbines have been sited to ensure no dwelling is located within 1 km of a turbine. Three dwellings located at 1 km from a turbine (T8, T11 and T17), are the closest turbines to a dwelling. Ten dwellings are distributed around the turbines and located within 2 km from the nearest turbine. Within the area 5 km from the site assets the ratio of dwellings equates to a density of 1 dwelling for every 90 km<sup>2</sup>; a low density.



## **Risk identification**

Bushfires have the potential to cause fatalities and serious injury, damage to property, extended community disruption and environmental degradation.

The objective of State Planning Policy 3.7 in examining development within bushfire prone areas is to reduce the vulnerability of development to the effects of a bushfire and to avoid increasing the threat of a bushfire external to the development.

The Risk assessment is therefore to analyse the potential (scenarios) for a bushfire to affect the site, to minimise the consequence, and the potential for a bushfire to escape the site and identify treatments to reduce the likelihood and consequence.

### **Expected site context Fire behaviour**

The Flat Rocks Wind Farm is within an extended area of pasture grasses and comparatively level land with slopes under vegetation of up to 3.0° (5.0° has been used to assess the risk)

Grassfires travel faster (GFDI) than a forest canopy fire, but a forest canopy fire can eject a higher level of embers and also eject them over a greater distance; up to 5 km.

A grassfire influenced only by wind, over flat land with consistent fuel, will take an elliptical shape in the direction of the wind. The width of the elliptical will be narrower as the windspeed increases.

### **Scenarios**

Given the land is flat and predominantly pasture, within and extending beyond the wind farm, the usual analysis of scenarios, a fire arriving from a different direction through different vegetation of different slopes is not necessary in this instance. Notwithstanding the prevailing wind directions identified by the nearest weather station, a fire can come from any direction and in this instance the surrounding conditions at each asset is the same and each asset has a surrounding area of grassland/pasture and slopes less than 5.0° at no less than 100 m.

Appendix 2 illustrates the vegetation at each site with a photograph, and Appendix 3 provides an assessment of each turbine and the substation and operations compound describing the vegetation (fire behaviour), resident location and nearest public road in each direction up to 5 km from each asset. It can be used to inform the arrival of a fire, to provide assistance and to alert those down wind of an asset should an uncontrolled ignition occur in an asset.

Two scenarios have been considered for risk identification.

A fire arriving at the site and a fire escaping from an asset within the wind farm.

### **Fire arriving at the site**

A grassfire arriving at an asset within the wind farm (each turbine, the substation and operations compound, and the construction compound).

The windspeed has been increased for the calculation 45 kmph to 65 kmph to identify a worst-case rate of spread and an elliptical fire spread 25% of its length. The residence time for a grassfire (most intense flaming is 15 seconds<sup>5</sup>, the temperature quickly rises reduces after its passing, and can travel over ground at up to 25 kmph<sup>6</sup>, although may appear to travel faster.

Grassfires produce smoke and are easily observed in an open landscape.

The head width of the fire will be proportionate to the distance that the ignition occurred from the site. A fire arriving at the site may affect more than one turbine, either by its width or if multiple turbines are in line with the fire.

A fire during construction will affect more people distributed at the construction sites, up to 150 people, whereas during operation, outside of the operations compound two technicians may be in the field. Farming practices will also continue within the area of the wind farm and up to each turbine.

<sup>5</sup> P.Cheney Grassfire, weather and fire behaviour CSIRO 2008

<sup>6</sup> P.Cheney Grassfire, weather and fire behaviour CSIRO 2008

### Fire escaping from an asset within the wind farm.

An ignition from within the wind farm may occur from the ongoing agriculture production, i.e. maintenance, harvesting vehicle movement, which will continue up to the base of the wind farm assets.

An ignition may also occur from activities directly associated with a wind farm, including the construction works, but through the ongoing operation may include hot works (although fabrication will mostly occur within the workshop requiring only installation at isolated sites) and vehicle movements. Separation areas, APZs, will be established around each asset to avoid a continuity of bushfire fuel and fire spread.

The most problematic fire ignition is a turbine nacelle fire due to accessibility constraints caused by the height.

### Turbine nacelle fires



*Plate 17: Illustration of the wind farm wake effect.*

A Spanish study<sup>7</sup> into turbine fires (primarily to assess ASET time) identified they are related to diverse ignition sources including lightning strike, electrical equipment malfunction (electrical cabinet in the nacelle - common), hot surface ignition. The nacelle contains oils (up to 900 L) plastics i.e. wire coatings, and the nacelle cover and insulation. Rotor hub and blades can also become involved in a fire.

The study identified the nacelle is fitted with natural ventilation to prevent overheating, but this also provides an oxygen source to a large amount of highly flammable materials.

The study also identified that if suppression systems are overwhelmed, a total loss is expected as firefighters have difficulty dealing with the nacelle's height. A nacelle fire will therefore only extinguish when the available fuels have been consumed. The study also identified that falling materials may lead to wildfires (European).

The Australian Fire and Emergency Service Authorities Council (AFAC) in its 2018 Guidelines identified there is little evidence to suggest a grassland fire is a threat to a turbine. It identified the case example of a bushfire started on a paddock affecting the Waterloo Wind Farm in South Australia in January 2017.

"The wind farm operator confirmed that there was no damage to any wind farm infrastructure and no danger at any time to human life as a result of the fire."

AFAC also identified that if the turbines are shut down there will be no consequence of a wake effect upon fire behaviour and the operations of low flying firefighting aircraft.

Whilst the AFAC position is acknowledged, it assumes a control of the turbine has not been affected by the failure. The process to shut down as identified should be to position the rotor head into the wind and lock the rotor in a Y position. Facing the rotor into the wind will reduce the likelihood of damage and ignition of the blades.

<sup>7</sup> Rengel, B Computational analysis of fire dynamics inside a wind turbine (2017)



## 2.3 Risk Analysis

### Existing controls

There is an inherent risk of bushfire in the Australian landscape. Various activities undertaken and infrastructure is provided which work to reduce the risk we have today; the residual risk.

### **Identified Stakeholders**

There are a range of stakeholders whose actions affect the bushfire risk, either by undertaking works that reduce the risk (preparation) or who are engaged in a response. They provide and maintain existing risk controls and an important part of understanding and adapting if necessary to the proposed development and risk treatments.

- The community
- Shire services
- Bushfire Brigade Captains and volunteers
- Landowners
- Water Corporation
- Western Power
- Telstra/ telecommunications sector
- Bureau of Meteorology
- Department of Fire and Emergency Services
- Office of Bushfire Risk Management
- Department of Biodiversity Conservation and Attractions
- Parks and Wildlife Service
- Main Roads Western Australia and
- WAPOL

### **State Emergency Management**

The Bureau of Meteorology plays an important role in monitoring local weather conditions from local weather stations, providing analysis and climate information, forecasts of climate and weather conditions and Fire Danger Ratings as a basis for assisting preventative actions such as declaring total fire ban days.

The Department of Emergency Services provides a range of important communication services including public announcement of the fire danger ratings, bushfire incidents and warnings (Australian Warning System standard).

It is also responsible for coordinating local brigade responses (Comcen) and taking incident control for Level 2 (Complex) - 3 incidents (Protracted).

### **State Emergency Management Framework**

The *Emergency Management Act 2005* has been established to detail roles and responsibilities at a State, district, and local level in the implementation of the emergency management principles of Prevention (Planning), Preparation, Response, and Recovery (PPRR).

The *State Emergency Management Policy* (State EM Policy) provides a strategic framework for emergency management in Western Australia, describing principles and objectives for the co-ordinated organisation of public authorities.

The policy is supported by a suite of documents that provide complete guidance on the strategic framework for Emergency Management in Western Australia.

Under s. 20(4) of the EM Act, a public authority that is given a role and responsibilities under a State EM Policy is to comply with the State EM Policy<sup>8</sup>.

- State Emergency Coordinator (SEC)
- District Emergency Coordinators (DECs);
- Local Emergency Coordinators (LECs) (WAPOL officer for the City of Kalamunda); and
- Local Emergency Management Committee - oversees local emergency management activities PPRR, through articulation of stakeholder responsibilities in the Local Emergency Management Arrangements (LEMA).

A local government is to establish one or more Local Emergency Management Committees (LEMCs) for its area to ensure that effective Local Emergency Management Arrangements (LEMA) are prepared. The LEMA is to be consistent with the State Emergency Management policies and the State Emergency Management plan. The LEMA addresses all emergencies, but special considerations within the LEMA include the bushfire season.

It addresses the roles and responsibilities of public authorities and persons involved in emergency management (stakeholders) and includes the Hazard Management Agency (comprising the Shire, WAPOL, and DBCA) in addressing the emergency management concepts of Prevention, Preparation, Response, and Recovery.

The LEMAs are reviewed every 5 years.

Shire of Kojonup Local Emergency Management Arrangements, September 2017

Shire of Broomehill-Tambellup Local Emergency Management Arrangements, September 2021

### Local Government Fire Management Planning

Activities in which local government is engaged, in addition to the LEMA, that relate to development planning include:

Administration of the *Bush Fires Act 1954* and enforcement of the annual fire break notice to limit the ignition and spread of bushfire. It also provides the basis for declaring total fire ban days and the offences for causing a bushfire. It plays an important role in maintaining awareness of the bushfire risk, measures to reduce the spread of a bushfire and measures to reduce the ignition of a bushfire. Local governments also use the Act to require the provision of cleared space around buildings and structures.

In regard to the importance of policing to prevent bushfire ignition the Bushfire Cooperative Research Centre *Fire Development, Transitions and Suppression* study 2014, studied urban and peri-urban areas around Perth and compared DFES incident data. It was noted that in the study, there was a 50% decline in the number of annual ignitions due to proactive arson reduction programs in cooperation between Local government and WAPOL<sup>9</sup>.

### The Shire of Kojonup firebreak order provides:

#### RURAL LAND

*Homesteads, Buildings, Haystacks, Bulk Fuel, Drums and Liquid Petroleum.*

*"During the period from 14th December to the 31st May inclusive you shall have firebreaks at least 20 metres wide"*

It also provides, for harvesting and hot works:

*It is compulsory that an engine powered pumping unit and not less than 600 litres of water must be in attendance during grain harvesting operations. Trailed units must have the towing vehicle attached at all times. The firefighting unit must be located in or immediately adjacent to the paddock being harvested at all times*

<sup>8</sup> State Emergency Management *A Strategic Framework for Emergency Management in Western Australia* October 2019

<sup>9</sup> A L Sullivan et al *Bushfire Cooperative Research Centre Fire Development, Transition s and Suppression study CSIRO 2014 p 17*



## The Shire of Shire of Broomehill-Tambellup firebreak order provides

### LAND ZONED FARMING

*“During the period from 31st October 2021 to 15th April 2022 inclusive, completely surrounding the perimeter of any homestead building (excluding isolated non-flammable buildings), fuel installation..... you shall have firebreaks at least 5 metres wide (if provided by burning, cultivating or chemical spraying), or 10 metres wide (if provided by being closely grazed or mowed)”*

Land >40 ha

*“The owner/occupier must have a mobile firefighting unit (self-propelled, towed or slip-on) in good working order, with a minimum capacity of 400 litres.”*

Administration of the *Planning and Development Act 2005*, includes the preparation of development policy and assessment supporting Development Approval, and compliance with the bushfire protection criteria.

The Planning and Development Act through the State Planning Policy is a risk management arrangement regulates the potential introduction of land uses that may increase the threat of bushfire, and ensure future development reduces the consequence of bushfire, through siting and design. It works in unison although separately with the Building Act 2011, which addresses the construction standard of the habitable building.

Responsibility for the ongoing enforcement of the development authorisation is provided through section 214 of the *Planning and Development Act 2005*.

Administration of the *Building Act 2011* and the requirements of the *National Construction Code*, specifying construction standards in declared bushfire prone areas. Not all structures require development approval or building approval. The *Planning and Development (Local Planning Scheme) Regulations 2015*, Deemed Provisions at clause 78E (1) states bushfire construction standards provided in the *National Construction Code* can be applied by development approval if not in conflict with the *Building Act 2011*.

### Bushfire Risk Management Plans

The Shire of Kojonup is in the process of preparing a Bush Fire Risk Management Plans (BRMP) following the OBRM *Bushfire Risk Management System and Bushfire Risk Management Plan template*.

The aim of the BRMP is to document a coordinated and efficient approach to the identification and treatment of assets exposed to bushfire and the coordination and prioritisation of tenure blind bushfire reduction initiatives.

### Utilities

### Telecommunications

The telecommunications coverage within 5 km of the wind farm provides for mobile phone communication, although a black spot analysis was not available. All residents are also understood to have landline connection.

Calls may be received by the Shire directly from members of the public, or through the ‘000’ service and DFES Communications Centre (ComCen) requesting a turn out message be sent

All brigades are registered with DFES SMS Callout system which is used to:

- Notify a Brigade to respond to a fire
- Notify Brigade members of meeting and training activities

Both Shires also have an SMS system for advising:

- Implementing and removing Harvest and Vehicle Movement Bans
- Notifying the community of Total Fire Bans
- Notifying the community of a fire
- Notifying the community of road closures

In addition to the SMS service it is understood the landowners within the vicinity of the wind farm also receive warnings based on 'WhatsApp' messages etc, to mobilise local farmer resources immediately.

Firefighting facilities, appliances, are sparsely distributed in the district. Most fires are addressed initially by local farmers/lot owners contributing their time and firefighting facilities to apply a quick suppression response.

Aerial support is available from Manjimup and Albany

### **Water resources**

A reticulated water supply is not available. Potable water is to be provided by water tank. Production water requirements will also be provided by tanked water. Throughout the sites surface dams are provided at a frequency of 1 per 1 ha.

### **Power Supply**

The work construction compound and batching plant will be connected to the reticulated power supply. On site power generation is not proposed at the construction compound but will be required at the individual turbine sites through construction.

### **Road Network**

The site is framed by Albany Highway (primary access west of the wind farm - sealed) Broomehill-Kojonup Road (north of the site - sealed) Brit Road (east of the site – unsealed -joins Warrenup Road to meet Broomehill Kojonup Road) and Tambellup Road (south- sealed). The site is serviced through the centre by Warrenup Road (north south - unsealed).

An internal road network will be created to provide construction and ongoing connection to each turbine site.

### **Consequence Criteria**

This risk assessment has followed AS/ISO 31000:2018 risk management and in turn the National Emergency Risk Assessment Guidelines (NERAG 2020) and has adapted it to a local scale.

For the purpose of this assessment, it is assumed a bushfire arriving at the wind farm is an insignificant consequence, that other than shutting down for the period of the bushfire, it will not delay a return to energy production<sup>10</sup>. A fire however can be fatal to people that are exposed to it, but the potential consequence can be reduced by management practices and human behaviour. The safety of isolated workers *will be addressed through the emergency management plan*.

The assessment has instead assessed the consequence of a nacelle fire, and a fire escaping a turbine site.

The risk assessment follows objective 5.1 from SPP 3.7

5.1 Avoid **any increase** in the threat of bushfire to people, property and infrastructure. The preservation of life and the management of bushfire impact are paramount.

The purpose is to consider the consequence of introducing a development within an area, and to avoid an increase in the threat of bushfire above that which currently exists, noting that pasture/agricultural production around and within the site also presents an existing degree of risk, a fuel potentially vulnerable to lightning strike, mechanical failure of equipment (harvesters), the exposure of hot surfaces from vehicles passing over grasses, and hot works i.e. welding and grinding in the field.

Grassfires are characterised as locationally predictable because they do not generally disperse embers far in front of the fire front. Resources are therefore deployed directly to the fire front.

The wind turbine wake effect, unless shut down during the bushfire event, has the potential to disperse ignitions down wind.

<sup>10</sup> As identified by Australasian Fire and Emergency Service Authorities Council Wind Farms and Bushfire Operations 2018



## External Consequence Assessment

### Human settlement

The site is adjoined by agricultural pasture land within 5 km of the wind farm. The associated residential density is 1 dwelling per 90 km<sup>2</sup>. The nearest township is Kojonup 19 km to the north east.

| Fire scenario, Risk bushfire, fire <b>escaping</b> from the site |              |              |              |
|--|--------------|--------------|--------------|
| North  | East         | South        | West         |
| 5 residences   | 6 residences | 9 residences | 9 residences |

| INJURY SEVERITY | DESCRIPTION  |
|-----------------|--|
| FATAL           | Mortally injured, is certain to lead to death regardless of available treatments Counted among deaths, not injuries  |
| CRITICAL        | Injuries that pose an immediate life threatening condition if not treated adequately and expeditiously Examples include uncontrolled bleeding, a punctured organ, other internal injuries, spinal column injuries or crush syndrome  |
| SERIOUS         | Injuries requiring a greater degree of medical care and use of medical technology such as X-rays or surgery, but not expected to progress to life threatening status Examples include full thickness burns across a large part of the body or partial thickness burns to most of the body, loss of consciousness, fractured bones, dehydration or exposure |
| MINOR           | Injuries requiring basic medical aid that could be administered by paraprofessionals, which would require bandages or observation Examples include a sprain, a severe cut requiring stitches, a minor burn (partial thickness on a small part of the body) or a bump on the head without loss of consciousness   |

Generally, agricultural residential properties within pastoral area have separation spaces effective for preventing direct flame contact against the residence. The land owners are also provided with an annual firebreak notice. Aerial observation also finds the dwellings within 5 km are separated from pasture grasses by cleared land for driveways and gardens. As a general principle if a building survives a bushfire, then fatalities can be avoided if refuge can be taken in the dwelling.

Whilst grassfires are fast moving up to 25 km/h<sup>11</sup> the landscape is open affording visibility to avoid an approaching fire.

The potential consequence is classed as 'serious – Moderate', the consequence is reduced by the conditions, grassland is a moderate bush fire hazard level, not extreme, and the landscape is open providing the opportunity to see an approaching fire and take early action.

<sup>11</sup> P.Cheney Grassfires Fuel, weather and fire behaviour 2008.

## Economic

|  |                                |                                |                                |
|--|--------------------------------|--------------------------------|--------------------------------|
| Fire scenario, Risk bushfire, fire <b>escaping</b> from the site |                                |                                |                                |
| North  | East                           | South                          | West                           |
| Agriculture production pasture                                   | Agriculture production pasture | Agriculture production pasture | Agriculture production pasture |

| LEVEL         | IMPACT ON IMPORTANT INDUSTRY  |
|---------------|---|
| CATASTROPHIC  | Failure of a significant industry or sector in area of interest as a direct result of emergency event   |
| MAJOR         | Significant structural adjustment required by identified industry to respond and recover from emergency event   |
| MODERATE      | Significant industry or business sector is significantly impacted by the emergency event, resulting in medium-term (i.e. more than one year) profit reductions directly attributable to the event |
| MINOR         | Significant industry or business sector is impacted by the emergency event, resulting in short-term (i.e. less than one year) profit reductions directly attributable to the event                |
| INSIGNIFICANT | Inconsequential business sector disruption due to emergency event   |

A fire is likely to occur from only one part of the development. A fire at a turbine site, a fire at the substation and the permanent operation and maintenance building, a fire from the construction compound, or a fire from a vehicle. The fire will expand downwind in an elliptical shape from the source of ignition. The extent of loss of pasture will be determined by the wind strength and the event duration. Suppression intervention will reduce the extent of loss.

The most extreme fires conditions occur through the summer, after the harvest. Traditionally summer season fires are not a significant loss of pasture production, and whilst fires can occur outside the summer season the fire spread can be slower (a lower fire danger index < 50 potentially controllable) or restricted before pasture grasses have cured.

The consequence is classed as 'minor'. A fire from the nacelle has the potential to spread downwind (elliptical) destroying a season's crop and disrupting the livelihood of a landowner by a year, in addition there is a potential for damage to fences and other infrastructure. It is assumed existing controls promoted through the firebreak notice to provide a separation of buildings from grassland has been applied

.(



## Environmental

|  |   |   |                            |
|--|---|---|----------------------------|
| Fire scenario, Risk bushfire, fire <b>escaping</b> from the site |   |   |                            |
| North  | East  | South   | West                       |
| Contiguous pasture grasses                                       | Contiguous pasture grasses and isolated bush blocks | Contiguous pasture grasses and isolated bush blocks | Contiguous pasture grasses |

| LEVEL         | IMPACT ON ENVIRONMENTAL VALUES                             |
|---------------|--|
| CATASTROPHIC  | Permanent destruction of environmental values of interest  |
| MAJOR         | Severe damage to environmental values of interest          |
| MODERATE      | Significant damage to environmental values of interest     |
| MINOR         | Minor damage to environmental values of interest           |
| INSIGNIFICANT | Inconsequential damage to environmental values of interest |

The site is largely surrounded by land cleared for agricultural purposes with the exception of isolated bush block that are representative of pre-European settlement.

The Flora, Vegetation and Fauna Assessment of the Flat Rocks Wind Farm Survey Area Prepared by Mattiske from field survey found no declared rare or priority flora to be present.

The consequence is classified as 'insignificant'.

## Cultural

|  |      |       |      |
|--|------|-------|------|
| Fire scenario, Risk bushfire, fire <b>escaping</b> from the site |      |       |      |
| North  | East | South | West |
| Nil  | Nil  | Nil   | Nil  |

| LEVEL         | IMPACT ON CULTURAL ASSETS  |
|---------------|--|
| CATASTROPHIC  | Widespread and permanent loss of objects of identified cultural significance                 |
| MAJOR         | Widespread damage or localised permanent loss of objects of identified cultural significance |
| MODERATE      | Damage or localised widespread damage to objects of identified cultural significance         |
| MINOR         | Damage to objects of identified cultural significance  |
| INSIGNIFICANT | Minor damage to objects of identified cultural significance                                  |

The report on an Ethnographic Survey of the Proposed Flat Rocks Wind farm site between Kojonup and Broomehill found "As a result of the inspections the indigenous representatives were satisfied that the Project area contains no sacred or significant Aboriginal heritage sites".

The consequence is classified as 'insignificant'.

### Likelihood Level

Notwithstanding the FDI (see section 4) has a similar occurrence of days over FDI 50, as the Perth CBD as a comparison, it has a low likelihood history.

Event likelihood is guided by the fire history, and the climatic precursors, which may lead to a landscape and uncontrollable fire. Not all fires are considered damaging, however a landscape fire threatens life and property.

| LIKELIHOOD     | ANNUAL EXCEEDANCE PROBABILITY (AEP) | AVERAGE RECURRENCE INTERVAL (ARI) (INDICATIVE) | FREQUENCY (INDICATIVE) |
|----------------|-------------------------------------|--|------------------------|
| Almost certain | 63% per year or more                | Less than 1 year                               | Once or more per year  |
| Likely         | 10% to <63% per year                | 1 to <10 years                                 | Once per 10 years      |
| Unlikely       | 1% to <10% per year                 | 10 to <100 years                               | Once per 100 years     |
| Rare           | 0.1% to <1% per year                | 100 to <1000 years                             | Once per 1000 years    |
| Very rare      | 0.01% to <0.1% per year             | 1000 to <10,000 years                          | Once per 10,000 years  |
| Extremely rare | Less than 0.01% per year            | 10,000 years or more                           | Once per 100,000 years |

(NERAG 2020)

The likelihood level is classed as 'unlikely.' There is no identified history of landscape fire affecting the site and whilst turbine fires (nacelle fires) have occurred it is rare, with 5 having occurred in Australia between 2004 and 2018. International studies find a typical wind farm with 150 turbines may experience one or two fires during 20 years of operation.<sup>12</sup>

### Risk Level

| LIKELIHOOD     | CONSEQUENCE LEVEL |          |          |         |              |
|----------------|-------------------|----------|----------|---------|--------------|
|                | INSIGNIFICANT     | MINOR    | MODERATE | MAJOR   | CATASTROPHIC |
| ALMOST CERTAIN | Medium            | Medium   | High     | Extreme | Extreme      |
| LIKELY         | Low               | Medium   | High     | Extreme | Extreme      |
| UNLIKELY       | Low               | Low      | Medium   | High    | Extreme      |
| RARE           | Very low          | Low      | Medium   | High    | High         |
| VERY RARE      | Very low          | Very low | Low      | Medium  | High         |
| EXTREMELY RARE | Very low          | Very low | Low      | Medium  | High         |

(NERAG 2020)

A comparison of the proposal with the current situation, both are classed as 'unlikely' as an indication of frequency of event. There is always the potential for a grassland fire to occur if the fuel is present.

The wind farm is expected to present a similar level of risk of ignition that exists within the locality. The overall risk level is classed as 'medium'. Whilst construction materials and APZs can ensure a building survival, the potential for injury to humans if caught in the open is serious.

The particular feature of the wind farm is the significance is not the frequency of ignition, or the intensity of the fire, rather it is how the ignitions could be distributed, as multiple ignitions at a distance from the source. This will require a different firefighting approach that may stretch resources. Whilst a grassfire requires suppression focused upon the fire line, if a fire is to occur at a turbine site spot fires may occur downwind due to the height of the nacelle. A fire at a turbine site will require a consciousness to plan to fight spot fires that may ignite downwind in addition to suppression at the fire line.

<sup>12</sup> Firetrace international 2020 citing studies into the frequency of turbine ignitions  
[https://www.firetrace.com/hubfs/\\_img/reports/Firetrace-Report-In-The-Line-Of-Fire.pdf](https://www.firetrace.com/hubfs/_img/reports/Firetrace-Report-In-The-Line-Of-Fire.pdf)



## 2.4 Risk Evaluation

The risk evaluation is used to decide and prioritise a range of risk treatments that had been identified to reduce the risk level. The highest priority risk treatments are applied first, to fit with the resources available, and become part of the risk controls identified in the first review. The second tier risk treatments then become the priority outcomes in the subsequent review.

This assessment however is part of a development assessment and has followed an approach to minimise the risk to *As Low as Reasonably Practical* (ALARP). The measures are to be implemented and complete as part of the authorisation.

Whilst the wind farm may contribute an additional ignition source, it is considered a comparable frequency and consequence to that of pasture farming operations. An ignition will result in a spreading grassfire.

The risk profile can also be considered in two phases. The construction phase involves a range of activities that could result in ignitions and grassfire but is likely to have people in close attendance to respond effectively if provided with suppression facilities. The operational phase has a different set of potential ignition causes that may be remotely detected and will take time to respond to.

## 2.5 Risk Treatment

The attached Risk Register has identified the risk items and a corresponding treatment arranged in order following preparations and response. Each treatment has been identified for its practicality and effectiveness in reducing the residual risk, after treatment through construction and operation to a Low level risk.

As part of a continuous improvement model the risk level is recalibrated in the risk register is recalibrated to high as an objective to achieve and *As Low as Reasonably Practical* (ALARP) risk following treatments that are within the owner's control. In this approach there is a point of declining benefit where it becomes impractical. The risk treatments are therefore nominated for their practicality, benefit, and acceptance (expediency) and effectiveness (confidence). The NERAG risk assessment method is an orderly method of qualitative assessment, residual risk is also a qualitative estimate.

## Risk Register and Residual Risk

| Risk Register  |            |  |                                       |                                   |                  |
|--|------------|--|---------------------------------------|-----------------------------------|------------------|
| Risk statement   | Risk Level | Risk Treatment   | Expediency/<br>priority <sup>13</sup> | Confidence<br>level <sup>14</sup> | Risk<br>Residual |
| <b>TURBINE SITE - APPROACHING FIRE</b>   |            |  |                                       |                                   |                  |
| <p><u>Construction</u></p> <p>All the turbine sites are located within pastoral grasses. Grassfire is fast moving, potentially fatal to exposed persons and may cause the ignition and loss of flammable objects.</p> <p>The turbine sites are open isolated and distant to the construction compound</p> <p>Up to 20 persons are expected at the construction site and will arrive at the site by private vehicle.</p> <p>Transportable buildings in the construction compound will provide amenities and ablutions</p> <p>Assembly machinery may be significantly damaged by flame contact and extreme heat</p> <p>Turbine components in the laydown area may be significantly damaged by flame contact and extreme heat.</p> <p>There is only one egress route from the turbine sites until reaching Warrenup Road (east). This may limit the opportunity to evacuate a turbine site in the event of a short onset fire arriving from the east.</p> | High       | <p><b>Preparation</b></p> <ul style="list-style-type: none"> <li>The supervisor at the turbine site is to be aware of the emergency procedures and trained in the operation of firefighting equipment<sup>15</sup>.</li> <li>At induction all workers and visitors are to receive a summary of the emergency procedures.</li> </ul> <p><b>Managing the fuels</b></p> <ul style="list-style-type: none"> <li>Establish an APZ around the turbine compound 30 m.</li> <li>Establish the compound as low threat (no vegetation within the compound) and flammable materials separated by 6 m.</li> <li>A 3 000 litre fire appliance (slip on unit) and high capacity output pump will accompany each working area during the construction phase and can be used to suppress an approaching fire if safe to do so.</li> <li>A 50 000 L water tank will be provided at the Construction Compound to replenish infield firefighting.</li> <li>A 50 000 L standalone water tank will be established at the commencement at the commencement of each stage (stage groupings shown): <ul style="list-style-type: none"> <li>Inside of the access gate to WTGs 13,14,15,17</li> <li>Inside of the access gate to WTGs 1,2,3,4,5,6,7,55</li> <li>Inside of the access gate to WTGs 8,9,10,11,16</li> </ul> </li> </ul> <p><b>Response</b></p> <ul style="list-style-type: none"> <li>Evacuate when safe: or</li> <li>Shelter in open the open space in areas furthest from the approaching fire (Passenger vehicles may be used for shelter,</li> </ul> | High                                  | High                              | Low              |

<sup>13</sup> Each item is a potential consequence or external risk which forms part of the authorisation to be implemented as part of the authorisation, it is not a matter of choice between treatments.

<sup>14</sup> There is a high certainty of the cause and direct consequence

<sup>15</sup> Western Australian Department of Fire and Emergency Services *Guidelines for Operating Private Equipment at Fires* March 2022



**Risk Register**

| Risk statement  | Risk Level | Risk Treatment   | Expediency/<br>priority <sup>13</sup> | Confidence<br>level <sup>14</sup> | Risk<br>Residual |
|---|------------|--|---------------------------------------|-----------------------------------|------------------|
|   |            | <p>parked and moved in the open space to maintain the furthest distance from the fire)</p> <p>Extinguish small fires.</p>  |                                       |                                   |                  |
| <p><u>Operation</u></p> <p>The turbine site upon completion will be open and clear of objects at ground level</p> <p>The turbines are distant to the operations room the nearest turbine is 10 km away and furthest is 20 km away.</p> <p>Occasional isolated work, attended by private vehicle except for times of exceptional maintenance.</p> <p>There is only one egress route from the turbine sites until reaching Warrenup Road (east). This may limit the opportunity to evacuate a turbine site in the event of a short onset fire arriving from the east.</p> | High       | <p><b>Managing the fuels</b></p> <ul style="list-style-type: none"> <li>Establish an APZ around the turbine base.</li> <li>20 m diameter area compacted limestone.</li> <li>40 m diameter area grass &lt; 100 mm.</li> </ul> <p><b>Response at turbine site</b></p> <ul style="list-style-type: none"> <li>Evacuate if safe.</li> <li>Shelter on the lee side of the pylon.</li> <li>Evacuate when safe.</li> </ul> <p><b>Operation response</b></p> <ul style="list-style-type: none"> <li>The Operations Manager is to shut down the rotation of the turbines upon notice of a bushfire within 5 km of the wind farm until the 'all clear' is given by emergency services.</li> <li>Trained personnel dispatched (3000 L appliance) to assist suppression efforts to extinguish grassfires (water is not to be applied to an electrical fire).</li> <li>The turbine is to be inspected after the 'all clear' is issued.</li> </ul> | High                                  | High                              | Low              |
| <b>CONSTRUCTION COMPOUND - APPROACHING FIRE</b>   |            |  |                                       |                                   |                  |
| <p><u>Construction</u></p> <p>The construction compound is isolated and located within an area of pastoral grass.</p> <p>It comprises the site camp, the batch plant, crane pad and vestas laydown are</p> <p>Up to 120 persons may be in attendance and will arrive by private vehicle</p> <p>The site contains potentially flammable objects: transportable buildings, fabric awnings over shipping containers, laydown area and materials, refuse bins and</p>   | High       | <p><b>Preparation</b></p> <ul style="list-style-type: none"> <li>The supervisor at the construction compound is to be aware of the emergency procedures and trained in the operation of the of the firefighting equipment.</li> <li>At induction (upon attending the windfarm) all workers and visitors are to receive a summary of the emergency procedure.</li> </ul> <p><b>Managing the fuels</b></p> <ul style="list-style-type: none"> <li>Establish an APZ around the site camp 30 m.</li> </ul>   | High                                  | High                              | Low              |

## Risk Register

| Risk statement   | Risk Level | Risk Treatment   | Expediency/<br>priority <sup>13</sup> | Confidence<br>level <sup>14</sup> | Risk<br>Residual |
|--|------------|--|---------------------------------------|-----------------------------------|------------------|
| <p>fuel store (regulated management of hazardous material under the <i>Dangerous Goods Safety Act 2007</i>)</p> <p>There is only one egress route from the turbine sites until reaching Warrenup Road (east). This may limit the opportunity to evacuate a turbine site in the event of a short onset fire arriving from the east.</p> |            | <ul style="list-style-type: none"> <li>Establish the site camp as low threat (no vegetation within the compound) and flammable materials separated by 6 m.</li> <li>Establish the Batch Plant, Crane Pad and Vestas laydown as low threat, grass maintained at less than 100 mm or a mineral or paved surface.</li> <li>A 3 000 litre fire appliance (slip on unit) and high capacity output pump (available to accompany each working area during the construction phase) will be based at the Construction Compound. These may be recalled or diverted to assist with fire suppression if safe to do so.</li> <li>A 50 000 L water tank will be provided at the Construction Compound to replenish infield firefighting.</li> <li>A 50 000 L standalone water tank will be established at the commencement at the commencement of each stage (stage groupings shown): <ul style="list-style-type: none"> <li>Inside of the access gate to WTGs 13,14,15,17</li> <li>Inside of the access gate to WTGs 1,2,3,4,5,6,7,55</li> <li>Inside of the access gate to WTGs 8,9,10,11,16</li> </ul> </li> </ul> <p><b>Minimising Exposure</b></p> <ul style="list-style-type: none"> <li>All persons are to gather at the site camp if safe to reach.</li> <li>The amenities building is capable of accommodating all attending personnel.</li> <li>If it is not safe to reach the site camp from the Batch Plant, Crane Pad and Vestas laydown.</li> </ul> <p><b>Response</b></p> <ul style="list-style-type: none"> <li>Shelter within compound if not safe to leave.</li> <li>Extinguish small fires; trained personnel to utilise the fire fighting appliance to contribute to fire suppression efforts.</li> <li>Evacuate when safe.</li> </ul> |                                       |                                   |                  |
| <b>SUBSTATION AND PERMANENT OPERATIONS BUILDING AND MAINTENANCE COMPOUND - APPROACHING FIRE</b>  |            |  |                                       |                                   |                  |



## Risk Register

| Risk statement  | Risk Level | Risk Treatment  | Expediency/<br>priority <sup>13</sup> | Confidence<br>level <sup>14</sup> | Risk<br>Residual |
|---|------------|---|---------------------------------------|-----------------------------------|------------------|
| <p><u>Construction</u></p> <p>The substation and operations building, and maintenance compound is located within pastoral grasses.</p> <p>Grassfires are fast moving, are potentially fatal to exposed persons and may cause the ignition and loss of flammable objects.</p> <p>Vulnerabilities to ignition are:</p> <ul style="list-style-type: none"> <li>– The site will contain equipment awaiting installation.</li> <li>– The site include the storage of oils Up to 40 persons are expected during construction and will arrive at the site by private vehicle.</li> </ul> <p>The substation and operation's compound location has through road options Tambellup Road West (east-west) and is close to Albany Highway (north-south). Options are available to evacuate away from an approaching fire.</p> | High       | <p><b>Preparation</b></p> <ul style="list-style-type: none"> <li>– The supervisor at the turbine site is to be aware of the emergency procedures and trained in the operation of the of the firefighting equipment.</li> <li>– At induction (upon attending the windfarm) all workers and visitors are to receive a summary of the emergency procedure.</li> </ul> <p><b>Managing the fuels</b></p> <ul style="list-style-type: none"> <li>– Establish an APZ around the construction compound 30 m.</li> <li>– Establish the compound as low threat (no vegetation within the compound) and flammable materials separated by 6 m.</li> <li>– A 3 000 L firefighting appliance will be in attendance during construction and available to contribute to fire suppression efforts if safe to do so.</li> </ul> <p><b>Response</b></p> <ul style="list-style-type: none"> <li>– Evacuate when safe.</li> <li>– Shelter within open area if not safe to leave.</li> <li>– Extinguish small fires.</li> </ul> | High                                  | High                              | Low              |
| <p><u>Operation</u></p> <p>Up to 10 persons may be in attendance at the operations building at any one time, including field technicians and routine maintenance equipment.</p> <p>Vulnerabilities to ignition are:</p> <ul style="list-style-type: none"> <li>– Oil reservoirs (for substation)</li> <li>– Operations building</li> <li>– Workshop, equipment and maintenance materials.</li> </ul> <p>The substation and operations compound has through road options Tambellup Road West (east-west) and is close to Albany Highway (north-south). Options are available to evacuate away from an approaching fire.</p>  | High       | <p><b>Preparation</b></p> <ul style="list-style-type: none"> <li>– At induction (upon attending the windfarm) all workers and visitors are to receive a summary of the emergency procedure.</li> <li>– A 3 000 L firefighting appliance, slip on unit, is to be stationed at the Maintenance Compound to contribute to fire suppression efforts.</li> <li>– A 50 000 L tank is to be provided at the Maintenance Compound for firefighting – grassfires.</li> </ul> <p><b>Managing the fuels</b></p> <ul style="list-style-type: none"> <li>– Maintain an APZ around the substation 30 m.</li> <li>– Maintain the area within the substation clear of vegetation.</li> <li>– Maintain an APZ zone 21 m around the operations building and maintenance compound.</li> </ul>  | High                                  | High                              | Low              |

| Risk Register  |            |  |                                       |                                   |                      |
|--|------------|--|---------------------------------------|-----------------------------------|----------------------|
| Risk statement   | Risk Level | Risk Treatment   | Expediency/<br>priority <sup>13</sup> | Confidence<br>level <sup>14</sup> | Risk<br>Residual     |
|  |            | <ul style="list-style-type: none"> <li>The Operations Building is to be constructed to BAL 29 bushfire standard.</li> </ul> <b>Response</b> <ul style="list-style-type: none"> <li>Evacuate if safe.</li> <li>Shelter in the operations building.</li> <li>Evacuate when safe.</li> <li>Trained personnel, in attendance, to assist with grassfire suppression efforts (3000 L firefighting appliance) note water is not to be applied on to an electrical fire.</li> </ul>  |                                       |                                   |                      |
| <b>THE MAKING OF ROADS</b>   |            |  |                                       |                                   |                      |
| <p>Personnel may be injured by exposure to bushfire attack, extreme heat, smoke and airborne particles.</p> <p>Work is undertaken in the open, within pasture grass.</p> | High       | <b>Preparation</b> <ul style="list-style-type: none"> <li>At induction (upon attending the windfarm) all workers and visitors are to receive a summary of the emergency procedure.</li> </ul> <b>Response</b> <ul style="list-style-type: none"> <li>Evacuate to the site Construction Compound if safe.</li> <li>Evacuate to the nearest turbine construction compound if the site Construction Compound cannot be reached.</li> <li>Report ignition immediately to the operations office.</li> <li>Operations Manager is to report immediately to the Shire.</li> <li>Operations manager is to advise the land owner</li> <li>Trained personnel dispatched to assist suppression efforts to extinguish grassfires with firefighting appliances (water is not to be applied to an electrical fire)</li> </ul> | High                                  | Medium                            | Medium <sup>16</sup> |
| <b>TRENCHING AND INSTALLING POWERLINES</b>   |            |  |                                       |                                   |                      |

<sup>16</sup> A safe space may be distant.



| Risk Register   |            |   |                                       |                                   |                      |
|---|------------|---|---------------------------------------|-----------------------------------|----------------------|
| Risk statement  | Risk Level | Risk Treatment  | Expediency/<br>priority <sup>13</sup> | Confidence<br>level <sup>14</sup> | Risk<br>Residual     |
| <p>Personnel may be injured by exposure to bushfire attack, extreme heat, smoke and airborne particles.</p> <p>Work is undertaken in the open, within pasture grass.</p>  | High       | <p><b>Preparation</b></p> <ul style="list-style-type: none"> <li>At induction (upon attending the windfarm) all workers and visitors are to receive a summary of the emergency procedure.</li> </ul> <p><b>Response</b></p> <ul style="list-style-type: none"> <li>Evacuate to the Construction Compound if safe.</li> <li>Evacuate to the nearest turbine construction compound if the site Construction Compound cannot be reached.</li> <li>Report ignition immediately to the operations office.</li> <li>Operations Manager is to report immediately to the Shire.</li> <li>Operations manager is to advise the land owner</li> <li>Trained personnel dispatched to assist suppression efforts to extinguish grassfires with firefighting appliances (water is not to be applied to an electrical fire)</li> </ul>   | High                                  | Medium                            | Medium <sup>17</sup> |
| <b>TURBINE SITE - ESCAPING FIRE</b>   |            |   |                                       |                                   |                      |
| <p><u>Construction</u></p> <p>Potential ignition sources from activities at the turbine compound</p> <ul style="list-style-type: none"> <li>Hot works, open flame and spark generating activities</li> <li>Cigarette disposal</li> <li>Vehicle movements to the site, hot elements or vehicle mechanical failure</li> <li>Mechanical or electrical failure at the site</li> <li>Refuelling and flammable material spillage</li> </ul> | High       | <p><b>Preparation</b></p> <ul style="list-style-type: none"> <li>The supervisor at the turbine site is to be aware of the emergency procedures and trained in the operation of the of the firefighting equipment.</li> <li>At induction (upon attending the windfarm) all workers and visitors are to receive a summary of the emergency procedure.</li> </ul> <p><b>Managing the fuels exclusion</b></p> <ul style="list-style-type: none"> <li>Establish an APZ around the turbine compound 30 m.</li> <li>Establish the compound as low threat (no vegetation within the compound) and flammable materials separated by 6 m.</li> <li>A 3 000 litre fire appliance (slip on unit) and high capacity output pump will accompany each working area during the construction phase to prevent the spread of fire.</li> <li>A 50 000 L water tank will be provided at the Construction Compound to replenish infield firefighting.</li> </ul> | High                                  | High                              | Low                  |

<sup>17</sup> A safe space may be distant

## Risk Register

| Risk statement  | Risk Level | Risk Treatment  | Expediency/<br>priority <sup>13</sup> | Confidence<br>level <sup>14</sup> | Risk<br>Residual |
|---|------------|---|---------------------------------------|-----------------------------------|------------------|
|   |            | <ul style="list-style-type: none"> <li>A 50 000 L standalone water tank will be established at the commencement at the commencement of each stage (stage groupings shown):               <ul style="list-style-type: none"> <li>Inside of the access gate to WTGs 13,14,15,17</li> <li>Inside of the access gate to WTGs 1,2,3,4,5,6,7,55</li> <li>Inside of the access gate to WTGs 8,9,10,11,16</li> </ul> </li> </ul> <p><b>Response</b></p> <ul style="list-style-type: none"> <li>Report ignition immediately to the operations office.</li> <li>Operations Manager is to report immediately to the Shire.</li> <li>Operations manager is to advise the land owner</li> <li>Trained personnel dispatched to assist suppression efforts to extinguish grassfires with the firefighting appliance (water is not to be applied to an electrical fire)</li> </ul>  |                                       |                                   |                  |
| <p><u>Operation</u></p> <ul style="list-style-type: none"> <li>Nacelle fire</li> </ul> <p>The turbine nacelle has a fire detection and suppression system but there have been instances where a mechanical failure has overwhelmed the suppression system and a nacelle fire has occurred.</p> <p>Given the height of a nacelle and the wake effect, there is a potential for embers from the turbine fire to be deposited up to 5 km down wind and potentially igniting a grassfire.</p> | High       | <p><b>Preparation</b></p> <ul style="list-style-type: none"> <li>The Operations Manager is to be aware of the emergency procedures and communication contacts.</li> <li>At induction (upon attending the windfarm) all workers and visitors are to receive a summary of the emergency procedure.</li> <li>The landowners, hosting the turbine, are to be trained in the event of a nacelle fire, to establish and not to enter the 75 m exclusion area, to suppress the fire line and monitor for spot fire igniting downwind from the turbine.</li> </ul> <p><b>Managing the fuels</b></p> <ul style="list-style-type: none"> <li>Maintain the APZ around the turbine base:</li> <li>20 m diameter area compacted limestone</li> <li>40 m diameter area grass &lt; 100 mm</li> <li>A 3000 L firefighting appliance, slip on unit, is to be stationed at the Maintenance Compound to contribute to fire suppression efforts.</li> <li>A 50 000 L water tank will be provided at the Maintenance Compound to replenish in field firefighting.</li> </ul> | High                                  | Moderate                          | Medium           |



## Risk Register

| Risk statement  | Risk Level | Risk Treatment   | Expediency/<br>priority <sup>13</sup> | Confidence<br>level <sup>14</sup> | Risk<br>Residual |
|---|------------|--|---------------------------------------|-----------------------------------|------------------|
|   |            | <ul style="list-style-type: none"> <li>A 50 000 L standalone water tanks is proposed to be located at the commencement of each stage (stage groupings shown): <ul style="list-style-type: none"> <li>Inside of the access gate to WTGs 13,14,15,17</li> <li>Inside of the access gate to WTGs 1,2,3,4,5,6,7,55</li> <li>Inside of the access gate to WTGs 8,9,10,11,16</li> </ul> </li> </ul> <p><b>Response</b></p> <ul style="list-style-type: none"> <li>Report ignition immediately to the operations office.</li> <li>Move clear 75 m from the turbine base (away from falling debris).</li> </ul> <p><b>Operation Response</b></p> <ul style="list-style-type: none"> <li>The operation manager is to shut down the rotation of the turbines upon notice of a bushfire within 5 km of the wind farm until the 'all clear' is given by emergency services.</li> <li>The affected turbine should if possible be oriented head to wind and shut down.</li> <li>Operations Manager to immediately report the incident to the land owner for the undertaking of the first response including</li> <li>Establishing the 75 m exclusion zone from the base of the turbine.</li> <li>Dispatch trained personnel with the fire appliance 3000 L to the affected turbine. <ul style="list-style-type: none"> <li>Suppress the fire line</li> <li>Monitor for ignitions down wind and contribute to suppression efforts coordinate with landowner fire appliances</li> </ul> </li> <li>Operations Manager is to report immediately to the Shire.</li> </ul> |                                       |                                   |                  |
| <p><u>Operations Maintenance</u></p> <p>Technicians attending the turbines and associated infrastructure.</p> <p>Sources may include:</p> <ul style="list-style-type: none"> <li>Hot works, open flame and spark generating activities</li> <li>Vehicle mechanical failure</li> </ul> |            | <p><b>Preparation</b></p> <ul style="list-style-type: none"> <li>The Operations Manager is to be aware of works being undertaken at the site.</li> <li>All workers attending the site are to have mobile phones and contacts.</li> <li>All worker attending the site are to report their attendance to the Operation manager or delegate before entering the site.</li> </ul>  |                                       |                                   |                  |

**Risk Register**

| Risk statement  | Risk Level  | Risk Treatment  | Expediency/<br>priority <sup>13</sup> | Confidence<br>level <sup>14</sup> | Risk<br>Residual |
|---|-------------|---|---------------------------------------|-----------------------------------|------------------|
|   |             | <ul style="list-style-type: none"> <li>At induction (upon attending the windfarm) all workers and visitors are to complete a risk assessment and receive a summary of the emergency procedure.</li> <li>Fire extinguishers are to be collected from the operations building and taken on site.</li> <li>Hot works are not to be undertaken on total fire ban or harvest ban days without a permit.</li> </ul> <p><b>Response</b></p> <ul style="list-style-type: none"> <li>Fire extinguishers are to be used to suppress the spread and extinguish a grassfire ignited by the activity at the site.</li> <li>Report the incident to the operations manager</li> </ul>  |                                       |                                   |                  |
| <b>CONSTRUCTION COMPOUND – ESCAPING FIRE</b>  |             |   |                                       |                                   |                  |
| <u>Construction</u><br>Sources of ignition <ul style="list-style-type: none"> <li>Hot works, open flame and spark generating activities</li> <li>Cigarette disposal</li> <li>Vehicle movements to the site, hot elements or vehicle mechanical failure</li> <li>Mechanical failure at the site</li> <li>Refuelling and flammable material spillage</li> </ul> | <b>High</b> | <b>Preparation</b> <ul style="list-style-type: none"> <li>The supervisor at the construction compound is to be aware of the emergency procedures and trained in the operation of the of the firefighting equipment.</li> <li>At induction all workers and visitors are to receive a summary of the emergency procedure.</li> <li>A 3 000 litre fire appliance (slip on unit) and high capacity output pump (available to accompany each working area during the construction phase) will be based at the Construction Compound. These may be recalled to assist with fire suppression at the Construction Compound and prevent the spread of fire.</li> <li>A 50 000 L water tank will be provided at the Construction Compound to replenish infield firefighting.</li> <li>A 50 000 L standalone water tank will be established at the commencement at the commencement of each stage (stage groupings shown): <ul style="list-style-type: none"> <li>Inside of the access gate to WTGs 13,14,15,17</li> <li>Inside of the access gate to WTGs 1,2,3,4,5,6,7,55</li> </ul> </li> </ul> | <b>High</b>                           | <b>High</b>                       | <b>Low</b>       |



## Risk Register

| Risk statement  | Risk Level | Risk Treatment  | Expediency/<br>priority <sup>13</sup> | Confidence<br>level <sup>14</sup> | Risk<br>Residual |
|---|------------|---|---------------------------------------|-----------------------------------|------------------|
|   |            | <ul style="list-style-type: none"> <li>○ Inside of the access gate to WTGs 8,9,10,11,16</li> </ul> <b>Managing the fuels</b> <ul style="list-style-type: none"> <li>– Establish an APZ around the construction compound 30 m.</li> <li>– Establish the compound as low threat (no vegetation within the compound) and flammable materials separated by 6 m.</li> </ul> <b>Response</b> <ul style="list-style-type: none"> <li>– Report ignition immediately to the operations office.</li> <li>– Operations Manager is to report immediately to the Shire.</li> <li>– Extinguish grassfires with the firefighting appliance.</li> </ul>   |                                       |                                   |                  |
| <b>SUBSTATION AND PERMANENT OPERATIONS BUILDING AND MAINTENANCE COMPOUND - ESCAPING FIRE</b>  |            |   |                                       |                                   |                  |
| <u>Construction</u><br>Sources of ignition <ul style="list-style-type: none"> <li>• Hot works, open flame and spark generating activities</li> <li>• Cigarette disposal</li> <li>• Vehicle movements to the site, hot elements or vehicle mechanical failure</li> <li>• Mechanical failure at the site</li> <li>• Refuelling and flammable material spillage</li> </ul> | High       | <b>Preparation</b> <ul style="list-style-type: none"> <li>– The supervisor at the turbine site is to be aware of the emergency procedures and trained in the operation of the of the firefighting equipment.</li> <li>– At induction all workers and visitors are to receive a summary of the emergency procedure</li> <li>– A 3 000 litre fire appliance (slip on unit) and high capacity output pump will be in attendance during the construction phase to prevent the spread of fire.</li> <li>– A 50 000 L water tank will be provided at the Construction Compound to firefighting.</li> </ul> <b>Managing the fuels</b> <ul style="list-style-type: none"> <li>– Establish an APZ around the substation 30 m.</li> <li>– Maintain the area within the substation clear of vegetation.</li> <li>– Establish an APZ 21 m around the operations building and maintenance compound.</li> <li>– The operations building is to be constructed to BAL 29 bushfire standard.</li> <li>– Maintain the area within the workshop area clear of vegetation.</li> </ul> <b>Response</b> | High                                  | High                              | Low              |

## Risk Register

| Risk statement   | Risk Level | Risk Treatment  | Expediency/<br>priority <sup>13</sup> | Confidence<br>level <sup>14</sup> | Risk<br>Residual |
|--|------------|---|---------------------------------------|-----------------------------------|------------------|
|  |            | <ul style="list-style-type: none"> <li>Report ignition immediately to the operations office .</li> <li>Operations Manager is to report the incident immediately to the Shire.</li> <li>Extinguish grassfires with firefighting appliances. Note water is not to be applied onto an electrical fire.</li> </ul>  |                                       |                                   |                  |
| <u>Operation</u><br>Sources of ignition <ul style="list-style-type: none"> <li>Transformer, or electrical shorting</li> <li>Building fire</li> <li>Vehicle movements over grass</li> <li>Hot works undertaken at the workshop</li> </ul> | High       | <b>Preparation</b> <ul style="list-style-type: none"> <li>At induction (upon attending the windfarm) all workers and visitors are to receive a summary of the emergency procedure.</li> <li>A 3000 L firefighting appliance, slip on unit, is to be stationed at the Maintenance Compound to contribute to fire suppression efforts.</li> <li>A 50 000 L water tank will be provided at the Maintenance Compound to firefighting.</li> </ul> <b>Managing the fuels</b> <ul style="list-style-type: none"> <li>Maintain the APZ around the substation 30 m.</li> <li>Maintain the area within the substation clear of vegetation.</li> <li>Maintain the APZ 21 m around the operations building and maintenance compound. Maintain the operations building at the BAL 29 bushfire construction standard.</li> </ul> <b>Response</b> <ul style="list-style-type: none"> <li>The Operations Manager is to report the incident immediately to the Shire.</li> <li>Extinguish grassfires with firefighting appliance 3000 L. Note water is not to be applied onto an electrical fire.</li> </ul> | High                                  | Moderate                          | Medium           |
| <b>USE OF ACCESS ROADS</b>   |            |   |                                       |                                   |                  |
| <u>Operation</u><br>Sources of ignition <ul style="list-style-type: none"> <li>Vehicle movements to the site, hot elements or vehicle mechanical failure igniting a grassfire.</li> </ul>  | High       | <b>Preparation</b> <ul style="list-style-type: none"> <li>Attendance on the site is to be reported to the Operations Manager.</li> <li>At induction (upon attending the windfarm) all workers and visitors are to receive a summary of the emergency procedure.</li> <li>Fire extinguishers are to be collected from the operations building and taken on site.</li> </ul>  | High                                  | High                              | Low              |



## Risk Register

| Risk statement | Risk Level | Risk Treatment   | Expediency/<br>priority <sup>13</sup> | Confidence<br>level <sup>14</sup> | Risk<br>Residual |
|----------------|------------|--|---------------------------------------|-----------------------------------|------------------|
|                |            | <b>Managing the fuels</b> <ul style="list-style-type: none"> <li>– A 20 m cleared access road is to be maintained with a minimum 6 m carriageway.</li> </ul> <b>Response</b> <ul style="list-style-type: none"> <li>– Operational procedures are to restrict vehicles to the made access roads and cleared compounds, unless required for firefighting.</li> <li>– Mechanical failure of vehicles are to park in the centre of the access road.</li> <li>– Fire extinguishers are to be used to suppress the spread and extinguish a grassfire ignited by the activity at the site.</li> <li>– Report the incident to the Operations Manager.</li> </ul> |                                       |                                   |                  |

## APPENDIX 1 - EMERGENCY MANAGEMENT PLAN



# EMERGENCY MANAGEMENT PLAN

The following Emergency management Plan follows the Emergency Management System Approach, Planning, Preparation, Response and Recovery.

## 1. PREPARATION

### Roles and responsibilities – fire preparedness

#### Emergency Planning Committee (EPC)

The Emergency Planning Committee represents the wind farm owners and management together with the Chief Warden. During the construction phase representatives for each function may be included on the EPC.

Prior to the commencement of construction the EPC is responsible for ensuring consistency is achieved between the work practices and emergency procedures of each function contractor.

The Emergency Planning Committee is responsible for:

- overseeing the preparation of the site buildings and grounds prior to the approaching bushfire season including the operational readiness of all fire suppression systems , alarms and communications.
- reviewing the EMP and ensuring all information is up to date
- liaising with Shire emergency services
- establishing the Emergency Management Team and assigning roles and responsibilities to staff; and
- overseeing the undertaking of education and training.

The Emergency Planning Committee evaluates the outcomes of any drills and ensures appropriate resources are provided to prepare for the bushfire season.

#### Emergency Management Team (EMT)

The Emergency Management Team shall comprise staff assigned to the following positions:

- Chief Warden

#### The Chief Warden

The Chief Warden will be the Site Manager in attendance during the construction phase and subsequently the Operations Manager, during operation of the wind farm.

A Deputy Chief Warden may be appointed as a representative at each work site during the construction phase; to be coordinated by the Chief Warden.

Chief Warden responsible for:

- Coordinating response to a bushfire event.
- Ensure the induction of emergency procedures for all Visitors/ Contractors undertaking work at a site
- Overseeing practice exercises and reporting to the EMC – continuous improvement
- Overseeing the training of all staff on emergency shut down procedure, and emergency service notification
- Overseeing the training of all staff, on evacuation and shelter procedures
- Overseeing the training of the EMT, communication and emergency service liaison, facility evacuation, firefighting and the use of facilities

*Note: Personnel attending the site are responsible for fire prevention and extinguishing minor fires caused by works on site - where it is safe to do so*

- Providing event control
- Maintaining records

## Alarm system

Each wind turbine is monitored for excessive heat and each nacelle is equipped with a fire suppression system that is automatically activated in the event of detection of fire, smoke or excessive heat.

The wind farm's fire detection system is monitored from the operations room.

## Evacuation plan

### Construction

The construction of the wind farm will result in multiple activities and works across the site. Each working area will be provided with a nominated fire warden.

All attending workers at induction will be made aware of the emergency procedures to be followed at the site.

An alarm may be raised at each working area and immediately reported to the site operations manager (Chief Warden).

An alarm may be raised by the site operations manager (Chief Warden) or delegate, alerting personnel at each working area to implement the emergency procedures.

Communications between the site operations manager (Chief Warden) and the nominated fire warden at each working site will be by two way radio (Primary), in addition to mobile phone.

### Operation

All attending workers at induction will be made aware of the emergency procedures to be followed at the site.

All employees working remotely on the site will maintain communications with the operations manager (Chief Warden) by two way radio (Primary), in addition to mobile phone

## Emergency evacuation routes

### Construction

The emergency evacuation routes are the nearest public road or the nearest turbine compound (cleared space), whichever is in the opposite direction to an approaching fire (safest opportunity)

### Operation

The emergency evacuation from the operations building and substation is to Albany Highway.

Field workers, isolated, are to evacuate to the nearest public road or take shelter at the nearest turbine base (the access road network on completion should provide the opportunity in most instance to evacuate the site and avoid the passage of a fire).

## Assembly points

### Construction

The main Assembly Point is the construction compound (between turbine sites T3 and T4).

In an emergency each nominated fire warden will report to the site operations manager (Chief Warden), to advise of their destination and account for all personnel.

A daily log of personnel and visitors to the construction compound and all work sites should be maintained by the site manager (or nominated delegate).

The site manager (Chief Warden) will undertake a roll call and all personnel are to be accounted for.

### Operation

The permanent operations building is the main Assembly Point



## Command centre

### Construction

The initial operations management will be coordinated from the construction compound (between turbine sites T3 and T4). It will provide the command centre in an emergency.

### Operation

The permanent operations building will provide the command centre in an emergency.

## Training

All site employees, at induction are to be aware of the emergency procedures

- Identify access and egress options and safer places.
- To report an incident immediately.
- Stay in contact, maintain access to radio communication at all times.
- Determine the safest action evacuate or take shelter.
- Report destination.

Each working area will have at least one person present who is trained in basic fire operations and will be responsible for managing the operation of the firefighting equipment and the use of the 1000 L (trailer) fire appliance.

### Operation

Regular employees at the site will be trained in basic firefighting and the operation of the 3000 L fire appliance to be stationed at the Maintenance Compound.

Workers and technicians prior to entering the site are required to collect a fire extinguisher and operation instructions, to extinguish a grassfire and report an incident before entering the site.

### Emergency drills

Through both the construction phase and during operation an emergency drill is to be undertaken prior to the bushfire season (August) and again mid-season (January). All employees are to be notified prior to an alarm being tested or a drill exercise.

A debriefing shall be held as soon as practically possible, after each drill.

## Resources

### Internal suppression systems

Each turbine is fitted with a fire detection system, and internal suppression system.

### On site equipment

The following equipment

#### At construction

- A 3000 L fire appliances (slip on unit) will attend each working area and be based at the Construction Compound: to be recalled or dispatched to assist fire suppression efforts.
- A 50 000 L standalone tank is to be provided at the site Construction Compound.
- 3 @50 000 L water tanks are to be distributed though the windfarm, maintained at full capacity, to provide a reliable water supply to be used to suppress grassfires.

### At operation

- A 50 000 L standalone tank is to be provided at the Maintenance Compound.
- A 3000 L fire appliance (slip on unit) is to be retained at Maintenance Compound to be used to assist infield fire suppression efforts.
- 3 @50 000 L water tanks are to be distributed though the windfarm, maintained at full capacity, to provide a reliable water supply to be used to suppress grassfires.
- Each attending technician vehicle is to carry the equivalent of one 9 kg fire extinguisher per vehicle and a first aid kit when on the windfarm site (These can be collected from the Maintenance Compound before entering the Windfarm).
- The permanent Maintenance Compound will be equipped with two large first aid kits (These can be collected from the Maintenance Compound before entering the Windfarm).



A 3000 L slip on unit

### Communication

#### Within site

Two way radio communication is to be provided with each working area and remote employee during operation.

#### External

Contact information for all adjoining properties is to be prepared and maintained up to date. This may include an SMS register, or another communication means e.g. WhatsApp.

Shire notification contacts and in turn emergency services contacts are to be confirmed.

### Chemical storage and handling

All chemicals will be stored in a designated chemical store during construction and operation. A register is to be kept and provided to any attending emergency services.



A register will be kept at the construction compound and the operations building.

Hazardous materials will be stored following the requirements of:

- Dangerous Goods Safety Act 2007
- Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007 (bulk >500 L)
- Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007
- Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007

Hazardous materials at the substation are banded with sufficient capacity to contain the volume of stored material and around the transformer in the event of a major oil leak.

## Hot works

No hot works will be undertaken outside on Total Fire Ban Days or harvest ban days without a permit.

## Fire preparedness review

A Fire Preparedness Inspection is to be undertaken in September each year and confirmed with the Emergency management committee

- An inspection of the Asset Protection Zones
  - Around the site camp (Construction compound) a 30 m wide area of grass maintained at less than 100 mm and no grass within the compound.
  - Around the Turbine construction compound a 30 m wide area of grass maintained at less than 100 mm and no grass within the compound.
  - Around the base of the Turbine (operational) a 20 m diameter area of compacted limestone or equivalent, and a 40 m diameter area of grass maintained at less than 100 mm.
  - Around the Substation a 30 m wide area of grass maintained at less than 100 mm and no grass within the substation area
  - Around the Operations building and maintenance compound a 21 m wide area of grass maintained at less than 100 mm and no grass within the maintenance compound. The operational building is to be constructed and maintained to the BAL 29 standard.
  - Access route easements are 20 m wide
- Turbine suppression systems in operating order.
- An inspection of the on-site firefighting equipment to be in operating order: Firefighting appliance, fire extinguishers, first aid and PPE.
- A review of currency this Emergency Management Plan (update contacts and learnings from drill exercises or bushfire events).
- Confirm firefighting arrangements with the Shire and neighbouring properties.
- Confirm landowners are aware of the fire fighting procedures in the event of a nacelle fire.

## Throughout the fire season

All employees are to report any defects

- Continual observation of the condition of the roads and cleared areas: grass is fast growing and will require regular attendance.

## 2. RESPONSE

In the event of a fire the following priorities will be observed:

1. Protect and rescue human life.
2. Report incident – land owner
3. Report incident – Shire
4. Render assistance in affected areas.

### Chain of command

The chain of command on site in the case of a fire is as follows:

1. Chief Fire Warden (Operations Manager) or proxy
2. Nominated staff to undertake firefighting (construction phase)
3. Land owner
4. Emergency Services upon arrival will have authority to deal with the fire.

The landowner, during operation, is in closest proximity to apply suppression to extinguish a grassfire; until the brigade arrives. Landowners are to be trained in responding to a Nacelle fire event, to establish an exclusion zone, apply suppression to the fire line outside of the exclusion zone, and monitor for spot fires downwind, up to 5 km.



## FIRE RESPONSE ACTIONS

|                                       |   |              |
|---------------------------------------|---|--------------|
| <b>Key contacts</b>                   |   |              |
| Community Emergency Services Manager  | Cindy Pearce  | 0417 071 567 |
| Kojonup Fire Brigade                  | Tony Fisher (Chief)   | 0428 311 504 |
| Broomehill and Tambellup Fire Brigade | Kim Oliver (Chief)  | 0427 258 157 |
| <b>Turbine land owners</b>            |   |              |
| WTG                                   | TBA   |              |
| WTG                                   | TBA   |              |
| WTG                                   | TBA   |              |
| <b>Alarm</b>                          | <p>Obtain information about the type and nature of the fire, including the direction of travel.</p> <ul style="list-style-type: none"> <li>– Determine need for shut down of turbines.</li> <li>– Alert adjoining residents (SMS contact/WhatsApp).</li> <li>– Instruct evacuation or shelter of personnel on site.</li> <li>– Report incident to the Shire and DFES.</li> <li>– Dispatch site fire services to assist with suppression.</li> </ul>   |              |
| <b>Approaching Fire</b>               | <p><u>Construction Phase</u></p> <p><b>If a fire is likely to encroach within 5 km of the Wind farm assets.</b></p> <ul style="list-style-type: none"> <li>– Vehicles and equipment are to be moved out of the path of any fire to and parked on clear ground.</li> <li>– All personnel not directly involved in the fire response are to evacuate the site.</li> <li>– Alert adjoining residents (SMS contact/WhatsApp).</li> </ul> <p><u>Operation Phase</u></p> <p><b>If a fire is likely to encroach within 5 km of the Wind farm assets.</b></p> <p><u>Determine the impact to the area</u></p> <ul style="list-style-type: none"> <li>– Direct the shutdown turbines and lock in the Y position, until the 'all clear is received'.</li> </ul> <p><u>Determine the impact at the site</u></p> <ul style="list-style-type: none"> <li>– Determine the severity of the fire. If there is potential endangerment of the site.</li> <li>– All personnel not directly involved in the fire response are to evacuate the site to a safe location as directed by the management team in coordination with public emergency services.</li> <li>– Guide personnel at risk to safety (evacuate or take shelter)</li> </ul> <p><i>Workers at a turbine (if not safe to evacuate) should park vehicles at the base of the turbine at the lee side of the approaching fire.</i></p> <ul style="list-style-type: none"> <li>– The Chief Warden (operations manager), and designated personnel, will ensure the evacuation of personnel has been successfully completed and that all personnel are accounted for.</li> </ul> |              |
| <b>Turbine Fire</b>                   | <p>Report fire</p> <ul style="list-style-type: none"> <li>– Shut down turbine, Y position and head to wind if possible.</li> </ul>  |              |

|  |   |
|--|---|
|  | <ul style="list-style-type: none"> <li>– Shut down other turbines.</li> <li>– Alert the turbine land owner and land owners within 5 km.</li> <li>– Alert the Shire. The Shire will alert the community (SMS contact/WhatsApp) and mobilise the local brigade response.</li> <li>– Assist local fire fighting response. Dispatch trained personnel with fire fighting appliance and coordinate with land owners to monitor and suppress spot fires downwind of the affected turbine.</li> </ul>  |
| <b>Substation Fire</b>   | <ul style="list-style-type: none"> <li>– Shut down the wind farm and electricity supply to the substation.</li> <li>– Do not apply water to electrical fires.</li> <li>– Contain fires within the APZ.</li> </ul> <p>(This procedure does not account for structural fire procedures at substation; this is to prevent the escape and a spread of bushfire from the substation).</p>  |
| <b>Access route fire</b>   | <p>All technicians attending the site are to acknowledge the emergency procedures (incident reporting) by induction certification before proceeding onto the wind farm.</p> <p>All technicians attending the site are to collect an extinguisher and first aid kit from the operations building before proceeding onto the wind farm.</p> <p>At induction, technicians attending the site should be aware in the event of a mechanical failure the vehicle should be parked immediately within the road way or on a cleared space. Do not drive over cured grass.</p> <p>The fire extinguisher should be used to suppress any fire escaping into or spreading into the adjoining grass.</p> <p>Immediately report the incident to the Operations Manager.</p> |
| <b>Building Fire</b><br><b>Workshop Fire</b>   | <p>Follow structural fire procedures.</p> <p>Evacuate buildings.</p> <p>Account for all staff.</p> <p>Set up an exclusion zone.</p> <p>Contain fires with the fire appliance, to within the APZ, and prevent the spread of fire.</p>  |
| If evacuations of staff is expected to extend beyond the normal work shift, communicate an expected return |   |



### 3. RECOVERY

After the 'all clear' is announced by emergency services (Shire or DFES)

#### **Contaminated fire-fighting water**

Contaminated fire-fighting water should not be permitted to enter the watercourse or contaminate the ground that supports the surface flows into a dam – bund and remove.

#### **Dealing with the media**

All enquiries are to be directed to the Project Manager.

#### **Restore operation**

If the site has not been adversely affected by fire, and an all clear has been issued down wind of the wind farm, up to 5km, the operation can commence.

If the facility is affected damaged by fire, it may be possible to restore operation to the areas that were not damaged. Damage to affected areas should not be interfered with until any required investigations are completed.

#### **Debriefing and continuous improvement**

A debriefing of staff will be held after the incident and opportunities for improvement identified.

A debriefing of staff, Emergency service and the local community should also be held after the incident and opportunities for improvement identified.

## APPENDIX 2 - VEGETATION CLASSIFICATION



Figure 1a Vegetation Classification

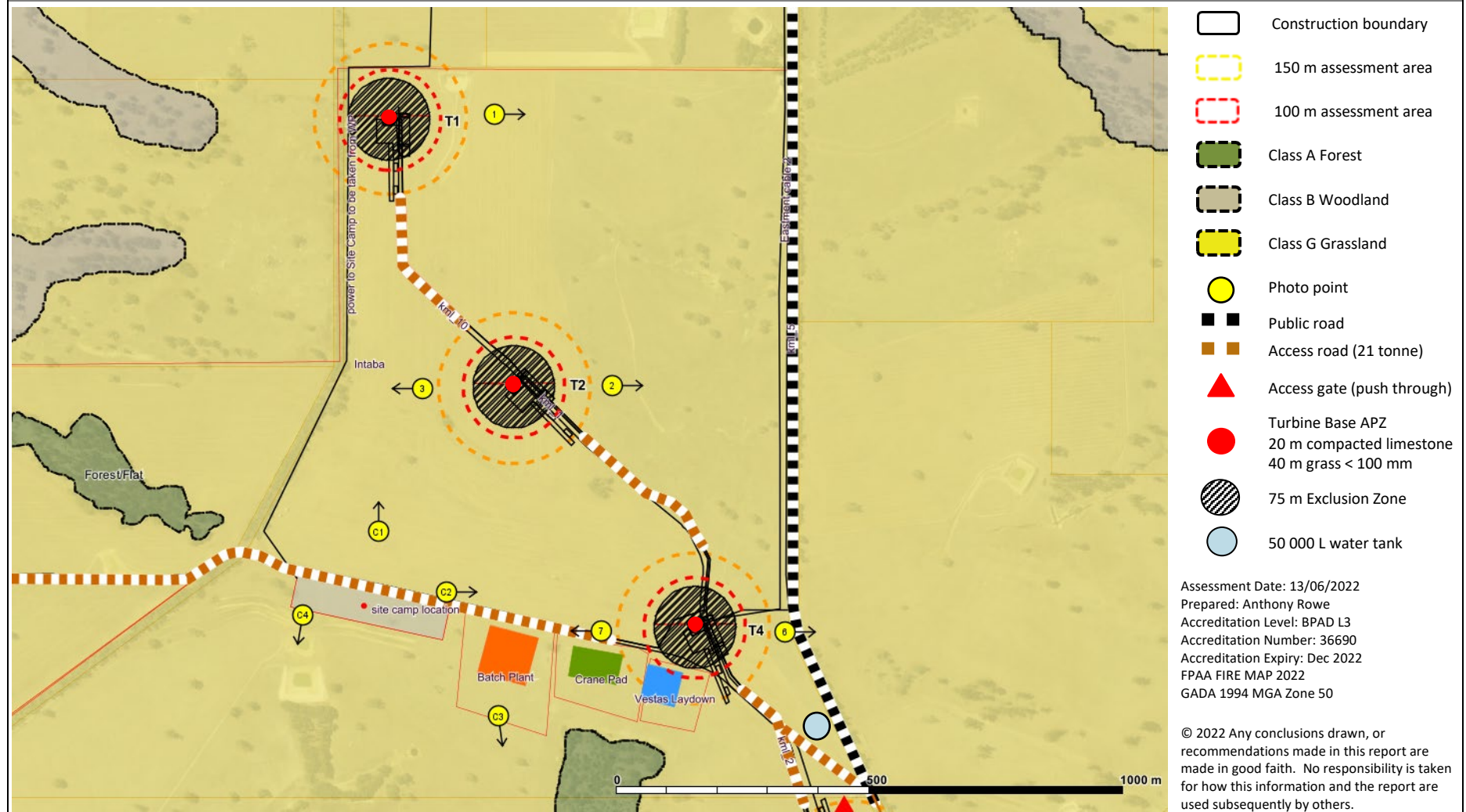


Figure 1b Vegetation Classification

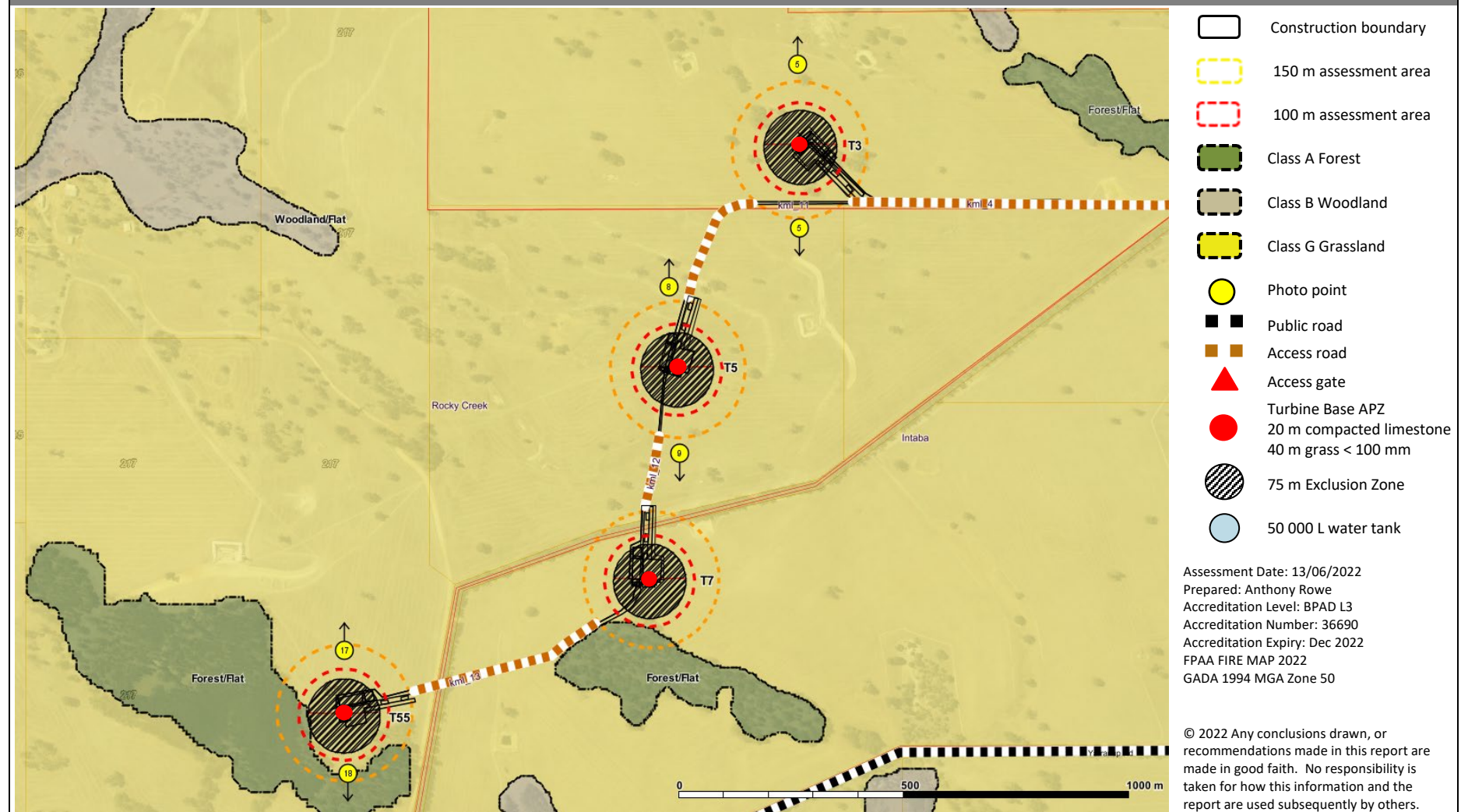




Figure 1c Vegetation Classification

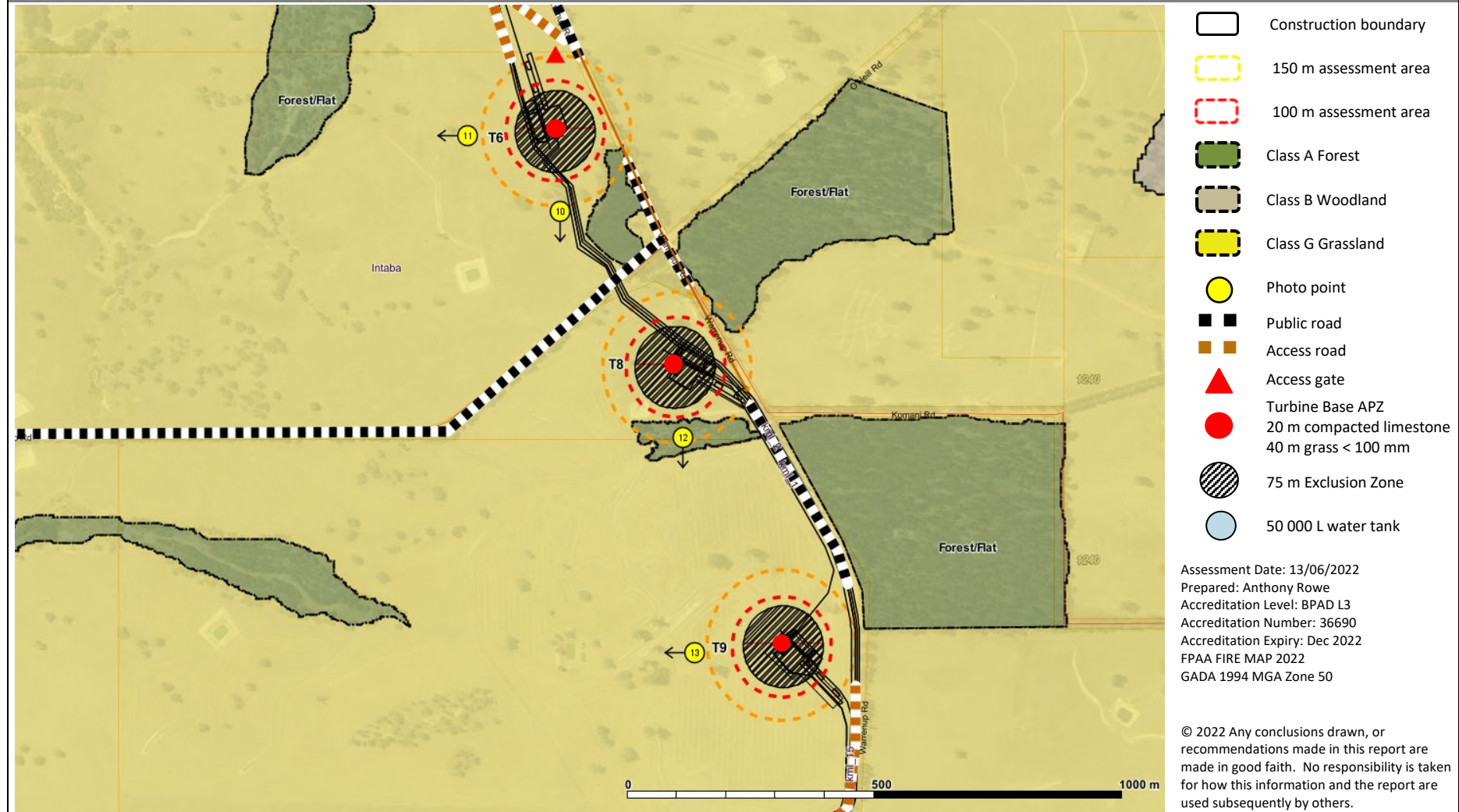


Figure 1d Vegetation Classification

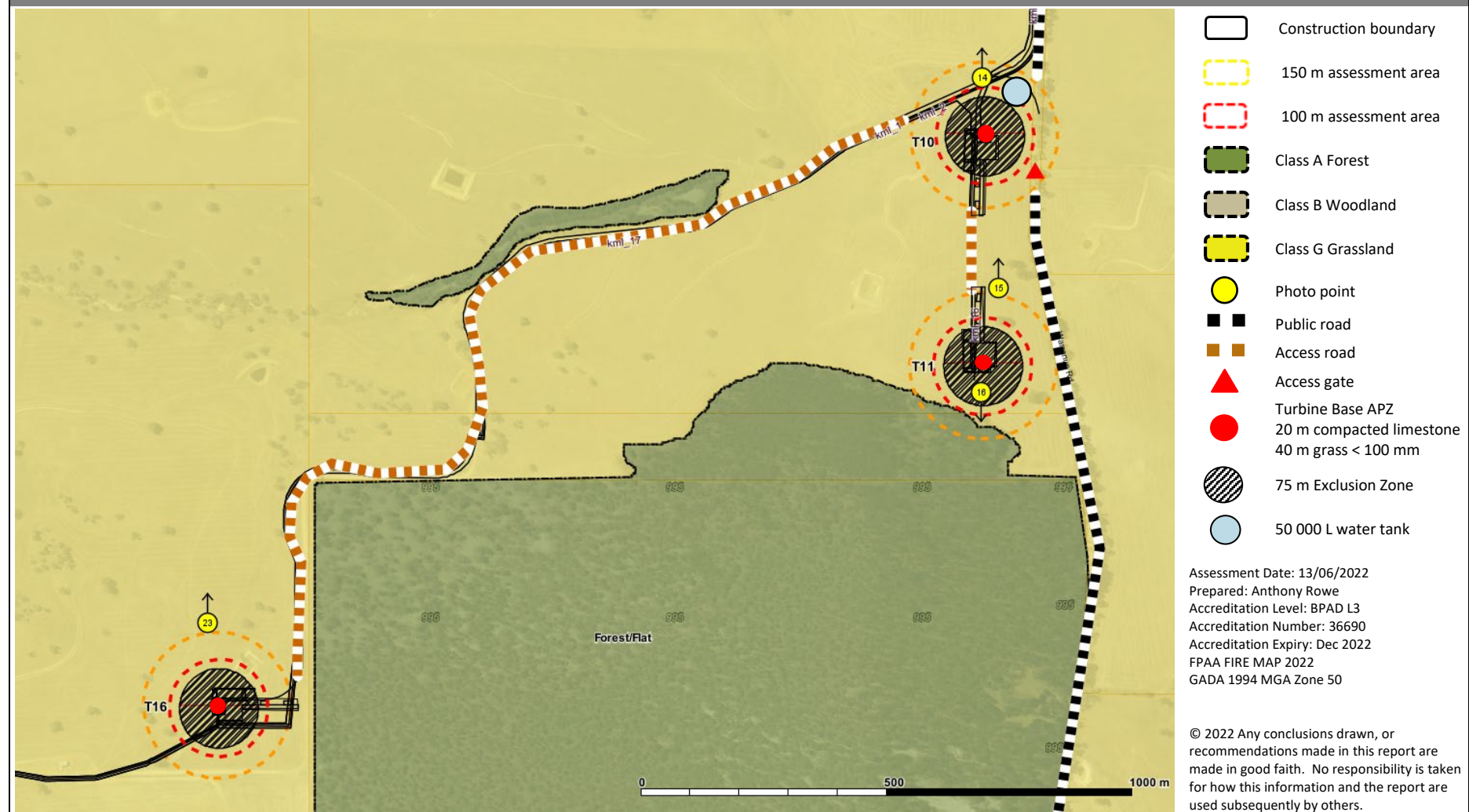




Figure 1e Vegetation Classification

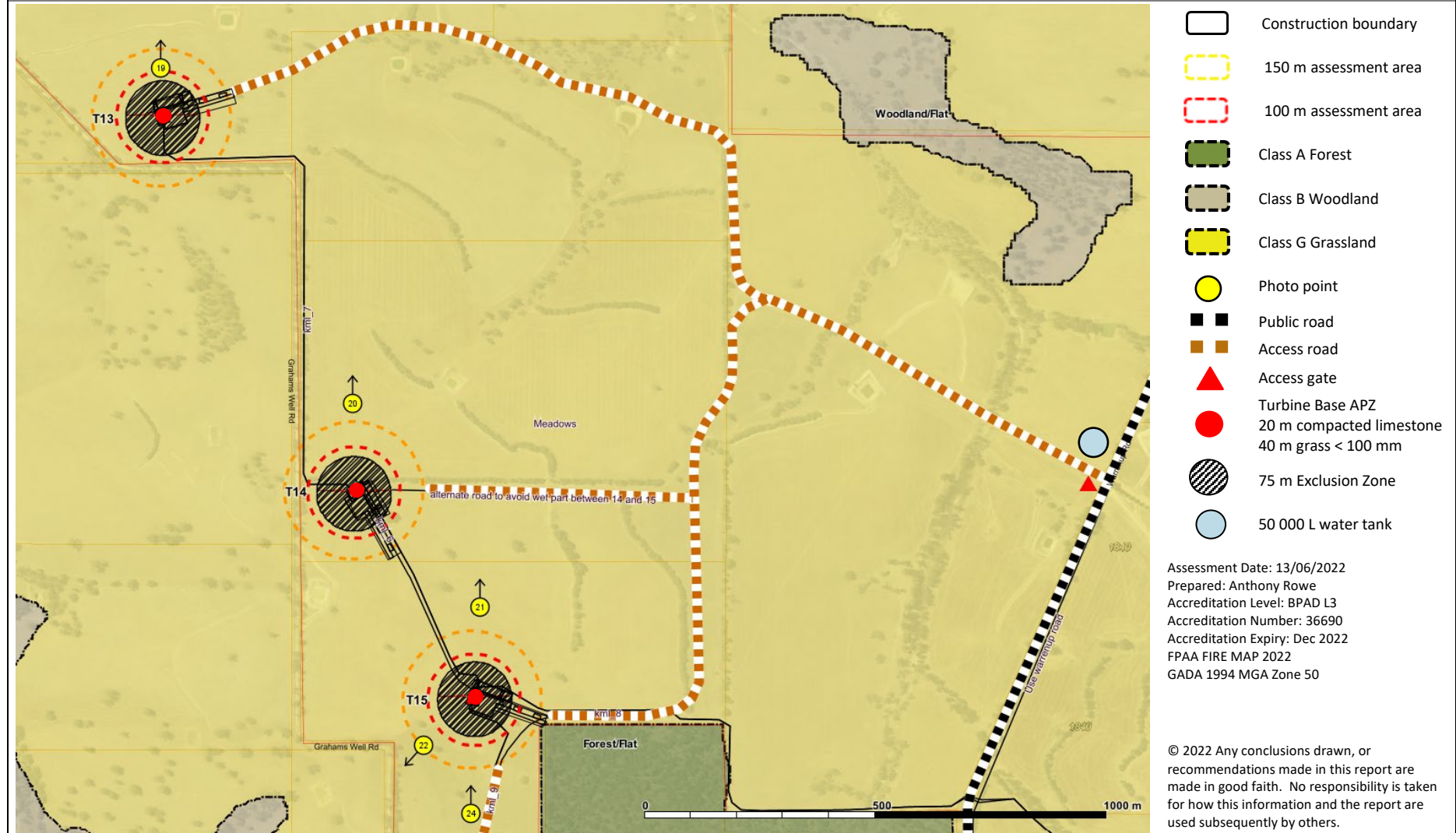


Figure 1f Vegetation Classification

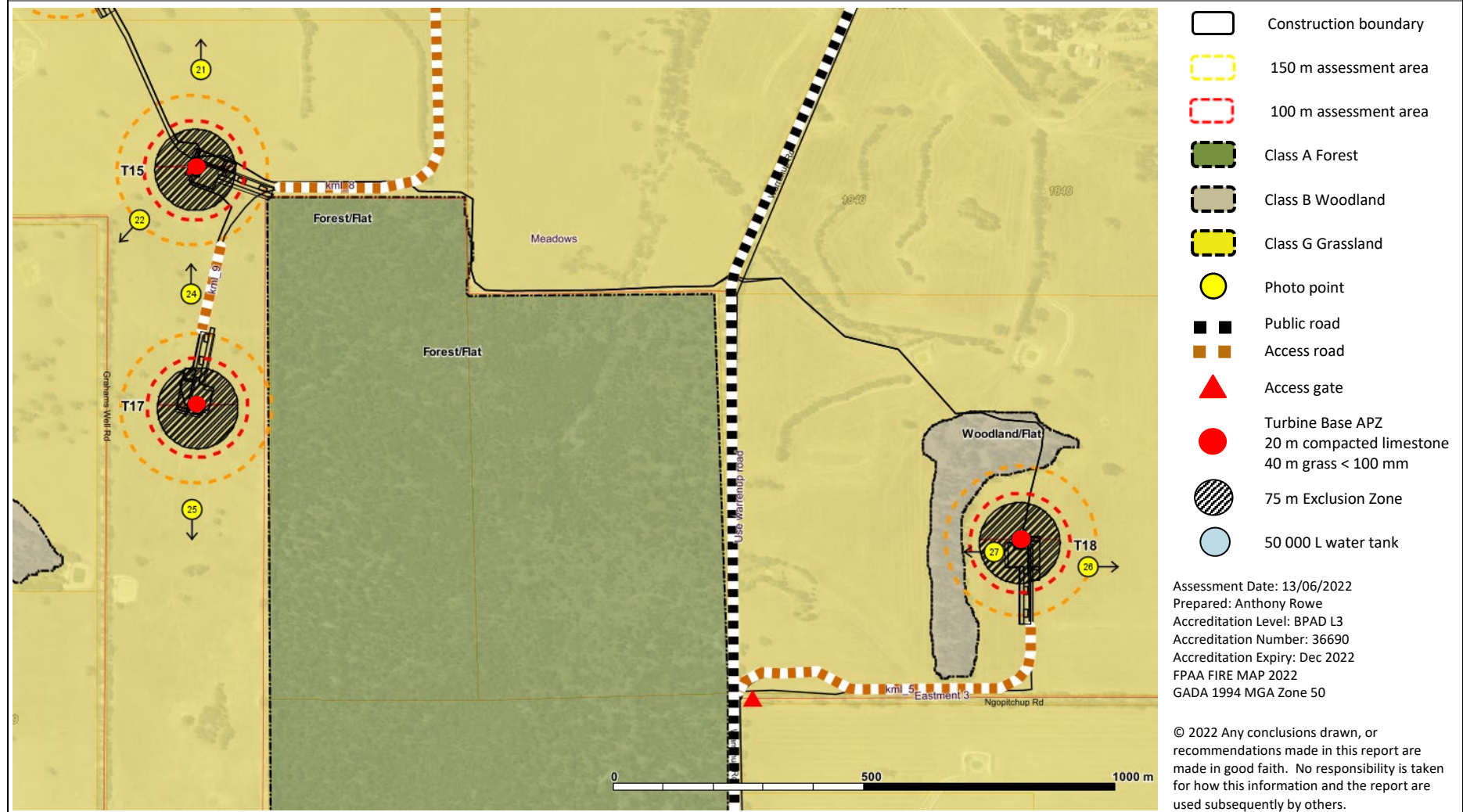
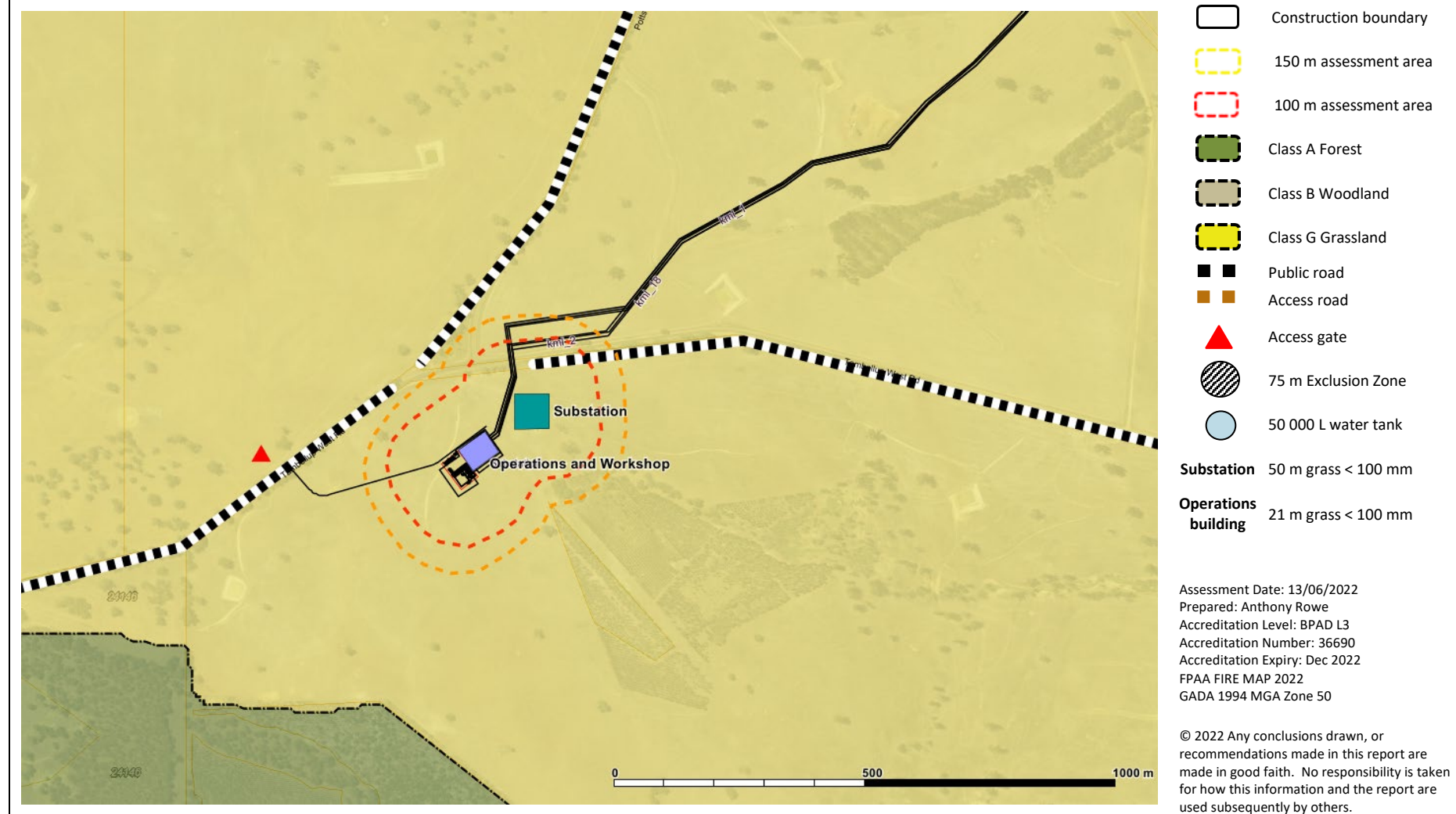




Figure 1g Vegetation Classification



**Photograph verification of vegetation at the construction compound and turbine sites**

|   |  |
|---|--|
|    |    |
| C1 Construction compound  | C2 Construction compound   |
|   |   |
| C3 Construction compound  | C4 Construction compound   |
|  |  |
| Photo 1: T1   | Photo 2: T2  |
|  |  |



Photo 3: T2



Photo 4: T3



Photo 5: T3



Photo 6: T4



Photo 7: T4



Photo 8: T5



Photo 9: T5



Photo 10: T6



Photo 11: T6



Photo 12: T8







Photo 13: T9



Photo 14: T10



Photo 15: T11



Photo 16: T11



Photo 17: T55



Photo 18: T55



Photo 19: T13

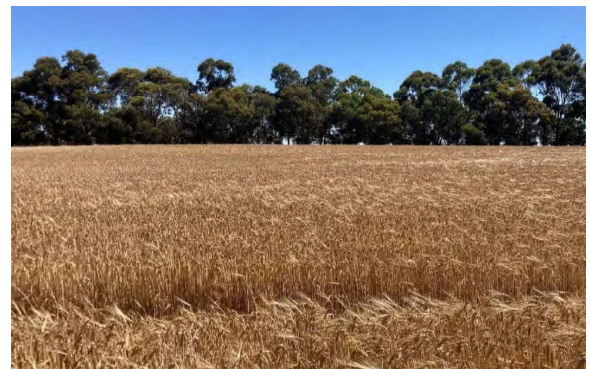


Photo 20: T14





Photo 21: T15



Photo 22: T15



Photo 23: T16



Photo 24: T17



Photo 25: T17

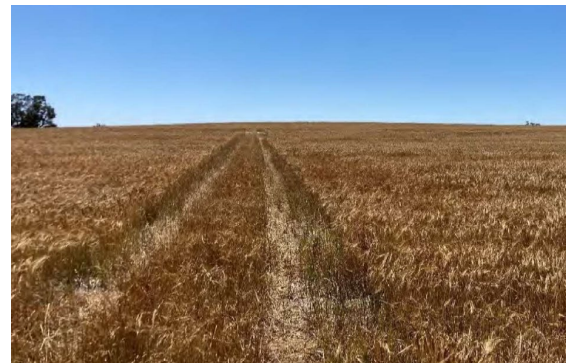


Photo 26: T18



Photo 27: T18

## APPENDIX 3 – SCENARIO RESPONSE PLAN



| Turbine        | Predominant Vegetation |      |       |      |                               |                        |   |                    |                        |
|----------------|------------------------|------|-------|------|-------------------------------|------------------------|---|--------------------|------------------------|
|                | North                  | East | South | West | North                         | East                   | South   | West               | Houses                 |
| <b>T1</b>      |                        |      |       |      |                               |                        |   |                    |                        |
| <150 m         | G                      | G    | G     | G    | G                             | G                      | G   | G                  |                        |
| 151 m - 2.5 km | G,F                    | G    | G     | G    | Grahams Well Road<br>1 km     | Warrenup Road<br>780 m | Work Camp Road<br>900 m                         |                    | 1.7 N, 1.3 NE          |
| 2.5 km - 5 km  | G                      | G    | G     | G    | T15 access and T 13<br>access | O'Neil Road<br>3.2 km  | Yarranup Road 2.1 km                            | Bilney Road 3.2 km |                        |
| <b>T2</b>      |                        |      |       |      |                               |                        |   |                    |                        |
| <150 m         | G                      | G    | G     | G    | Grahams Well Road<br>2.1 km   | Warrenup Road<br>540 m |   |                    | 1.6 NE, 2.3 N, 2.4 SE  |
| 151 m - 2.5 km | G                      | G    | G     | G    |                               | O'Neil Road<br>2.4 km  | Work Camp Road<br>480 m<br>Yarranup Road 1.5 km | Bilney Road 3.3 km |                        |
| 2.5 km - 5 km  | G                      | G    | G     | G    |                               |                        |   |                    |                        |
| <b>T3</b>      |                        |      |       |      |                               |                        |   |                    |                        |
| <150 m         | G                      | G    | G     | G    |                               |                        |   |                    |                        |
| 151 m - 2.5 km | GW                     | G    | G     | G    | Grahams Well Road<br>2.1 km   | Warrenup Road          | Yarranup Road                                   |                    | 1.7. E                 |
| 2.5 km - 5 km  | G                      | G    | G     | G    |                               |                        |   | Potts Road 3.6 km  | 2.7 N, 2.8 N, 3.7 SE,, |
| <b>T4</b>      |                        |      |       |      |                               |                        |   |                    |                        |
| <150 m         | G                      | G    | G     | G    |                               |                        |   |                    |                        |
| 151 m - 2.5 km | G                      | G    | G     | G    | Grahams Well Road<br>2.1 km   | Warrenup Road          | Yarranup Road                                   |                    | 1.9 N. 1.8 SW          |
| 2.5 km - 5 km  | G                      | G    | G     | G    |                               | O'Neil Road 1.4 km     | Tambellup Road<br>6.4 km                        | Potts Road 5.4 km  | 2.8 N 4.3 NE. 3.4 W    |

| Turbine        | Predominant Vegetation |          |          |      |  |                         |                               |                   |  |
|----------------|------------------------|----------|----------|------|--|-------------------------|-------------------------------|-------------------|--|
|                | North                  | East     | South    | West | North  | East                    | South                         | West              | Houses   |
| <b>T5</b>      |                        |          |          |      |  |                         |                               |                   |  |
| <150 m         | G                      | G        | G        | G    |  |                         |                               |                   |  |
| 151 m - 2.5 km | G w                    | G        | GF       | G    |  | Warrenup Road<br>2.4 km | Yarranup Road 1.2 km          | Potts Road 3.4 km |  |
| 2.5 km - 5 km  | G                      | G        | G        | G    | Grahams Well Road<br>2.7 km                        | O'Neil Road 3.2 km      |                               |                   |  |
| <b>T6</b>      |                        |          |          |      |  |                         |                               |                   |  |
| <150 m         | G                      | G        | G        | G    |  | Warrenup Road           | Yarranup Road                 |                   |  |
| 151 m - 2.5 km | G                      | G        | G, F(SE) | G    |  | O'Neil Road<br>600 m    |                               |                   | 1.3 NE, 2.3 NE   |
| 2.5 km - 5 km  | G                      | G        | G        | G    | Grahams Well Road<br>3.1 km                        | Birt Road 5.1 km        |                               | Potts Road 5.5 km | 3.9 W, 4.7 E, 4.3 NE, 3.5 N<br>3.1 S 3.3 S, 4.7 SW                         |
| <b>T7</b>      |                        |          |          |      |  |                         |                               |                   |  |
| <150 m         | G                      | G        | G        | G    |  |                         |                               |                   |  |
| 151 m - 2.5 km | G                      | G        | G        | G    |  |                         | Yarranup Road<br>700 m        |                   | 1.4 NW   |
| 2.5 km - 5 km  | G                      | G        | G        | G    | Grahams Well Road<br>3.1 km                        | Warrenup Road<br>2.6 km | Tambellup Road<br>4.9 km      | Potts Road 3.2 km | 3.8E, 3.7 NE, 3.8 NE, 4.8<br>W, 3.1 SW, 3.2 SW, 3.5<br>SW, 4.1 SE, 4.3 SE. |
| <b>T8</b>      |                        |          |          |      |  |                         |                               |                   |  |
| <150 m         | G                      | G, F(NE) | G        | G    |  | Warrenup Road<br>113 m  |                               |                   |  |
| 151 m - 2.5 km | G                      | G        | G        | G    | Yarranup Road<br>200 m                             |                         |                               |                   | 1.1E, ,2.4 S   |
| 2.5 km - 5 km  | G                      | G        | G        | G    | Ngopitchup Road 4.1<br>Grahams Well Road<br>3.6 km | Birt Road 5.1 km        | Tambellup West Road 5.7<br>km | Potts Road 4.8 km | 2.8 N, 3.8 N 4.6 E, 5.4 E ,<br>2.7S 4.6 SW, , 5.01SW,<br>5.2 SW, 4.1W      |



| Turbine        | Predominant Vegetation |          |       |      |   |                         |                               |                   |  |
|----------------|------------------------|----------|-------|------|---|-------------------------|-------------------------------|-------------------|--|
|                | North                  | East     | South | West | North   | East                    | South                         | West              | Houses   |
| <b>T9</b>      |                        |          |       |      |   |                         |                               |                   |  |
| <150 m         | G                      | G        | G     | G    |   | Warrenup Road<br>140 m  |                               |                   |  |
| 151 m - 2.5 km | G                      | G, F(NE) | G     | G    | Yarranup Road<br>800 m                                |                         |                               |                   | 1.1NE, 1.8S, 2.2 S   |
| 2.5 km - 5 km  | G                      | G        | F,G   | G    | Ngopitchup Road 4.6 km<br>Grahams Well Road<br>4.1 km | Birt Road 5.9 km        | Tambellup West Road 5.1<br>km | Potts Road 5.0 km | 3.3N, 3.8 N 4.7 NE , 4.3E<br>4.7SW,5.1SW, ,5.1SW,<br>4.8NW |
| <b>T10</b>     |                        |          |       |      |   |                         |                               |                   |  |
| <150 m         | G                      | G        | G     | G    |   | Warrenup Road 100m      |                               |                   |  |
| 151 m - 2.5 km | G                      | G        | F(SE) | G    | Yarranup Road<br>1.2 km                               |                         |                               |                   | 1.3NE, 1.4S, 21.7 S  |
| 2.5 km - 5 km  | G                      | G        | G     | G    | Ngopitchup Road 4.6 km<br>Grahams Well Road<br>4.1 km | Birt Road 6.4km         | Tambellup West Road 4.6<br>km | Potts Road 5.0 km | 3.9N, 5.2NE, 4.9E , 4.4SW,<br>4.8SW, 4.9SW, 4.7NW          |
| <b>T11</b>     |                        |          |       |      |   |                         |                               |                   |  |
| <150 m         | G                      | G        | F     | G    |   | Warrenup Road 140m      |                               |                   |  |
| <2.5 km        | G                      | G        | G     | G    | Yarranup Road 1.5 km                                  |                         |                               |                   | 1.7NE, 1.1S, 1.3S  |
| <5.0 km        | G                      | G        | G     | G    | Ngopitchup Road<br>5.5 km                             | Birt Road 6.6 km        | Tambellup West Road 4.1<br>km | Potts Road 4.9 km | 4.3N, 5.5NE, 4.4E , 4.9E,<br>4.4W, 4.7W, 4.8W 4.9NW        |
| <b>T12</b>     |                        |          |       |      |   |                         |                               |                   |  |
| <150 m         | G                      | G        | G     | F    |   |                         |                               |                   |  |
| 151 m - 2.5 km | G                      | G        | G     | G    |   |                         | Yarranup Road 800m            |                   | 1.1nw  |
| 2.5 km - 5 km  | G                      | G        | G     | G    | Grahams Well Road<br>5.0 km                           | Warrenup Road<br>3.5 km | Tambellup West Road 4.5<br>km | Potts Road 4.9 km | 4.3NE, 4.4E, 4.3SE, 4.7SE,<br>2.6S,2.6S,3.0S, 4.1SW        |

| Turbine        | Predominant Vegetation |      |         |      |  |                         |                               |                            |  |
|----------------|------------------------|------|---------|------|--|-------------------------|-------------------------------|----------------------------|--|
|                | North                  | East | South   | West | North  | East                    | South                         | West                       | Houses   |
| <b>T13</b>     |                        |      |         |      |  |                         |                               |                            |  |
| <150 m         | G                      | G    | G       | G    | Grahams Well Road<br>120 m                               |                         | Grahams Well Road<br>120 m    |                            |  |
| 151 m - 2.5 km | G                      | G    | G       | G    |  | Warrenup Road<br>2.5 km |                               |                            | 2.5SE, 1.3SW, 1.6NW,<br>1.8NW                      |
| 2.5 km - 5 km  | G                      | G    | G       | G    | Broomehill-Kojonup Road<br>5.1 km                        | Palomar Road<br>5.1 km  | Yarranup Road<br>6.4 km       | Potts Road 4.9 km          | 3.4NE, 5.0SE, 3.9S, 2.9S,<br>3.5W, 3.7W, 4.6NW     |
| <b>T14</b>     |                        |      |         |      |  |                         |                               |                            |  |
| <150 m         | G                      | G    | G       | G    |  |                         |                               | Grahams Well Road 120<br>m |  |
| 151 m - 2.5 km | G                      | G    | G,F(SW) | G    |  | Warrenup Road<br>1.5 km |                               |                            | 1.9E, 1.4S, 1.8W                                   |
| 2.5 km - 5 km  | G                      | GG   | G       | G    | Broomehill-Kojonup Road<br>6.0 km                        | Palomar Road<br>4.7 km  | Yarranup Road 5.6 km          | Potts Road 5.4 km          | 3.7NE, 4.4E, 5.0SE, 3.0S,<br>3.7W, 4.0W            |
| <b>T15</b>     |                        |      |         |      |  |                         |                               |                            |  |
| <150 m         | G                      | G    | G       | G    |  |                         |                               |                            |  |
| 151 m - 2.5 km | G                      | G    | F(SE)   | G    |  | Warrenup Road<br>1.2 km |                               | Grahams Well Road<br>180 m | 1.7E, 1.48S, 1.5W                                  |
| 2.5 km - 5 km  | G                      | G    | G       | G    | Broomehill-Kojonup Road<br>6.0 km                        | Palomar Road 4.4 km     | Yarranup Road 5.2 km          | Potts Road 5.4 km          | 4.0NE, 4.0E, 4.6SE, 2.6S,<br>4.0W, 4.4W            |
| <b>T16</b>     |                        |      |         |      |  |                         |                               |                            |  |
| <150 m         | G                      | F    | G       | G    |  |                         |                               |                            |  |
| 151 m - 2.5 km | G                      | G    | G       | G    | Yarranup Road 1.2 km                                     |                         |                               |                            | 1.6E, 1.9E   |
| 2.5 km - 5 km  | G                      | G    | G       | G    | Ngopitchup Road<br>4.6 km<br>Grahams Well Road<br>4.1 km | Birt Road 6.4 km        | Tambellup West Road 4.6<br>km | Potts Road 5.0 km          | 5.2N, 3.2NE, 4.4E, 4.9E,<br>2.5W, 3.0W, 3.1W 4.1NW |



| Turbine             | Predominant Vegetation |      |          |      |   |                                     |                               |  |  |
|---------------------|------------------------|------|----------|------|---|-------------------------------------|-------------------------------|--|--|
|                     | North                  | East | South    | West | North   | East                                | South                         | West   | Houses   |
| <b>T17</b>          |                        |      |          |      |   |                                     |                               |  |  |
| <150 m              |                        |      |          |      |   |                                     |                               |  |  |
| 151 m - 2.5 km      |                        | F    |          |      |   | Warrenup Road<br>1.1 km             |                               | Grahams Well Road<br>160 m                             | 1.8NE, 1.0S, 12.0W   |
| 2.5 km - 5 km       |                        |      |          |      | Broomehill-Kojonup Road<br>6.0 km                               | Palomar Road 4.4 km                 | Yarranup Road 4.7 km          | Potts Road 5.5 km                                      | 4.5NE, 4.1E, 5.1SE, 4.8S,<br>4.0W, 4.4W                        |
| <b>T18</b>          |                        |      |          |      |   |                                     |                               |  |  |
| <150 m              | G                      | G    | G        | W    |   |                                     |                               |  |  |
| 151 m - 2.5 km      | G                      | G    | G        | G    |   | O'Neil Road/ Palomar<br>Road 1.8 km | Ngopitchup Road<br>0.3 km     | Warrenup Road<br>0.6 km<br>Grahams Well Road<br>1.8 km | 1.0N, 2.4E, 1.6S, 2.0e   |
| 2.5 km - 5 km       | G                      | G    | G        | G    | Broomehill-Kojonup Road<br>6.4 km                               |                                     | Yarranup Road<br>4.7 km       | Potts Road 7.3 km                                      | 4.3N, 4.8E, 4.2E, 4.4S,<br>3.9W, 4.7NW, 4.4NW.                 |
| <b>Construction</b> |                        |      |          |      |   |                                     |                               |  |  |
| <150 m              | G                      | G    | G        | G    |   |                                     |                               |  |  |
| 151 m - 2.5 km      | G,                     | G    | G        | G    |   | Warrenup Road<br>0.5 km             | Yarranup Road<br>1.2 km       | O'Neil Road 1.2 km                                     | 2.1N, 2.2E   |
| 2.5 km - 5 km       | G, F(N)                | G    | G, F(SW) | G    | Grahams Well Road<br>2.8 km<br>Broomehill-Kojonup Road<br>611 m | Birt Road 5.9 km                    | Tambellup West Road 6.0<br>km | Potts Road 5.0 km                                      | 2.8N, 4.7N, 4.6NE, 5.6E,<br>3.6S, 3.9S, 4.6SW,<br>4.8SW, 5.1SW |
| <b>Substation</b>   |                        |      |          |      |   |                                     |                               |  |  |
| <150 m              | G                      | G    | G        | G    | Tambellup West Road<br>150 m                                    |                                     |                               | Potts Road 150 m                                       |  |
| 151 m - 2.5 km      | G                      | G    | G        | G    |   |                                     |                               | Albany Highway<br>2.4 km                               | 1.8N, 2.2, N, 2.3N   |
| 2.5 km - 5 km       | G                      | G    | G        | G    | Yarranup Road<br>3.1 km   | Warrenup Road<br>5.3 km             | Albany Highway<br>4.1 km      |  | 4.5SE, 4.6SE, 3.8SW,<br>3.1W, 3.9NW                            |

## APPENDIX 4 – NACELLE SUPPRESSION SYSTEMS



# Technical description and data for fire suppression system

Document no.: 0079-9639 V00

Class: RESTRICTED

Type: T09

Date: 2018-12-04

**Wind.** It means the world to us.™

## Wind turbine type

Read the full document before you start to do work.

Send questions or concerns about the document to Vestas Wind Systems A/S.

| Wind turbine type | Mk version |
|-------------------|------------|
| V117-4.0/4.2 MW   | Mk 3E      |
| V136-4.0/4.2 MW   | Mk 3E      |
| V150-4.0/4.2 MW   | Mk 3E      |

## Change description

| Description of changes |
|------------------------|
| First edition.         |



# Table of Contents

|    |  |   |
|----|--|---|
| 1  | Abbreviations and technical terms .....    | 4 |
| 2  | Reference documents .....                  | 4 |
| 3  | Purpose .....                              | 4 |
| 4  | Weights and (overall) dimensions .....     | 4 |
| 5  | Technical description and data .....       | 5 |
| 6  | Location of the equipment .....            | 6 |
| 7  | Technical and functional description ..... | 6 |
| 8  | Key electrical data .....                  | 7 |
| 9  | Interfaces .....                           | 7 |
| 10 | Environmental and design data .....        | 7 |

# 1 Abbreviations and technical terms

0020484495

**Table 1.1: Abbreviations**

| Abbreviation | Explanation                                     |
|--------------|---|
| AMT          | Access and maintenance tools                    |
| APS          | Auxiliary power supply system                   |
| CCI          | Control and communication infrastructure system |
| FSS          | Fire suppression system                         |

**Table 1.2: Explanation of terms**

| Term | Explanation |
|------|-------------|
| None |             |

# 2 Reference documents

0020484494

**Table 2.1: Reference documents**

| Document no. | Title                         |
|--------------|-------------------------------|
| 0053-1210    | Electrical diagram 4 MW Mk 3E |
| 0063-3807    | Novec 1230 safety datasheet   |

# 3 Purpose

0011516197

The purpose of the document is to give a detailed technical description of the FSS.

The objective of the Vestas FFS for the wind turbine is to provide suppression of fires in the components specified in [section 7 Technical and functional description, page 6](#).

The system is intended to provide an additional layer of fire protection, together with the supplied arc detector technology, the lightning protection system, and the optional smoke/heat detection sensor package.

# 4 Weights and (overall) dimensions

0011516194

**Table 4.1: Weights**

| Item no.             | Description                     | Weight [kg] |
|----------------------|---------------------------------|-------------|
| 29079139<br>29079260 | Cylinder unit, CONV/CONTR/TRAFO | 85.0        |
| 29079334<br>29079335 | Cylinder unit, CONV/CONTR       | 36.0        |
| 29063707             | PIPE FSS C3 ASM CONTR           | 2.55        |



| Item no. | Description           | Weight [kg] |
|----------|-----------------------|-------------|
| 29077542 | FSS PIPE C3 ASM CONV  | 5.60        |
| 29077543 | PIPE FSS C3 ASM TRAFO | 9.09        |

## 5 Technical description and data

0011516199

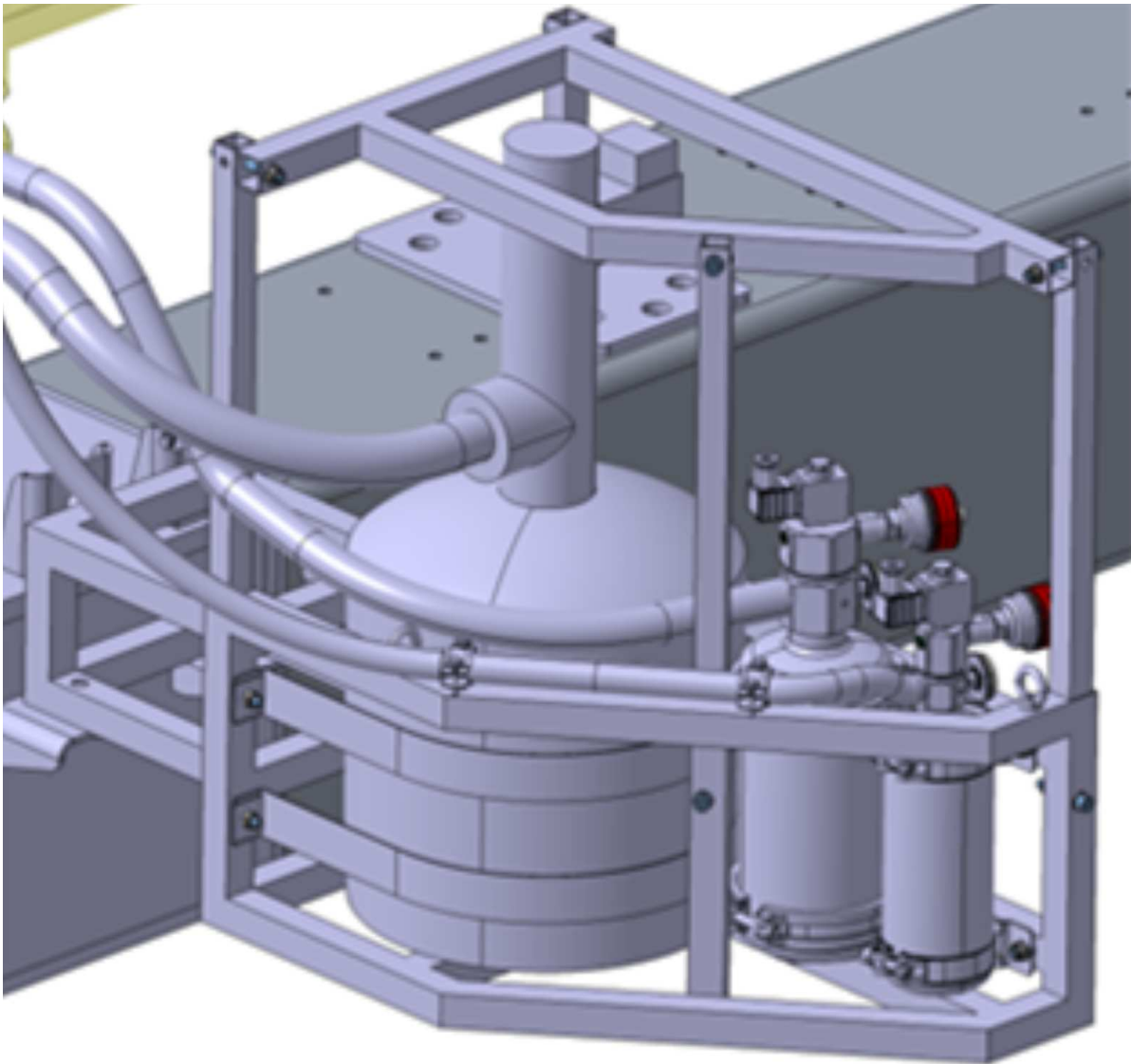


Figure 5.1: Illustration of cylinder unit

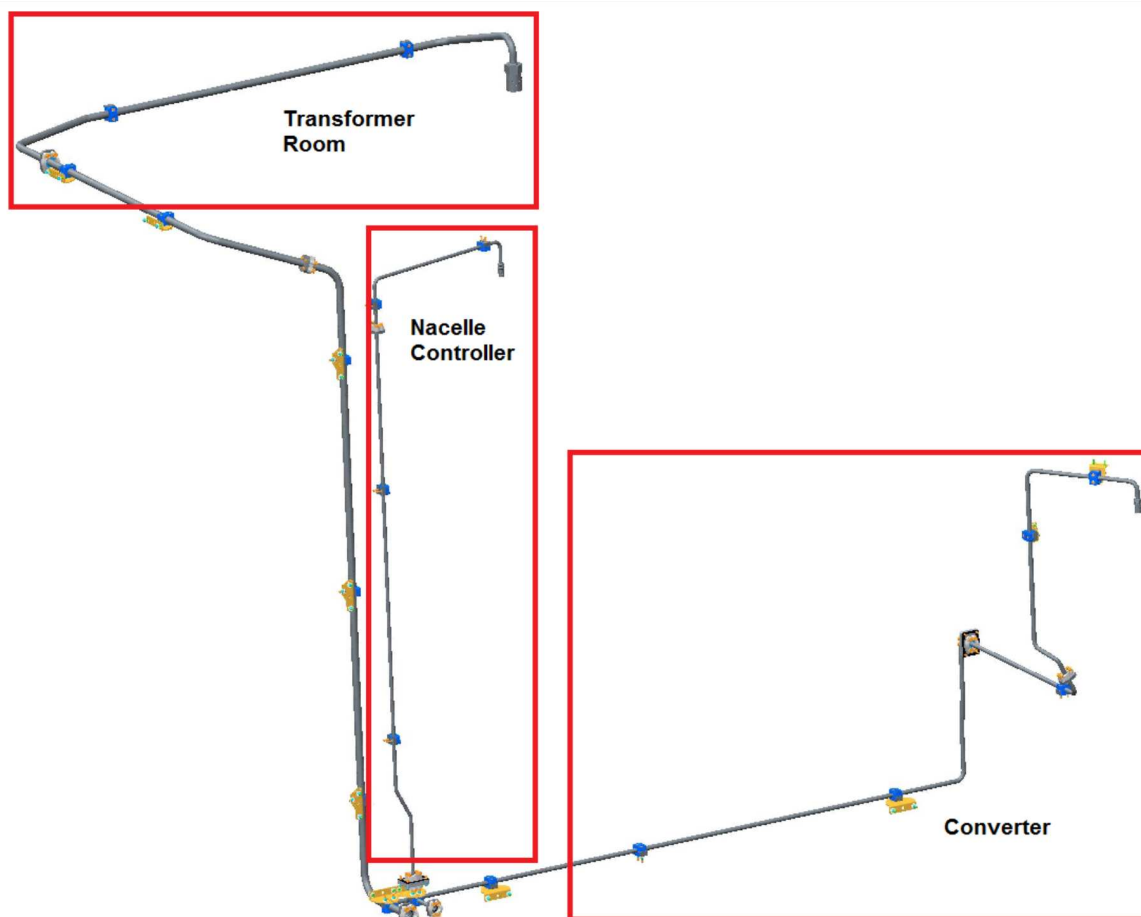


Figure 5.2: Illustration of pipe system

## 6 Location of the equipment

0011516196

The location of the equipment is in the nacelle.

## 7 Technical and functional description

0011516195

This FSS is a so-called electrically activated, fixed fire-fighting system.

When the FSS is activated by the smoke detection system, the cylinder valve in question is automatically opened by the valve actuator. This allows the agent inside the cylinder to flow through the pipe system and distribute the suppression agent into the fire hazard zones.

Upon actuation, the pressure switch, which is employed on all cylinders, must give a feedback signal to the wind turbine CCI to set an FSS alarm.

The fire hazard zones are as follows:

- Nacelle controller cabinet
- Converter cabinet
- Transformer room

The fire protection strategy is to individually detect and extinguish potential fires in the targeted compartments given above before the fire spreads to other components.

The system consists of the main components that follow:



1. Cylinder unit
2. Suppression agent
3. Pipe system with nozzles

A fire suppression event in all the fire hazard zones is triggered by the related smoke sensors.

## 8 Key electrical data

0020493502

Table 8.1: Key electrical data

| Item  | Data      |
|---|-----------|
| See 'Electrical diagram' section -700-06-05 | 0053-1210 |

## 9 Interfaces

0011516210

The FSS has mechanical interfaces to the following modules and systems:

- Rear frame structure
- Trafo wall
- Nacelle controller
- Converter
- Trafo room

The electrical interfaces of the FSS are as follows:

- CCI
- APS
- Smoke detection system

The FSS also has interface to the wind turbine software and AMT.

## 10 Environmental and design data

0011516209

The 3M Novec 1230 fire protection fluid, according to ISO 14520-5:2006, was developed as a sustainable clean extinguishing agent for use in total flooding applications. This agent is a replacement for Halon and first-generation Halon replacement alternatives. Novec 1230 extinguishes principally by removal of heat from the fire. The agent/air mixture has a heat capacity much higher than that of air alone. A higher heat capacity means that this gas mixture will absorb more energy (heat) for each degree of temperature change it experiences than the same mass of air. This energy absorption causes the combustion zone to cool to the point that the fire is extinguished. Fires can be extinguished if any of the required components are removed: heat, oxygen, fuel source, or the chain reaction. Novec 1230 has the highest heat capacity of any commercially available Halon alternative, resulting in the lowest extinguishing concentrations for a given fuel.

Novec 1230 was also selected as a suppression agent for its environment-friendly characteristics. Novec 1230 has zero impact on ozone depletion and the same impact on global warming as that of carbon dioxide. Novec 1230 also leaves no residue for clean-up in the event of a false suppression event. Novec 1230 is electrically non-conductive and can be exposed to live circuits without side effects. The cost of a false suppression is limited to wind turbine downtime, service cost of the alarm, and the cost of replacement of the specific system (heat

reactive tubing and suppressant agent storage container), as there are no clean-up costs or damaged components to the suppression system that needs to be replaced.

Novec 1230 is safe for human presence in the event of an unintended suppression event without open flames.

In case of a fire event with open flames, special precautions shall be taken before you enter the fire hazard zone in question.

For further details in case of a fire event, see 0063–3807 ‘Novec 1230 safety datasheet’, section 5.



## APPENDIX 5 – REFERENCES

## GENERAL REFERENCES

Australian Institute for Disaster Resilience 2015, *Australian Disaster Resilience Handbook 10: National Emergency Risk Assessment Guidelines*, CC BY-NC

Australian Building Codes Board 2019, *Handbook: Bushfire Verification Method*, Commonwealth of Australia and States and Territories 2019, published by the Australian Building Codes Board.

Australian Building Codes Board 2014, *Information Handbook: Design and Construction of Community Bushfire Refuges*, 2014

Blanchi R., Whittaker J., Haynes K., Leonard J., Opie K., Holland M., Dreyfuss S., 2015 *Sheltering practices during bushfire*, CSIRO Land and Water Report to the Emergency Management Victoria Natural Disaster Resilience Grants Scheme.

P Cheney and Andrew Sullivan *Grassfires Fuel, weather and fire behaviour*, CSIRO 2008

Florece V., and Pannell D J. 2016, *Economic Assessment of bushfire risk management options in Western Australia: case studies in the Perth Hills and in south-west of Western Australia*, The University of Western Australia, Report Prepared for The State Emergency Management Committee Secretariat, attachment 2

SA Department of Environment and Natural Resources, Government of South Australia, 2012 *Overall Fuel Hazard Guide for South Australia*

Standards Australia 2010, *Australian Standard AS 3745:2010 Planning for emergencies in facilities*

Standards Australia 2009, *AS 3959:2018 Construction of buildings in bushfire-prone areas*, Sydney

Standards Australian and Standards New Zealand 2018, *Australian Standard / New Zealand Standard ISO 31000:2018 Risk management – principles and guidelines*

State Administrative Tribunal of Western Australia, HARMANIS HOLDINGS NO. 2 PTY LTD and WESTERN AUSTRALIAN PLANNING COMMISSION [2019] WASAT 43 (25 June 2019)

Sullivan A L., Cruz M G., Ellis F. M., Gould J S., Plucinski M P., Hurley R., and Koul V. 2014, *Fire Development, Transitions and Suppression, Final Project Report*, Bushfire Cooperative Research Centre, CSIRO Ecosystem Science and CSIRO Climate Adaptation Flagship.

Western Australian Department of Fire and Emergency Services *Guidelines for Operating Private Equipment at Fires* March 2022

Western Australian Planning Commission (WAPC) 2015, *State Planning Policy 3.7 Planning in Bushfire Prone Areas*, Perth.

Western Australian Planning Commission and Department of Fire and Emergency Services (WAPC), *Guidelines for Planning in Bushfire Prone Areas Version 1.4*, Western Australia. December 2021.

Western Australian Planning Commission (WAPC) 2019 *A Guide to developing a Bushfire Emergency Evacuation Plan* October 2019.

Western Australian State Emergency Management Committee *A Strategic Framework for Emergency Management in Western Australia* October 2019

WA Department of Planning Land and Heritage 2016, *Visual Guide for bushfire risk assessment in Western Australia*

Western Australian Planning Commission (WAPC) 2015, *State Planning Policy 3.7 Planning in Bushfire Prone Areas*, Western Australian Planning Commission, Perth, Perth

Whittaker J., Blanchi R., Haynes K., Leonard J., Opie K., 2017 *Experiences of sheltering during Black Saturday bushfire: Implications for policy and research*

### Online references

Office of Bushfire Risk management (OBRM), Map of Bush Fire Prone Areas, viewed June 2022, <  
<https://maps.slip.wa.gov.au/landgate/bushfireprone/>>

Office of Bushfire Risk Management (OBRM), Bushfire Risk Management (BRM) Plan Guidelines, viewed June 2022

Overview of Problems and Solutions in Fire Protection Engineering of Wind Turbines January 2014 Fire Safety Science 11:983-995 [https://iafss.org/publications/fss/11/983/view/fss\\_11-983.pdf](https://iafss.org/publications/fss/11/983/view/fss_11-983.pdf)

Rengel, B Computational analysis of fire dynamics inside a wind turbine (2017)  
<https://core.ac.uk/download/pdf/87657371.pdf>



# Noise Impact Mitigation Management Plan



# Kojonup

*One community, many choices*

Our Ref: DB.BDA.8

Dr Sarah Rankin – Managing Director

Moonies Hill Energy Pty Ltd

5 Barnfield Road

CLAREMONT WA 6010

Dear Sarah,

**MOONIES HILL ENERGY PTY LTD, DEVELOPMENT LAYOUT PLAN, NOISE IMPACT MITIGATION  
MANAGEMENT PLAN AND EASEMENT AGREEMENT.**

The Shire of Kojonup Council at its 9<sup>th</sup> November 2022 meeting approved the following motion:

**Motion 125/22 That:**

- 1) Council approves the Development Layout Plan (Condition 17) for the Flat Rocks Wind Farm as reproduced in Attachment 9.4.2.2.
- 2) The Chief Executive Officer (CEO) and Shire President are granted authority to execute, to apply the Shire of Kojonup's (Shire) common seal to the Agreement for Installation (Attachment 9.4.2.4) to enable the proponent to have access to portions of road reserves for infrastructure approved by the Development Layout Plan, and to enable the Shire (in the Shire's capacity as manager of the road reserve) to approve and have a record of the engineering details of the infrastructure approved of or contemplated by the DLP in the affected road reserves. This authority is subject to the CEO being satisfied that the intended easement locations provided for in the Agreement match with the DLP locations, and being satisfied with the technical details of the drawings for the cabling.

- 3) The CEO is granted authority to confirm the Shire's approval of the Noise Impact Mitigation Management Plan, provided the proponent first causes the version Rp 001 R01 20220108 dated 28.10.22 (Attachment 9.4.2.3), to be amended in the second-last sub-paragraph of 3.0 so as to state:

'In the event that background noise monitoring is carried out in the future, the results of this monitoring would be used for determining wind speed dependent noise limits in accordance with Condition 29, subject to their inclusion in an updated version of this NIMMP requiring approval by the Shire's Chief Executive Officer.'

- 4) Council notes that it is Council's understanding that any future noise monitoring for the purpose of establishing background noise should be undertaken without the turbines in operation.
- 5) Council further notes that approval of the Development Layout Plan and management plans does not override the need to obtain any relevant approvals that may be separately required from other agencies.
- 6) The CEO advises the Shire of Broomehill-Tambellup of this decision.

Please take note of points 4 & 5 as it relates to the management of the development.

The Development Layout Plan has been approved, as per the above motion, satisfying condition 17 in the development approval pre construction conditions.

I acknowledge that Enel forwarded the updated NIMMP plan, as per the above motion, in an email received Thursday 10<sup>th</sup> November 2022 at 2:47 PM from Gabrielle Mallarini, and I therefore confirm that condition 21 in the development approval pre construction conditions is now satisfied.

As CEO I will be assessing the easement agreement ensuring that the Shire President and myself are satisfied with the agreement, as per the above motion, at which time I will forward an executed copy.

If you have any questions regarding these matters, please do not hesitate to contact Grant Thompson (Chief Executive Officer) through the Shire Office on (08) 9831 2400.

Regards,



Grant Thompson

Chief Executive Officer

11/11/2022





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Project: **FLAT ROCKS WIND FARM – STAGE 1**

Prepared for: **Enel Green Power Australia Pty Ltd  
 Level 23.07, One International Towers  
 100 Barangaroo Avenue  
 Sydney NSW 2000**

Attention: **Tomas Gibbs**

Report No.: **Rp 001 R02 20220108**

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|---------|------|---|--------------|------------|-------------------------|
| Issued  | -    | -   | 18 Aug. 2022 | E. Griffen | J. Adcock<br>C. Delaire |
| Issued  | R01  | Amended to reflect Council's comments       | 28 Oct. 2022 | C. Guzik   | C. Delaire              |
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## SUMMARY

This document was prepared on behalf of Enel Green Power Australia Pty Ltd to address Condition 21 of the development approvals for the Flat Rocks Wind Farm which require the preparation of a Noise Impact Mitigation Management Plan (NIMMP) for the wind farm.

The following table identifies the location of relevant NIMMP content with respect to the requirements of Condition 21.

| Development approval NIMMP requirement   | Relevant section in this NIMMP |
|--|--------------------------------|
| 21. Prior to commencing any works, the Applicant is to lodge a Noise Impact Mitigation Management Plan for approval by the local government. The Noise Impact Mitigation Management Plan is to outline the process by which the Applicant will - |                                |
| (a) Undertake post-commissioning testing to ensure compliance with condition 29, including testing at existing noise sensitive premises;   | Section 5.0                    |
| (b) Make arrangements with adjoining landowners regarding the construction of noise sensitive premises on land;  | Section 8.0                    |
| (c) Modify micro-siting to ensure compliance with condition 29;  | Section 4.0                    |
| (d) Modify the operation of the wind turbines to ensure compliance with condition 29;  | Section 7.0                    |
| (e) Manage complaints regarding noise impact during the operational phase of the development.  | Section 6.0                    |



## TABLE OF CONTENTS

|     |  |    |
|-----|--|----|
| 1.0 | INTRODUCTION.....  | 5  |
| 2.0 | DEVELOPMENT APPROVAL CONDITIONS .....                    | 6  |
| 3.0 | OPERATIONAL WIND FARM NOISE LIMITS .....                 | 7  |
| 4.0 | MICRO-SITING REQUIREMENTS .....                          | 8  |
| 5.0 | OPERATIONAL WIND FARM NOISE TESTING PROCEDURES .....     | 8  |
| 5.1 | Noise measurement locations.....                         | 8  |
| 5.2 | Operational wind farm noise analysis .....               | 9  |
| 5.3 | Operational wind farm noise reporting.....               | 9  |
| 6.0 | NOISE COMPLAINT HANDLING AND INVESTIGATION REPORTS ..... | 11 |
| 7.0 | NOISE REMEDIATION PLANS .....                            | 13 |
| 8.0 | ADJOINING LANDOWNER ARRANGEMENTS .....                   | 14 |

APPENDIX A GLOSSARY OF TERMINOLOGY

APPENDIX B TURBINE COORDINATES

APPENDIX C RECEIVER COORDINATES

APPENDIX D DEVELOPMENT APPROVAL

APPENDIX E MICRO-SITING REQUIREMENTS

APPENDIX F OPERATIONAL WIND FARM NOISE TESTING PROCEDURES

APPENDIX G OPERATIONAL WIND FARM NOISE ANALYSIS

APPENDIX H FLAT ROCKS WIND FARM STAGE ONE – COMPLAINTS HANDLING PROCEDURE

## 1.0 INTRODUCTION

This report presents the operational noise compliance monitoring procedures for the Flat Rocks Wind Farm.

The Flat Rocks Wind Farm is a consented project located in the Shire of Broomehill-Tambellup and Shire of Kojonup local government areas, approximately 20 km southeast of Kojonup, Western Australia. The development approvals<sup>1</sup> for the Flat Rocks Wind Farm allow the development of up to forty-four (44) turbines and associated infrastructure including conditions which specify requirements for the control of environmental noise associated with the project. The project is proposed to be constructed over two (2) stages.

This report was commissioned by Enel Green Power Australia Pty Ltd (Enel Green Power) for Stage 1 of the wind farm (up to 18 turbines) to address Condition 21 of the development approvals which requires the preparation of a Noise Impact Mitigation Management Plan (NIMMP). The NIMMP will need to be updated before construction of Stage 2 of the Flat Rocks Wind Farm.

The purpose of the NIMMP is to clarify the procedures that will be used to measure and assess whether the wind farm is operating in accordance with the operational noise requirements of the development approvals.

This report specifies:

- Procedures for modifying the micro-siting of the turbines to enable operational noise levels to comply with the limits specified by the development approvals;
- Operational wind farm noise monitoring and assessment procedures;
- Operational wind farm noise compliance reporting procedures;
- Procedures to investigate complaints relating to operational wind farm noise; and
- Procedures for modifying the operating configuration of the wind farm to achieve compliance with the noise limits specified by the development approvals.

The basic quantities used within this document to describe noise adopt the conventions outlined in ISO 1996-1:2016<sup>2</sup>. Accordingly, all frequency weighted sound pressure levels are expressed as decibels (dB) in this report. For example, sound pressure levels measured using an “A” frequency weighting are expressed as dB L<sub>A</sub>. Alternative ways of expressing A-weighted decibels such as dBA or dB(A) are therefore not used within this report.

Acoustic terminology used in this report is presented in Appendix A.

The NIMMP has been prepared on the basis of the wind farm layout and existing dwellings detailed in Appendix B and Appendix C respectively. Any changes to the type, hub height or layout of the wind turbines to be used at site will necessitate a review and possible amendment of the procedures detailed herein.

<sup>1</sup> Shire of Broomehill-Tambellup development approval was issued in December 2021 (DAP No. IPA12112235) and the Shire of Kojonup development approval was issued in October 2021 (DAP No. DB.BDA.8)

<sup>2</sup> ISO 1996-1:2016 *Acoustics - Description measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures*

## 2.0 DEVELOPMENT APPROVAL CONDITIONS

The development approvals for the Flat Rocks Wind Farm include conditions which specify requirements for the control of environmental noise associated with the project.

Conditions 5, 21, 29 and 30 of the development approvals establish requirements for the control of noise during operation of the Flat Rocks Wind Farm. The conditions are reproduced in full in Appendix D. The key requirements are summarised in Table 1.

**Table 1: Development approval – summary of operational noise related requirements**

| Condition | Summary of key requirements  |
|-----------|--|
| 5         | Requires a revised noise impact assessment if the proposed turbine for the wind farm differs from the turbine included in the development approvals.   |
| 21        | Specifies that a Noise Impact Mitigation Management Plan (NIMMP) must be prepared prior to commencement of development of the wind farm. The NIMMP is to outline the process for: <ul style="list-style-type: none"> <li>• Undertaking post commissioning testing to ensure compliance with noise limits</li> <li>• Arrangements with adjoining landowners regarding future noise sensitive premises</li> <li>• Modifying micro-siting and operation of the wind turbines to ensure compliance with the noise limits</li> <li>• Manage complaints regarding noise impacts of the operational noise of the turbines.</li> </ul> |
| 29        | Defines noise limits which apply to operational noise associated with the wind farm.   |
| 30        | Requires that the Noise Impact Mitigation Management Plan is implemented during the operational phase of the development.  |



### 3.0 OPERATIONAL WIND FARM NOISE LIMITS

Operational noise limits apply at dwellings (generally referred to as receivers herein) in the vicinity of the Flat Rocks Wind Farm, as specified in Condition 29 of the development approvals.

Condition 29 requires the operational noise of each wind turbine to not exceed the greater of “35 dB(A) or background noise ( $L_{A90}$ , 10 minutes), by more than 5 dB(A)” at all receivers.

The development approvals do not specify the guidelines, standards, procedures, or metrics to assess compliance with the operational wind farm noise limits. In the absence of a specified method within the development approvals, the South Australian Environment Protection Authority publication *Wind Farms – Environmental Noise Guidelines 2009*<sup>3</sup> (the SA guidelines) is referenced for assessment purposes; this is common practice for the assessment of wind farms operating in Western Australia, and is the same procedure which was referenced for the assessment of operational turbine noise in the noise impact assessment report<sup>4</sup> submitted with the development application for the wind farm.

Accordingly, the operational wind turbine noise levels of the wind farm, when measured and assessed in accordance with the SA guidelines, must achieve the criteria detailed in Condition 29 of the development approvals. Specifically, the applicable operational wind farm limits are the greater of:

- 35 dB  $L_{A90}$ ; and
- Background noise ( $L_{A90}$ ) + 5 dB  $L_{A90}$ .

At the time of preparing this NIMMP, background noise measurements have been conducted and additional information is provided in the noise impact assessment report. However, the available background noise data is not considered suitable for deriving background noise dependent limits. In the absence of suitable background noise data, and as a conservative approach, compliance may be assessed using the minimum noise limit of 35 dB  $L_{A90}$ . In the event that background noise monitoring is carried out in the future, the results of this monitoring would be used for determining wind speed dependant noise limits in accordance with Condition 29, subject to their inclusion in an updated version of this NIMMP requiring approval by the Shire’s Chief Executive Officer.

The coordinates of the receivers (provided by Enel Green Power) considered in this NIMMP are tabulated in Appendix C.

<sup>3</sup> The SA guidelines were updated in November 2021. The November 2021 issue of the SA guidelines has been used to form the basis of the assessment procedures.

<sup>4</sup> Herring Storer Acoustics document 27351-4-10226-04 *Noise Impact Assessment* dated 23 November 2021

#### 4.0 MICRO-SITING REQUIREMENTS

Condition 21(c) of the development approvals specifies a requirement for a procedure for turbine micro-siting prior to construction of each wind turbine, which will enable compliance with the noise limits specified in Condition 29 to be achieved.

Accordingly, if the turbine locations are proposed to be modified as part of the micro-siting, a revised noise model of the site must be prepared based on the revised turbine layout. The objective of this revised noise modelling would be to assess whether the predicted noise levels with the revised turbine layout achieve the noise limits specified in Condition 29 of the development approvals.

Further details and project-specific requirements are detailed Appendix E.

#### 5.0 OPERATIONAL WIND FARM NOISE TESTING PROCEDURES

Condition 21(a) of the development approvals specifies a requirement for a procedure to undertake post commissioning noise measurements of the operational wind turbines.

The unattended noise monitoring shall be conducted in accordance with the SA guidelines (as referenced in Section 3.0), subject to the project-specific procedural clarifications and requirements contained in Appendix F.

##### 5.1 Noise measurement locations

Operational noise measurements should be carried out at the seven (7) preferred receiver locations detailed in Table 2 subject to permission being granted by the landowners.

**Table 2: Preferred noise compliance monitoring locations**

| Receiver | Direction from wind farm | Distance from nearest turbine, m |
|----------|--------------------------|----------------------------------|
| NSH09    | S                        | 1,005                            |
| NSH13    | SW                       | 1,423                            |
| NSH14    | SSW                      | 1,002                            |
| NSH15    | NE                       | 1,388                            |
| SH27     | ENE                      | 1,027                            |
| SH29     | N                        | 1,020                            |
| SH30     | NW                       | 1,055                            |

These locations have been selected to represent the nearest receivers around the Flat Rocks Wind Farm where predicted noise levels identified in the noise impact assessment report are comparable to the 35 dB  $L_{A90}$  minimum operational noise limit.

In the event that permission is not able to be obtained for conducting compliance measurements at the preferred receivers, alternative locations shall be considered.

The measurement systems shall be positioned in the vicinity of the dwelling at each of the preferred receivers for compliance monitoring. The following confirms the key aspects of SA guidelines with respect to measurement locations:

- The measurements shall not occur within 5 m of a vertical reflecting surface;
- The measurements shall occur within 30 m of the dwelling; and
- The monitoring locations shall be located as far as practically possible from streams, watercourse and vegetation which may result in localised increases in background noise levels.

If practical constraints or landowner/resident preferences preclude placement of the noise monitor in accordance with the above procedures, alternative equivalent locations shall be identified and selected. The reasons for the deviation, and the justification for the selected equivalent location, must be documented in the post-commissioning report.

Evaluating compliance based on measurements solely undertaken at the preferred testing locations can be problematic as a result of the influence of ambient noise sources. Accordingly, supplementary measurements may be undertaken at intermediate locations positioned nearer to the wind farm to:

- Assist the evaluation of noise levels solely attributable to the operation of the wind farm; and
- Provide data for reference locations where testing can be repeated, if required, for the purposes of re-assessing compliance in future.

Noise monitoring at intermediate locations shall occur simultaneously while monitoring is carried out at the corresponding receiver location.

Subject to access constraints, the intermediate locations are to be located:

- Between the wind turbines and the preferred receivers for compliance monitoring, at a location where the predicted wind turbine noise levels are approximately 45 dB  $L_{A90}$ ; and
- As far as practically possible from any tall vegetation or structures that are likely to increase background noise levels during periods of increased wind.

Indicative intermediate locations are identified in Figure 1.

## 5.2 Operational wind farm noise analysis

The operational wind farm noise analysis shall be conducted in accordance the assessment procedures and requirements documented in the SA guidelines.

Further details and project-specific requirements are detailed in Appendix G.

## 5.3 Operational wind farm noise reporting

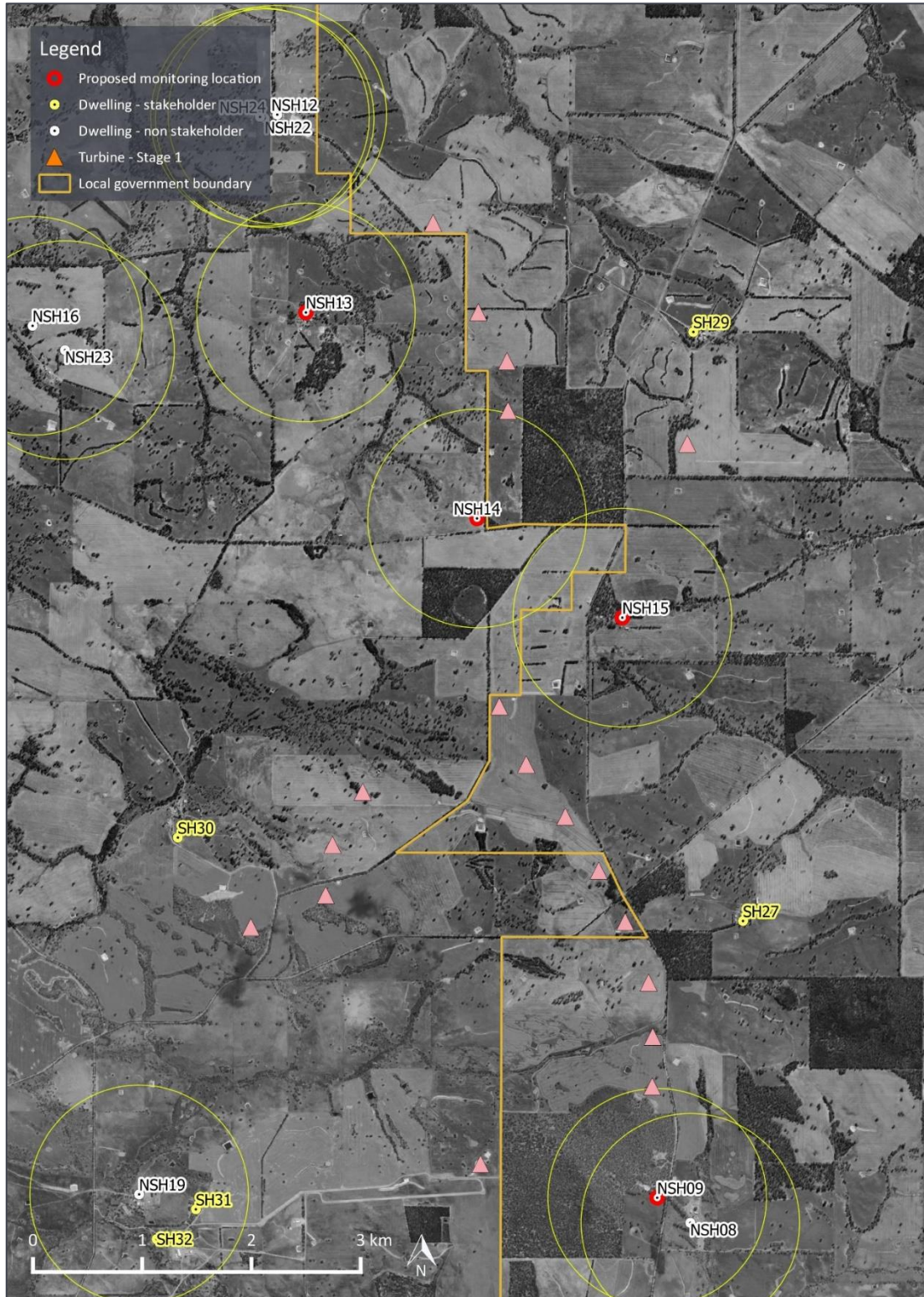
The reporting shall adhere to the documentation requirements detailed in Section 5 of the SA guidelines, and shall include the following additional information:

- Supporting documentation for the site wind speed data referenced in the compliance assessment
- Charts illustrating the noise measurement results shall clearly identify all samples that have been filtered from the analysis due to rainfall or the identification of extraneous noise influences. The analysis shall be supplemented by a summary table for each noise monitoring location detailing the total number of measurements points, the number of points that have been removed (i.e., as a result of data filtering, and the final number of data points that the analysis has been based on, including the number of downwind data points in the dataset);
- Full details of all attended observations conducted for the purpose of identifying where annoying characteristics including tonality are potentially present in the sound of the wind farm; and
- Full details of any supplementary procedures that have been adopted as part of conducting the compliance assessment.



It is acknowledged that the turbines approved under the Stage 1 development for the Shire of Kojonup and Shire of Broomehill-Tambellup of the municipal boundary are intended for Stage 1 only. It is intended that the wind farm is to expand by constructing additional turbines at Stage 2 which will require further development approval. Although the NIMMP has been prepared in response to the development approval for Stage 1, it is noted that similar noise restrictions are likely to apply to the cumulative noise impact from Stage 1 and Stage 2, if and when Stage 2 is approved.

**Figure 1: Preferred noise monitoring locations and Stage 1 turbine layout**



## 6.0 NOISE COMPLAINT HANDLING AND INVESTIGATION REPORTS

Noise investigation reports are to be prepared when additional noise testing (i.e. additional to post-commissioning noise testing to verify compliance with Condition 29) is instigated in the following situations:

- Complaints have been received regarding noise impacts from operational wind farm noise, and management of the complaint in accordance with the operator's complaint handling procedure<sup>5</sup> indicates that measurements are required in order to verify the compliance status of the wind farm; or
- A potential for non-compliance has been established by some other means, defined as follows:
  - Post-commissioning noise testing was not able to demonstrate compliance, and alternative targeted investigations (i.e. other than simply extending the duration of the noise compliance testing to obtain additional data) are required in order to determine whether the wind farm is compliant with the requirements of the development approvals.
  - The operating configuration of the wind farm has been altered, or major components of the wind turbines (e.g., blades or power conversion plant) have been replaced with alternative equipment, and the noise emission characteristics of the wind farm may have changed. This is primarily relevant to situations where there is uncertainty around the effect of the change on noise levels (i.e. uncertainty around whether the change could decrease or increase either noise levels or tonality). It is however also relevant to situations where changes have been implemented in accordance with a noise remediation plan and the effectiveness of the mitigation measures require verification.

The type of additional testing to be carried out must be selected according to the circumstances which instigated the requirement for a noise investigation report.

In some instances, the required additional testing may comprise a repeat of the testing undertaken following completion of the wind farm (subject to permission to access residential properties where relevant). In other instances, the requirement for additional testing may be satisfactorily addressed by conducting repeat measurements at the intermediate locations (i.e. utilising intermediate locations as controlled reference points for the noise emission of the wind farm).

In instances where the need for the noise investigation report relates to a complaint or annoying noise characteristics, the additional investigations will generally need to be conducted at or in the vicinity of the relevant receiver under similar conditions (e.g., wind speed, wind direction, time of day) to the event under investigation. Exceptions may apply if the characteristic in question relates to tonality, and it can be demonstrated by testing in proximity of the turbines that tonality is not a characteristic of the wind farm's noise emissions.

Targeted investigations may comprise on/off testing of the wind farm for specific wind conditions, or investigation of potential characteristics for specific wind conditions.

The scope and form of additional noise testing to be undertaken for the purpose of a noise investigation report shall be determined by a suitably qualified and experienced acoustic engineer. Measurement, attended observation and analysis procedures for the additional compliance testing shall be consistent with the specifications detailed in Section 5.0 of this NIMMP where relevant.

<sup>5</sup> ENEL Green Power document *Flat Rocks Wind Farm Stage One - Complaints Handling Procedure* current as of 8 June 2022. This procedure is reproduced in Appendix H.

Prior to conducting the additional testing associated with the noise investigation report, a brief additional testing statement describing the purpose, selected method and scheduling of the investigation shall be submitted to the local government. Any potential delays to the commencement of the additional testing, such as requirements for specific weather conditions or access constraints, shall be documented in the additional testing statement.

The additional testing statement shall specify the timeframe for submission of the noise investigation report to the local government.

The local government shall be notified as soon as practically possible following formal identification of a non-compliance. A non-compliance is deemed to have been formally identified once it is documented in a completed noise investigation report that is available for submission to the Local government.

The noise investigation reports shall document:

- An assessment of the wind farm's compliance with the operational noise performance requirements of the development approvals;
- Any requirements for further investigations if the results of the noise compliance testing are not sufficient to conclude that the noise associated with the wind farm is compliant with the development approvals; and
- A requirement to prepare a noise remediation plan if the results of the additional noise testing demonstrate that the noise associated with the wind farm is not compliant with the development approvals.

The noise investigation reports shall also adhere to the documentation requirements detailed in Section 5 of the SA guidelines, and shall include the following:

- A concise summary of the reason why the additional noise testing was instigated;
- Identify the weather and operational conditions associated with the complaint or potential non-compliance;
- A complete description of the measurement and analysis procedures adopted for the additional noise testing including, where necessary, details of any variations from the procedural specifications detailed in Section 5.0 of this NIMMP;
- Supporting documentation for the site wind speed and direction data referenced in the noise investigation;
- Charts illustrating the noise measurement results identifying all samples that have been filtered from the analysis due to rainfall or the identification of extraneous noise influences. In instances where subsets of data require analysis as detailed in Appendix G, the charts shall illustrate the different identified trends. The analysis shall be supplemented by a summary table for each noise monitoring location detailing the total number of measurements points, the number of points that have been removed, and the final number of data points that the analysis has been based on (including the number of downwind data points in the dataset); and
- If relevant, full details of all attended observations conducted for the purpose of identifying if annoying noise characteristics are potentially present in the sound of the wind farm. If objective analysis is undertaken to investigate potential characteristics, full details of the analysis and results shall be documented. This shall include a description and justification for any procedures that have been used to screen results that are unlikely to be related to the operation of the wind farm; and
- Reports are to be submitted annually to the relevant authority.



## 7.0 NOISE REMEDIATION PLANS

Noise remediation plans shall be produced when the results of post-commissioning noise monitoring or a noise investigation report demonstrates that the noise of the Flat Rocks Wind Farm is not compliant with the performance requirements of the development approvals. A noise remediation plan shall identify the aspects of the operation of the turbines to achieve compliance with Condition 29 of the development approvals.

More specifically, the noise remediation plans shall document the following:

- A concise summary of the testing that has been undertaken to determine that the wind farm is not compliant with the development approval;
- The receivers where non-compliance has been directly or indirectly established;
- The wind conditions in which non-compliance has been established;
- A performance specification for the noise reduction that must be achieved in order for the wind farm to be compliant at all receivers. The performance specification shall be expressed in terms of the magnitude of the noise level reduction that must be achieved, and the wind speeds and wind directions that the performance specifications apply to;
- Details of the noise mitigation measures to be implemented in order to achieve the performance specification and, where appropriate, supporting evidence to demonstrate that the measures are expected to enable compliance to be achieved (e.g. sound power level information for reduced noise modes);
- If a non-compliance is detected, an interim operating pattern is to be implemented immediately to prevent continued non-compliance, pending the formulation and the implementation of a long-term solution. Details of measures being immediately implemented are to be advised to the shires;
- A brief statement describing the selected method of additional noise testing that will be undertaken in order to assess the effectiveness of the mitigation measure(s) and reassess compliance with the requirements of the development approvals; and
- A time frame for conducting additional noise testing and producing a noise investigation report.

Noise mitigation measures to demonstrate compliance may comprise the following:

- Changes to the operating configuration of the wind farm (i.e., reduced noise operating modes or shutdowns during selected wind conditions); or
- Engineering measures which involve replacement or modification of major turbine components, or a combination of the two.

In situations where rectification of the source of an identified non-compliance is expected to involve longer term design, development and implementation, the remediation plan shall identify intermediate mitigation strategies to be used until the final mitigation strategy is implemented. Intermediate mitigation strategies shall also be defined in situations where a non-compliance has been identified, but the precise magnitude of the non-compliance remains to be quantified through additional noise testing.

If intermediate mitigation strategies are to be utilised, the noise remediation plan shall document both the intermediate and longer-term noise mitigation strategies, including details of the implementation timing and the additional testing that will be undertaken to assess compliance after each measure is implemented.

## 8.0 ADJOINING LANDOWNER ARRANGEMENTS

Condition 29 of the development approvals specifies wind turbine noise limits which apply at dwellings. The condition does not differentiate between existing premises and premises developed after the approval of the Flat Rocks Wind Farm. It is therefore necessary for the operator of Stage 1 of the Flat Rocks Wind Farm to assess wind turbine noise levels at proposed residential development sites in the vicinity of the wind farm and, where required, determine suitable arrangements with adjoining landowners to address wind turbine noise levels at new residential dwellings.

The operator of Stage 1 of the wind farm shall review all proposals for dwellings on lots partly or wholly located within 1,500 m of the micro-sited location of the stage 1 turbines. The review shall comprise a predictive noise assessment to determine if wind turbine noise levels are expected to achieve the noise limits specified in Condition 29 at the proposed dwelling location or any part of the adjoining land.

If the development of a new dwelling is proposed after Stage 1 of the wind farm has commenced operating, and noise compliance monitoring has been completed, the review shall also account for any relevant findings from the noise compliance monitoring completed at other receivers.

If operational wind farm noise levels are predicted above the Condition 29 noise limits at the proposed dwelling location, but below the Condition 29 noise limits within the adjoining land, possible alternative dwelling locations should be discussed with the landowner.

## APPENDIX A GLOSSARY OF TERMINOLOGY

|  |   |
|--|---|
| <b>Amplitude Modulation</b>                | Sound that is characterised by a rhythmic and higher than normal rise and fall in sound level at regular intervals.   |
| <b>A-weighting</b>                         | The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.  |
| <b>dB</b>                                  | Decibel. The unit of sound level.   |
| <b>Frequency</b>                           | The number of pressure fluctuation cycles per second of a sound wave. Measured in units of Hertz (Hz).  |
| <b>Hertz (Hz)</b>                          | Hertz is the unit of frequency. One hertz is one cycle per second. One thousand hertz is a kilohertz (kHz).   |
| <b>L<sub>A90</sub> (t)</b>                 | <p>The A-weighted noise level equalled or exceeded for 90% of the measurement period. This is commonly referred to as the background noise level.</p> <p>The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.</p> |
| <b>L<sub>Aeq</sub> (t)</b>                 | <p>The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level.</p> <p>The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.</p>                     |
| <b>L<sub>w</sub></b>                       | The sound power level. The level of total sound power radiated by a sound source.   |
| <b>L<sub>WA</sub></b>                      | The "A" weighted sound power level.   |
| <b>Noise sensitive premises (receiver)</b> | The location of a noise sensitive activity associated with a habitable space or education space in a building not on the wind farm site, as per the definitions outlined in SA guidelines, and as per any project-specific clarifications or definitions detailed in the development approval.  |
| <b>Annoying Characteristics</b>            | Features of a sound which, when present, increase the likelihood of adverse reaction the sound. These characteristics include tonality, impulsiveness and amplitude modulation.   |
| <b>Tonality</b>                            | Sound characterized by a single frequency component or narrow-band components that emerge audibly from the total sound (e.g. whines or hissing sounds)  |



## APPENDIX B TURBINE COORDINATES

The following table sets out the approved coordinates of the eighteen (18) turbines which form Stage 1 of the Flat Rocks Wind Farm.

**Table 3: Flat Rocks Wind Farm turbine coordinates – WGS 84 zone 50H**

| Turbine | Easting, m | Northing, m |
|---------|------------|-------------|
| WTG01   | 531,854    | 6,241,757   |
| WTG02   | 532,100    | 6,241,227   |
| WTG03   | 530,604    | 6,240,976   |
| WTG04   | 532,458    | 6,240,750   |
| WTG05   | 530,327    | 6,240,492   |
| WTG06   | 532,764    | 6,240,255   |
| WTG07   | 530,264    | 6,240,031   |
| WTG08   | 533,006    | 6,239,787   |
| WTG09   | 533,224    | 6,239,233   |
| WTG10   | 533,258    | 6,238,736   |
| WTG11   | 533,253    | 6,238,266   |
| WTG13   | 531,248    | 6,246,180   |
| WTG14   | 531,662    | 6,245,363   |
| WTG15   | 531,924    | 6,244,916   |
| WTG16   | 531,682    | 6,237,572   |
| WTG17   | 531,927    | 6,244,440   |
| WTG18   | 533,574    | 6,244,165   |
| WTG55   | 529,580    | 6,239,739   |

## APPENDIX C RECEIVER COORDINATES

The following table sets out the coordinates of the receivers considered in the preparation of the Flat Rocks Wind Farm NIMMP.

**Table 4: Flat Rocks Wind Farm – receivers – WGS 84 zone 50H**

| Receiver | Easting, m | Northing, m | Receiver | Easting, m | Northing, m |
|----------|------------|-------------|----------|------------|-------------|
| NSH01    | 529,798    | 6,252,398   | SH26     | 537,647    | 6,239,337   |
| NSH02    | 534,034    | 6,254,130   | SH27     | 534,084    | 6,239,794   |
| NSH03    | 534,715    | 6,252,104   | SH28     | 531,662    | 6,251,703   |
| NSH04    | 533,706    | 6,248,509   | SH29     | 533,630    | 6,245,183   |
| NSH05    | 538,397    | 6,245,086   | SH30     | 528,913    | 6,240,557   |
| NSH06    | 536,092    | 6,244,487   | SH31     | 529,077    | 6,237,156   |
| NSH07    | 536,187    | 6,243,019   | SH32     | 528,718    | 6,236,883   |
| NSH08    | 533,602    | 6,237,033   | SH33     | 537,743    | 6,239,372   |
| NSH09    | 533,299    | 6,237,262   |          |            |             |
| NSH10    | 527,067    | 6,249,862   |          |            |             |
| NSH11    | 527,858    | 6,248,864   |          |            |             |
| NSH12    | 529,822    | 6,247,171   |          |            |             |
| NSH13    | 530,084    | 6,245,361   |          |            |             |
| NSH14    | 531,650    | 6,243,477   |          |            |             |
| NSH15    | 532,980    | 6,242,569   |          |            |             |
| NSH16    | 527,583    | 6,245,239   |          |            |             |
| NSH17    | 525,526    | 6,244,591   |          |            |             |
| NSH18    | 525,548    | 6,238,704   |          |            |             |
| NSH19    | 528,558    | 6,237,293   |          |            |             |
| NSH20    | 531,581    | 6,233,170   |          |            |             |
| NSH21    | 526,817    | 6,247,723   |          |            |             |
| NSH22    | 529,707    | 6,247,138   |          |            |             |
| NSH23    | 527,880    | 6,245,017   |          |            |             |
| NSH24    | 529,664    | 6,247,150   |          |            |             |
| NSH25    | 539,639    | 6,249,790   |          |            |             |

## APPENDIX D DEVELOPMENT APPROVAL

The following conditions are relevant to the content of this NIIMP and are identically defined in the Shire of Broomehill-Tambellup Development Approval issued in December 2021 (DAP No. IPA12112235) and the Shire of Kojonup Development Approval issued in October 2021 (DAP No. DB.BDA.8).

### Wind turbine location and micro-siting

4. The wind turbines are to be micro-sited in accordance with the following restrictions -

(a) All wind turbines shall be located a minimum distance of 1 kilometre from any residential dwelling / sensitive premises existing at the time of the issue of this planning approval unless approval in writing is first granted from the owner of that residential dwelling / sensitive premises to a closer location;

(b) The wind turbines shall be located in accordance with the 'Flat Rocks Wind Farm Landscape and Visual Assessment'. This report requires, in order to satisfy visual amenity considerations, either relocation of specified wind turbines or in the alternative, the implementation of vegetation screening.

### Turbine specifications

5. This approval is for Vestas V150 4.2MW wind turbine. Where the use of an alternative wind turbine is proposed, the Applicant must prepare and lodge with the local government a revised Noise Impact Assessment based upon the proposed alternative turbine, which demonstrates that the alternative turbine can comply with condition 29 below.

### Pre-construction conditions

21. Prior to commencing any works, the Applicant is to lodge a Noise Impact Mitigation Management Plan for approval by the local government. The Noise Impact Mitigation Management Plan is to outline the process by which the Applicant will -

(a) Undertake post-commissioning testing to ensure compliance with condition 29, including testing at existing noise sensitive premises;

(b) Make arrangements with adjoining landowners regarding the construction of noise sensitive premises on land;

(c) Modify micro-siting to ensure compliance with condition 29;

(d) Modify the operation of the wind turbines to ensure compliance with condition 29;

(e) Manage complaints regarding noise impact during the operational phase of the development.

### Operational conditions

29. The Applicant shall ensure at all times that the operation of each wind turbine complies with the following noise levels at noise sensitive premises -

(a) Will not exceed 35dB(A); or

(b) Will not exceed the background noise (LA90, 10 minutes) by more than 5dB(A); whichever is the greater.

30. The Applicant is to implement the following approved plans, as they relate to the operational phase of the development, during the life of this development approval -

(a) the Fire Management Plan, required by condition 19;

(b) the Traffic Management Plan, required by condition 20;

(c) the Noise Impact Mitigation Plan, required by condition 21; and

(d) the Landscape Management Plan, required by condition 22.



## APPENDIX E MICRO-SITING REQUIREMENTS

The noise limits specified in the development approvals apply to the total noise level of the completed Flat Rocks Wind Farm development. Accordingly, the revised noise modelling shall account for the combined noise of turbines associated with stages 1 and 2 of the wind farm. For the purposes of this NIMMP for Stage 1 of the wind farm, the revised noise modelling shall be based on a wind farm layout comprising:

- the micro-sited Stage 1 turbine layout and the final selected turbine and operating configuration for Stage 1; and
- the approved development application layout for the Stage 2 turbines and the Vestas V150 4.2MW turbine specified in the development approvals.

The micro-siting of the Stage 1 turbines shall be modified to enable compliance with the noise limits if the noise modelling indicates:

- the total predicted wind turbine noise levels (i.e., the combined noise level of Stage 1 and Stage 2) are above the noise limits defined by Condition 29 at any existing receivers as of the date of the development approvals; and
- the Stage 1 turbines materially contribute to the predicted exceedance (i.e., the predicted total noise contribution of the Stage 1 turbines is equal to, or greater than, a level 3 dB below the Condition 29 noise limits).

If modifications to the Stage 1 micro-siting are found to be required from the modelling described above, the modifications may include:

- further changes to the Stage 1 turbine locations to reduce the noise levels; and/or
- specification of noise curtailed modes of operation as part of the micro-siting process for certain wind speeds and wind directions.

Once the micro-siting of Stage 1 has been finalised (accounting for all other specialist and design assessments), a micro-siting noise assessment report shall be prepared and shall document the following:

- the noise prediction method and the selected input parameters;
- the sound power level data used for the noise modelling;
- the predicted noise levels at each receiver as of the date of the development approvals;
- an assessment of compliance with the noise limits specified in the Condition 29 of the development approvals; and
- full details of any modifications to the Stage 1 micro-siting, as described above, that are required to achieve compliance with the noise limits defined in Condition 29 of the development approvals.

The micro-siting noise assessment report shall be made available to the local government on request.

## APPENDIX F OPERATIONAL WIND FARM NOISE TESTING PROCEDURES

### F1 Noise measurement procedures

The unattended noise monitoring shall be conducted in accordance with the SA guidelines (as referenced in Section 3.0), subject to the following project-specific procedural clarifications and requirements:

- The measurements shall occur for the measurement durations defined in Section F2;
- The  $L_{A90}$  noise level shall be determined in consecutive 10-minute intervals synchronised with the interval commencing on the hour and each 10-minute increment following the start of each hour;
- All noise measurements shall be conducted using low noise floor ( $\leq 20$  dB) instrumentation that is certified to Class 1 standards (highest standard of instrumentation for field measurements) in accordance with AS/IEC 61672.1-2019 *Electroacoustics - Sound level meters – Specifications*;
- The independent (laboratory) calibration date of the sound level measurement instrumentation must be within 2 years of the measurement period, as specified in Section 5.5 of Australian Standard 1055:2018 *Acoustics – Description and measurement of environmental noise*;
- Microphones shall be fitted with enhanced wind shield systems (enlarged primary wind shields or secondary wind shields) designed on the basis of the guidance contained in the UK Institute of Acoustics publication *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise* dated May 2013 (the IOA GPG);
- Subject to the consent of the residents, 2-minute audio recordings shall be obtained for every 10-minute interval of the survey. The sampling rate for audio recordings shall be sufficient to allow assessment of tonality, if required, across the frequency range 10-5,000 Hz; and
- Instantaneous one-third octave band sound pressure levels (fast response) shall be recorded in 100 ms intervals to enable an analysis of amplitude modulation if required (this requirement is only applicable to unattended measurements conducted at, or in the vicinity of, receivers).

Further information and guidance about data to be obtained during attended observations is provided in Section F3.

### F2 Noise measurement timing and duration

The unattended measurements are proposed to comprise a minimum of six (6) weeks continuous monitoring, extended by up to six (6) weeks if required to obtain sufficient data, accounting for the recommendations detailed in clause 4.1 of the SA guidelines.

The data must have at least 2,000 10-minute intervals where at least 500 pairs of data correspond to the worst-case wind direction at the measurement location.

Extended surveys may be required to:

- Obtain data for wind speeds and conditions that are representative of the normal operating range of the turbines  

The target minimum wind speed range is 3 m/s to 12 m/s at hub height, based on the notional wind speeds when the turbines commence operating and reach their maximum rated power.
- Address non-uniform distributions or a sparsity of noise measurement data in certain wind speeds or directions that may be consequential to the assessment outcome
- Address significant variations in measurement data which may be the result of seasonal factors or contaminating sounds, and which cannot be addressed with selective data filtering.

A preliminary analysis of the data may be required to assess the suitability of the data prior to completion of the measurements (refer to Appendix G of this NIMMP for details of analysis procedures).

If significant data limitations remain evident after the surveys have been extended by six (6) weeks, the merits of an additional survey extension shall be reviewed by the acoustic consultant responsible for conducting the testing. If further extensions are not considered to be warranted, the compliance assessment strategy for the location(s) in question shall be reviewed and the local government consulted.

The monitoring shall be commenced within three (3) months of Stage 1 of the Flat Rocks Wind Farm becoming fully operational. For the purposes of this schedule, the wind farm is considered fully operational once all Stage 1 turbines have been commissioned and the Australian Energy Market Operator has released Stage 1 of the project to operate at full power output.

Adhering to the planned schedule of monitoring will be dependent on the consent of the landowners of the preferred receivers for conducting the monitoring.

Details of the timing and scheduling of the attended observations that are to occur as part of the testing are provided in Section F3.

### **F3 Tonicity and other noise characteristics**

#### **F3.1 General assessment procedures**

The presence of tonality and other annoying characteristics (characteristics) in the noise associated with the wind farm shall be reviewed on the basis of the following:

- Attended observations
- Site records during the monitoring period (comprising observations by site personnel and data from the site's complaint handling and management system – see description in Section F6).

In instances where characteristics comprising amplitude modulation, impulsiveness or tonality are identified as potential feature(s) of the noise associated with the wind farm, an objective assessment of the sound's character shall be undertaken to assist in determining if penalties should be applied to the measured noise levels or to inform the need for any rectification works.

#### **F3.2 Attended observations**

To investigate whether characteristics are a potential feature of the noise associated with the wind farm, attended observations shall be undertaken by a qualified acoustic engineer with experience in the assessment of wind farm sound.

Three (3) sets of attended observations shall be undertaken during the monitoring as follows:

- During deployment of the monitoring instrumentation;
- During an interim visit to the site; and
- During retrieval of the monitoring installation.

Scheduling of the deployment and retrieval of the monitoring equipment is dependent on practical considerations including timing of access to residential properties. However, the wind farm must be operating at the time of all attended observations, and attempts shall be made to arrange the periods of attendance to coincide with suitable weather conditions for conducting wind farm observations.

Suitable conditions are generally considered to be:

- Wind speeds between approximately 5 m/s and 10 m/s at the turbine hub-height;
- Little or no rainfall; and
- Times when background noise levels are expected to be lower.

At least one (1) set of attended observations shall be conducted during the night-time period (avoiding shoulder periods near sunrise or sunset when ambient noise levels may increase).



The attended observations should ideally include downwind conditions<sup>6</sup> between the wind farm and the receivers. However, this will be dependent on the available wind conditions and will not always be practical. If wind conditions preclude observations under downwind conditions in the vicinity of the receivers, observations should be made at alternative orientations to the wind farm which are downwind of the wind farm at comparable separation distances (subject to practical access constraints) to obtain an indication of characteristics under downwind conditions.

If the available weather conditions and operating conditions at the time of attendance do not permit representative observations to be made, additional attended observations may need to be carried out. In addition, the acoustic engineer shall review the site records (see description in Section F6) to determine if additional attended observations may be warranted.

Each set of attended observations in the vicinity of the receivers shall comprise observations for at least 10-minutes. The minimum duration of the observations shall be increased to 30-minutes per observation location when the sound of the wind farm is clearly audible.

During each attended observation, and at all locations, audio samples shall be obtained to provide a record of the sound environment at the time of the inspection and provide a basis for further objective assessment if required.

### **F3.3 Objective assessment method - tonality**

The findings of the attended observations shall be used to determine whether an objective assessment of tonality is warranted. Specifically, if tonality is identified during the attended observations, an objective assessment of tonality is to be undertaken. The results shall be used to assist the decision to apply penalties, and if so, when to apply penalties.

The applicable objective assessment method defined in Section 4.6 of the SA guidelines is IEC 61400-11.

Objective assessment methods can produce false positives and false negatives, particularly when applied to large volumes of unattended measurement results which are affected by a combination of ambient and wind farm related sounds. The results of objective assessments must therefore always be considered in conjunction with the findings of the subjective assessments.

If the objective assessment does not indicate the presence of tonality at a level which warrants the application of a penalty, the objective assessment may still need to be carried out for the unattended audio records (where available), to determine the potential for a penalty to be warranted at other times.

In such instances, the acoustic engineer responsible for conducting the objective assessment shall determine the need for further investigation of the unattended audio records and shall document the determination in the reporting for the compliance assessment (see reporting requirements subsequently in Section 5.3).

Caution must be exercised when conducting objective assessments of unattended audio recordings. Applying the objective assessment method to the total sound of the wind farm and ambient environment will inevitably produce false-positives caused by sound sources that are unrelated to the operation of the wind farm (e.g. bird or insect noise in an audio sample may result in a tone being determined in the sound recording). Penalties shall only be applied when the wind farm is confirmed as the source of tonality. Penalties are also strictly only applicable to the component of the sound that is solely attributable to the operation of the wind farm. The results of automated analysis of unattended audio recordings will therefore likely require the application of data filtering measures to remove false positives for periods with attributes that are most likely related to ambient sounds (e.g. tonality as a result of birds or insects). Further guidance is provided in Section F6.

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<sup>6</sup> Downwind conditions are generally defined as wind speeds and directions which equate to a positive vector wind speed of at least 2 to 3 m/s in the direction from the nearest turbines and the observation location

In instances where there is uncertainty about whether penalties are warranted at the compliance monitoring locations, data or observations at intermediate locations (between the wind farm and the compliance monitoring locations) may be referenced where available.

**F3.4 Objective assessment methods – annoying characteristics**

If the attended observations indicate the presence of annoying characteristics that may warrant rectification, an objective assessment may be required to verify and assess the presence of the characteristics. These characteristics may include amplitude modulation and impulsiveness (noting that the SA guidelines indicated the likelihood of these characteristics occurring is low). At the date of this NIMMP, relevant assessment methods which are suitable for informing such an investigation are listed in Table 5.

**Table 5: Annoying characteristics – example methods of objective assessment**

| Annoying characteristic | Objective assessment method   |
|-------------------------|---|
| Amplitude modulation    | <p>UK Institute of Acoustics publication <i>Amplitude Modulation Working Group publication Final Report - A Method for Rating Amplitude Modulation in Wind Turbine Noise Version 1</i> dated 9 August 2016 (UK IOA AM procedure).</p> <p>The UK IOA AM procedure is endorsed by the South Australia EPA at section 4.7 of the SA guidelines. Reference should be made to the SA guidelines’ advice on the use of this procedure to determine if rectification is warranted.</p>   |
| Impulsiveness           | <p>Australian Standard 1055:2018 <i>Description and measurement of environmental noise</i> (AS 1055:2018)</p> <p>The method defined in Appendix E (informative) <i>Objective method for application of an impulse adjustment to receiver noise</i>.</p> <p>The SA guidelines do not provide advice on suitable measures for investigating annoying characteristics related to impulsiveness, but notes that the SA EPA is not aware of any wind farms characterised by continuous impulsive sounds. The AS 1055:2018 method is noted in lieu of specific guidance, primarily for the purpose of informing an assessment of whether rectification of impulsiveness is warranted (i.e. AS 1055:2018 should not be referenced for the application of penalties to the wind turbine noise).</p> |

**F4 Site wind speeds**

Site wind speeds shall be collected in 10-minute samples throughout the noise measurement period. The timing of each 10-minute sample shall be synchronised with the interval commencing on the hour and each 10-minute sample following the start of each hour.

This data shall be used to determine the wind speed at 125 m AGL (hub height) corresponding to free-field conditions (i.e. free from turbine wake effects) at the reference mast location(s). In particular, if background noise monitoring is conducted prior to commencement of operation of the wind farm, the post-commissioning noise levels are to be correlated with wind speeds measured at the same mast location(s) used for the background noise survey.

Wind speeds at 125 m AGL which are determined from wind speed measurements at heights below 125 m shall be determined using the procedures outlined in the IOA GPG *Supplementary Guidance Note 4: Wind Shear*, or an alternative method deemed appropriate by the wind engineer responsible for the supply of the data.

Wind speeds may need to be measured at different locations for different wind directions in order to obtain data that is not influenced by the wake effects of upwind turbines (e.g. collection of wind data at upwind locations around the perimeter of the wind farm). Wind speeds measured at different locations will need to be translated to the wind speed at the reference mast locations (i.e. to determine the wind speed which would have been measured at the reference masts in the absence of the wind farm).

All procedures used to determine 125 m AGL wind speeds at the reference mast locations shall be validated and documented by the wind engineer for the project (see reporting requirements in Section 5.3).

## **F5 Local weather data**

The following local weather data shall be recorded during the noise survey:

- Local wind speeds: wind speeds at 1.5 m AGL shall be measured in 10-minute samples at a minimum of one (1) noise compliance monitoring location. The use of enhanced wind shield systems (detailed in Section F1) shall be the primary method of addressing the potential for wind-induced extraneous noise across the measurement microphones. However, local wind speeds in the vicinity of the noise measurement systems shall be obtained to provide a secondary reference when reviewing the trends of the measured noise data
- Rainfall: rainfall shall be measured in 10-minute intervals at a minimum of one (1) noise compliance monitoring location during the survey.

The timing of each 10-minute sample for the local weather data shall be synchronised with the interval commencing on the hour and each 10-minute increment following the start of each hour.

## **F6 Wind farm site data and records**

The following data shall be obtained from the wind farm operators:

- Site operational data: the operational status of each turbine shall be recorded in 10-minute samples and shall contain sufficient detail to differentiate whether a turbine was operating (including its mode of operation), available to operate, configured in an atypical mode of operation or shutdown. Each 10-minute sample of data shall be synchronised with the interval commencing on the hour and each 10-minute increment following the start of each hour.
- Site records: site personnel shall be advised of the noise monitoring and shall be requested to record any observations with respect to atypical operations or noise levels (related to both the wind farm and ambient environment) which may influence the measurements. These observations, as well as any noise complaints independently recorded via the site's complaint handling and management system (where appropriate), shall be provided to the acoustic consultant. As a minimum, each record shall include details of the time, duration and location of the observation.



## APPENDIX G OPERATIONAL WIND FARM NOISE ANALYSIS

### G1 Rainfall

Any 10-minute sample in which rainfall occurred shall be filtered and therefore removed from the analysis. The measurement data shall also be reviewed to identify and filter periods following rainfall in which the trend of the measurements indicates the noise levels are likely to have been elevated as a result of wet roads or flow noise associated with drainage systems and local watercourses.

### G2 Extraneous noise screening

The measured noise data shall be reviewed to identify and filter periods in which extraneous noise sources are likely to have affected the measurements. Extraneous noise sources include, but are not limited to, domestic machinery, agricultural operations, construction noise or elevated bird/frog/insect noise.

Individual 10-minute measurement samples that are likely to have been affected by high frequency extraneous noise shall be identified and filtered from the analysis when the following conditions<sup>7</sup> are satisfied:

- The highest A-weighted one-third octave band noise level is greater than 1 kHz; and
- The identified one-third octave band A-weighted noise level is greater than a level of 20 dB  $L_{A90}$  and is within 5 dB of the broadband A-weighted noise level for the 10-minute sample in question.

The sound of a wind farm is unlikely to result in tones above 1 kHz at receivers (due to high levels of atmospheric sound absorption at frequencies above 1 kHz) and, in the unlikely event of such a tone occurring, it is unlikely to dominate the sound pressure level of a one-third octave band. However, the procedure outlined above shall not be used to remove any measurement sample where the identified one-third octave band corresponds to a frequency in which the attended observations have indicated the potential for tones related to the operation of the wind farm. Further discussion of extraneous noise screening related to seasonal variations is provided in Section G4.

### G3 Atypical wind farm operation screening

The objective of the analysis is to assess whether the noise levels of the wind farm comply with the requirements of the development approvals when all of the Stage 1 wind turbines are operating normally. It is therefore necessary to address periods when noise levels may have been lower as a result of turbines being curtailed (i.e. reduced power and noise emissions, whether as a result of maintenance related issues or external energy market restrictions) or shutdown.

The operational records for each Stage 1 turbine shall therefore be reviewed for each 10-minute period to identify any periods of curtailment or shutdown. These periods shall then be addressed using either the simplified or detailed analysis options described below. It is important to note that the simplified analysis is a very conservative procedure which limits the compliance assessment to noise levels measured during periods that are not affected by curtailment. The simplified analysis option will therefore commonly result in the removal of large quantities of data for sites where turbine curtailment occurs more frequently. If the simplified analysis yields insufficient data, the detailed analysis option will need to be used.

Further, both the simplified and detailed analysis options are intended for assessing compliance when the wind farm has reached a steady state of operations. Experience at multiple wind farm sites in Australia has indicated that the initial period of operation is often not steady and may include unexpected periods of turbine curtailment and shutdown. Some practical concessions may therefore be required for the initial round of monitoring.

<sup>7</sup> Griffin, D., Delaire, C., & Pischedda, P. (2013). Methods of identifying extraneous noise during unattended noise measurements. *20th International Congress of Sound & Vibration*.

### G3.1 Simplified option

This analysis option is based on removing any 10-minute intervals in which the total noise level of the wind farm at a receiver may have been reduced. This approach provides a relatively simple and robust assessment for situations when turbine outages are relatively infrequent. This approach should therefore be used as the basis for operational filtering wherever practical to do so. However, depending on the operating configuration of the wind farm, this approach can result in the exclusion of large quantities of data from the assessment. In these situations, the detailed analysis option would need to be used.

For the purposes of the simplified analysis option, any 10-minute period in which relevant turbines are curtailed or shutdown shall be identified and removed from the analysis (for the relevant monitoring location being considered). The turbines that are considered not relevant for each receiver are those turbines with the lowest predicted noise levels which collectively result in a predicted noise level 15 dB<sup>8</sup> lower than the total predicted noise level of the wind farm at the receiver. This means that if any or all of the non-relevant turbines were to not operate during a given measurement period, the reduction in total noise level would be 0.1 dB or less. The net effect of any curtailed or shutdown turbines would therefore be negligible, and the retained data is representative of full power operation of the wind farm.

### G3.2 Detailed option

This approach is based on selective filtering of 10-minute intervals according to the operating configuration of the wind farm.

If an individual turbine, or select group of turbines, is regularly curtailed or shutdown during the compliance monitoring, this option may involve modification of the simplified approach. Specifically, the data may be filtered as per the simplified analysis option, but independently of the operating state of these turbines, provided that the net effect of their curtailment does not materially affect the compliance outcomes.

However, if the operating configuration involves regular curtailment or shutdown of different turbines across the wind farm, the analysis would involve calculating the net effect of curtailment and shutdowns in each 10-minute interval. Compliance may then be assessed based on the data for periods when the net calculated effect does not alter the compliance assessment outcome.

For both detailed analysis options, to verify that turbine curtailment or shutdowns do not alter the compliance outcome, the calculated margin of compliance must be greater than the net calculated effect of curtailment and shutdowns. For example, if the analysis indicates that the noise level of the wind farm complies with the noise limit by 1 dB, the net calculated effect of curtailment and shutdowns must be less than 1 dB to demonstrate a compliance outcome that is valid for full power operations.

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<sup>8</sup> A level that is 10 dB below the noise source under investigation is generally used for environmental noise assessment work. However, a source of noise that is 10 dB lower in level will contribute 0.4 dB to the total noise level. A 0.4 dB level variation may alter a wind farm compliance assessment outcome. Hence the selection of a lower threshold based on being 15 dB lower than the total predicted noise level of the wind farm.

## G4 Review of seasonal considerations

Seasonal variations can affect both the level of background sound and operational wind farm noise.

### G4.1 Background sound

The main potential sources of seasonal variations in background sound are:

- Rainfall (see data filtering procedures in Section G1)
- Insect, bird and other fauna noise (see data filtering procedures in Section G2)
- Local domestic plant such as air-conditioning or heating
- Changes in domestic or agricultural activity in the vicinity of the monitoring location.

Other sources of background sound variation may relate to changes in vegetation, wind direction and wind shear.

The data shall be reviewed to identify any anomalous trends that are indicative of significant seasonal variations. These types of effects may be evident as elevated noise levels at low wind speeds (less than 3 m/s at hub height), or striations in the data characterised by relatively constant levels across a range of wind speeds (e.g. as would occur if domestic or agricultural machinery significantly influences the measurements).

Any identified variations in the measured levels that are likely to be attributable to seasonal changes in background sound levels shall be filtered from the analysis where possible. If the effect cannot be reliably filtered, and the effect is sufficient to preclude an assessment of the wind farm's compliance, supplementary procedures (see Section G6) or repeat measurements will be required.

### G4.2 Wind farm noise

The main potential source of seasonal variation in wind farm noise levels is wind direction and wind speed.

The wind directions and wind speeds that occurred during the survey shall be reviewed to determine whether the conditions were representative of the range generally expected at the wind farm site. In particular, if upwind or crosswind conditions are found to have occurred more regularly than is generally expected at the site, repeat measurements will generally be required.

In some cases, a sensitivity analysis or supplementary assessment (see Section G6 for procedures) may be sufficient to enable an assessment of compliance without further measurement extensions.

For example, while the SA guidelines is based on evaluating compliance for the aggregated measurement data for the range of conditions normally expected at the site, an analysis limited to data obtained under downwind conditions may be sufficient to demonstrate compliance. Additionally, the availability of limited data for high wind speeds may be addressed by using other information relating to the change in the wind farm's sound emission with increasing wind speed (e.g. sound power level test data obtained in accordance with IEC 61400-11:2012 or measurement data obtained at intermediate locations or other compliance monitoring locations around the wind farm – see supplementary procedures in Section G6).

The assessment is referenced to hub height wind speeds and therefore seasonal wind shear variations are primarily relevant to potential variations in background noise levels rather than wind farm noise levels. However, wind shear may be relevant to the assessment of annoying characteristics. This is because increased wind shear may result in lower background sound levels for a given wind speed (i.e. increasing the likelihood of the wind farm being audible) and may also affect the sound characteristics of the wind farm. Attended observations must therefore include time periods when increased wind shear could be expected (note the requirement in Section G3 for at least one set of attended observations to occur during the night period for each stage of the surveys).



### G4.3 Downwind directions

In accordance with the SA guidelines, the analysis is to account for wind directions when the receivers are downwind of the wind farm.

Downwind conditions for each monitoring location are equal to  $\pm 45$  degrees around a central downwind direction, as detailed in Table 4.

**Table 6: Downwind directions**

| Location | Central downwind direction (°) | Downwind direction range (°) |
|----------|--------------------------------|------------------------------|
| NSH09    | 177                            | 132 – 222                    |
| NSH13    | 235                            | 190 – 280                    |
| NSH14    | 196                            | 151 – 241                    |
| NSH15    | 54                             | 9 – 99                       |
| SH17     | 57                             | 12 – 102                     |
| SH29     | 3                              | 318 – 48                     |
| SH20     | 321                            | 276 - 366                    |

### G5 Adjustment for background noise levels

If suitable background noise data are obtained, the data shall be used to adjust compliance monitoring results for the influence of background noise levels. To enable the background noise levels to be used for this purpose, the data filtering procedures used to determine a valid data point must be identical for both the analysis of background and operational noise levels.

The adjustment shall be applied to the integer wind speed bin analysis of the compliance monitoring data, using the method described in clause 4.4 of the SA guidelines.

### G6 Supplementary procedures

The data filtering and background noise adjustment procedures detailed in Section G1 to Section G4.3 shall be used to reduce the influence of background noise levels.

If the residual influence of background sound precludes a definitive assessment of compliance, supplementary procedures shall be used to reduce the uncertainty.

A supplementary analysis shall be undertaken by comparing data measured at the compliance monitoring locations during upwind and downwind conditions. Higher noise levels during downwind conditions are indicative of the results being influenced by the operation of the wind farm. Conversely, comparable noise levels during upwind and downwind conditions are indicative of an environment dominated by the influence of sources that are not related to the operation of the wind farm (primarily for sites where background sound levels are not expected to vary significantly with wind direction).

Noise measurement data obtained at intermediate locations shall be used as follows:

- Noise level versus wind speed profile: data obtained at an intermediate location shall be used to define the profile of the change in measured wind turbine noise levels with increasing wind speeds. This profile shall then be compared to the profile measured at the compliance monitoring location to determine if increasing noise levels at the receivers are attributable to the wind farm (i.e. the profiles at the intermediate and the receivers are equivalent) or the influence of wind related background sound levels (i.e. the profiles at the intermediate locations and the receivers are not equivalent)
- Data filtering: any 10-minute period in which the measured noise level at the receiver is higher than the simultaneously measured level at the intermediate location shall be considered background sound affected and may be removed from the analysis

- Extrapolation: data obtained at an intermediate location shall be extrapolated to the receiver in accordance with the procedure documented in Section 11.2 of ISO 1996-2 *Acoustics — Description, measurement and assessment of environmental noise — Part 2: Determination of environmental noise levels* 2017 (ISO 1996-2:2017). The extrapolation shall be undertaken on the basis of the prediction method guidance in the SA guidelines, subject to a +/-1 dB uncertainty margin to the predictions to account for variations in the tolerance of the calculations at intermediate and receptor distances. The procedure may also be used to assess noise levels at other receivers where compliance monitoring has not been undertaken.

If the results of an assessment based on measurement data obtained at an intermediate location are inconclusive, or if noise measurement data at an intermediate location is not available, an alternative method of enabling an assessment of the wind farm at the receivers will need to be defined. This may involve:

- Targeted assessment of specific conditions (i.e. wind speeds, wind directions and times of day);
- Additional measurements at a representative location where background sound levels are lower; or
- Attended measurements in accordance with the procedures defined in Section 4.5 of the SA guidelines.

### **G7     Application of penalties for tonality**

If penalties for tonality are found to be warranted, the penalties shall be applied to the noise of the wind farm in accordance with the SA guidelines.

The penalties shall be applied only if the tone is audible at a receiver. The tonal penalty should be applied to the calculated noise level in the wind speed bin where tonal characteristics are detected for at least 10 % of the data in that associated wind speed bin.

If penalties are to be applied to the results of unattended noise measurement data, based on the results of analysis of the audio recordings during the survey, caution must be applied to avoid the application of penalties as a result of false-positive results from objective assessment methods. For example, penalties should not be applied to individual measurement samples in which an objective assessment has identified potential tonality which has not been observed (e.g. tones identified in the unattended data at frequencies other than those that have been observed from the operation of the wind farm). Some level of data filtering is therefore expected to be implemented when applying a tonality penalty to the results of unattended noise measurement data.

### **G8     Rectification of annoying characteristics**

The SA guidelines have been developed with the fundamental characteristics of noise from a wind farm taken into account. These include the aerodynamic noise from the passing blades (commonly termed as amplitude modulation or ‘swishing’), and the infrequent and short-term braking noise. These noise characteristics are inherent to the operation of a wind farm and some level of these characteristics are expected to be observed.

Effects associated with high degrees of either amplitude modulation or low frequency noise are rare and are not expected to impact on receivers. However, such noise characteristics may potentially be exacerbated by different weather conditions or during different seasons. Annoying characteristics that are not fundamental to a typical well-maintained wind farm must be rectified.

## APPENDIX H FLAT ROCKS WIND FARM STAGE ONE – COMPLAINTS HANDLING PROCEDURE



### Flat Rocks Wind Farm Stage One – Complaints Handling Procedure

#### Enel Green Power Background:

Enel Green Power, within the Enel Group, develops and operates renewable energy plants worldwide and is present in Europe, the Americas, Africa, Asia and Oceania. A world leader in clean energy, with a total capacity of more than 54 GW and a generation mix that includes wind, solar, geothermal, and hydroelectric power, as well as energy storage facilities, Enel Green Power is at the forefront of integrating innovative technologies into renewable energy plants.

Enel Green Power acquired the Flat Rocks Wind Farm Stage One Project from the West Australian renewable energy developer, Moonies Hill Energy in April 2022.

#### Project Background:

The Flat Rocks Wind Farm Stage One will consist of 18 Vestas wind turbines (approximately 75 megawatts) and related civil and electrical infrastructure.

The project is in the Great Southern region of WA, approximately 35 km southeast of Kojonup. The project spans the Kojonup Shire Local Government Area and the Broome-hill Tambellup Shire Local Government Area.

The relevant Development Approvals for the Flat Rocks Wind Farm have been obtained from the Kojonup and Broomehill-Tambellup Shire Councils. The Approvals set out conditions that must be complied with in undertaking the development. The conditions cover construction, operation, decommissioning, and administrative matters.

#### Introduction

Flat Rocks Wind Farm Stage One takes all complaints seriously and aims to acknowledge and resolve complaints in a timely manner.

#### What is a complaint and who can make a complaint.

A complaint as an expression of dissatisfaction made to or about Flat Rocks Wind Farm Stage One, related to its services or staff, where a response or resolution is explicitly or implicitly expected or legally required.

We acknowledge that anyone has a right to lodge a complaint and we will ensure that all the complaints we receive will be managed respectfully, objectively, and efficiently. At times, clarification may be required regarding whether a stakeholder is lodging a complaint rather than an enquiry.

#### How to lodge a complaint.

- Call: 02 9164 9400





- Email: flatrockswindfarm@enel.com
- Writing to Enel Green Power Australia Sydney Office: Level 23, Tower 1, 100 Barangaroo Avenue Barangaroo Sydney, NSW 2000.

### **What happens after a complaint is lodged**

Where complaints are received in person, via telephone or email, we aim to provide an acknowledgement and initial response immediately if possible, or the next working day. Where complaints are received by post, we aim to provide acknowledgement and initial response within five working days.

Following this, the project team will assess the complaint and coordinate an investigation (if required) and propose resolution measures. We aim to communicate the results of investigations and proposed resolution measures within five working days.

Communication of the resolution should include:

- actions taken in response to the complaint
- outcome(s) of the complaint
- rationale for any decisions made
- proposed resolution offered
- request for feedback from the complainant as whether the information provided has resolved their complaint, and
- information on escalation options available to the complainant if required.

A complaint will be considered closed when a complainant advises that they consider the complaint resolved. Alternatively, if no response is received from the complainant within ten working days, the complaint will be considered closed.

### **Further investigation of complaints.**

Where a complainant believes a complaint has not been resolved satisfactorily, the following escalation pathways may be explored:

#### **Kojonup Shire Council**

- Website: [www.kojonup.wa.gov.au](http://www.kojonup.wa.gov.au)
- Email: [council@kojonup.wa.gov.au](mailto:council@kojonup.wa.gov.au)
- Phone: 08 9831 2400
- Post: PO Box 163, Kojonup WA 6395

#### **Broomehill Tambellup Shire Council**

- Website: [www.shirebt.wa.gov.au](http://www.shirebt.wa.gov.au)
- Email: [mail@shirebt.wa.gov.au](mailto:mail@shirebt.wa.gov.au)
- Phone: 08 9825 355
- Post: 46 - 48 Norrish St, Tambellup 6320



#### Office of the Australian Energy Infrastructure Commissioner

- Website: [www.nwfc.gov.au/](http://www.nwfc.gov.au/)
- Email: [nwfc@environment.gov.au](mailto:nwfc@environment.gov.au)
- Telephone: 1800 656 395
- Post: PO Box 24434 Melbourne VIC 3001

#### Environmental Protection Authority Western Australia

- Website: [www.epa.wa.gov.au](http://www.epa.wa.gov.au)
- Email: [info.epa@dwer.wa.gov.au](mailto:info.epa@dwer.wa.gov.au)
- Telephone: +61 8 6364 7000
- Post: Locked Bag 10 Joondalup DC WA 6919

#### Complaints Register

All complaints will be recorded within an internal Project Complaints Register. This register may be made publicly available and may be provided to regulatory bodies as appropriate. Personal information will be stored and shared in accordance with relevant privacy legislation.

The Complaints Register will include the following details:

- the complainant's name and address (if provided)
- the time and date of the incident
- a unique receipt number for each complaint
- a description of the complainant's concerns
- the process for investigating the complaint, and the outcome of the investigation, and
- the actions taken to resolve the complaint.

# Construction Management Plan





# Flat Rocks Wind Farm

## Construction Management Plan

Enel Green Power Australia Pty Ltd

14 July 2022

**GHD Pty Ltd | ABN 39 008 488 373**

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Perth, Western Australia 6000, Australia

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| <b>Project name</b>   |                 | Owner Engineering Flat Rocks   |                 |                  |                           |                  |             |
|-----------------------|-----------------|--|-----------------|------------------|---------------------------|------------------|-------------|
| <b>Document title</b> |                 | Flat Rocks Wind Farm   Construction Management Plan                                  |                 |                  |                           |                  |             |
| <b>Project number</b> |                 | 12574907   |                 |                  |                           |                  |             |
| <b>File name</b>      |                 | 12574907-00000-CM-PLN-001_C Flat Rocks Wind Farm - Construction Management Plan.docx |                 |                  |                           |                  |             |
| <b>Status Code</b>    | <b>Revision</b> | <b>Author</b>  | <b>Reviewer</b> |                  | <b>Approved for issue</b> |                  |             |
|                       |                 |  | <b>Name</b>     | <b>Signature</b> | <b>Name</b>               | <b>Signature</b> | <b>Date</b> |
| S3                    | A               | Adam Riley   | Andrew Ferres   |                  | Rob Senior                |                  | 05/07/22    |
| S3                    | B               | Adam Riley   | Andrew Ferres   |                  | Rob Senior                |                  | 08/07/22    |
| S3                    | C               | Adam Riley   | Andrew Ferres   |                  | Rob Senior                |                  | 14/07/22    |
|                       |                 |  |                 |                  |                           |                  |             |
|                       |                 |  |                 |                  |                           |                  |             |

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# Contents

|  |           |
|--|-----------|
| <b>1. Introduction</b>                         | <b>1</b>  |
| 1.1 Project Overview                           | 1         |
| 1.2 Purpose of this plan                       | 2         |
| 1.3 Scope and limitations                      | 3         |
| 1.4 Definitions and Abbreviations              | 3         |
| <b>2. Project Organisation</b>                 | <b>4</b>  |
| 2.1 Key Personnel and Contact Details          | 4         |
| 2.2 Work Hours                                 | 4         |
| <b>3. Project Description</b>                  | <b>5</b>  |
| 3.1 Site Access                                | 5         |
| 3.1.1 Roads/Access Track Upgrades              | 5         |
| 3.2 Turbines                                   | 7         |
| 3.3 Hardstanding                               | 8         |
| 3.4 Lifting Operations                         | 8         |
| 3.5 Temporary Buildings & Worker Accommodation | 9         |
| 3.6 Temporary Car Parking Areas                | 10        |
| 3.7 Site Facilities and Laydown                | 10        |
| 3.7.1 Concrete Batching Plant                  | 10        |
| 3.7.2 Water Tanks                              | 10        |
| 3.7.3 Material Storage and Laydown Areas       | 10        |
| 3.8 Substation/Switchyard                      | 10        |
| 3.9 Transmission Lines and Underground Cabling | 11        |
| 3.9.1 Overhead Lines                           | 11        |
| 3.9.2 Underground Cabling                      | 11        |
| 3.10 Met Masts                                 | 11        |
| <b>4. Construction Sequencing</b>              | <b>13</b> |
| <b>5. Environmental Impacts and Mitigation</b> | <b>14</b> |
| 5.1 Dust and Other Construction Impacts        | 14        |
| 5.2 Management of Weed Infestations            | 14        |

## Table index

|         |   |    |
|---------|---|----|
| Table 1 | Details of Construction Management Plan requirements for Development Approval | 2  |
| Table 2 | Definitions and Abbreviations   | 3  |
| Table 3 | Key Personnel and Contact Details   | 4  |
| Table 4 | Project wind turbine characteristics  | 7  |
| Table 5 | Construction Sequencing   | 13 |



## Figure index

|          |  |    |
|----------|--|----|
| Figure 1 | Location of Flat Rocks Wind Farm - Western Australia | 1  |
| Figure 2 | Flat Rocks Project Area                              | 2  |
| Figure 3 | Temporary roads and access tracks                    | 6  |
| Figure 4 | Turbine Layout                                       | 7  |
| Figure 5 | Typical crane hardstand and laydown                  | 8  |
| Figure 6 | Typical crane paving section                         | 8  |
| Figure 7 | Location of Site Facilities and Batch Plant          | 9  |
| Figure 8 | Typical Met Mast isometric view                      | 11 |
| Figure 9 | Typical Met Mast footing layout                      | 12 |

## Appendices

|            |                                |
|------------|--------------------------------|
| Appendix A | Development Layout Plan        |
| Appendix B | Site Facilities Layout         |
| Appendix C | Concrete Batching Plant Layout |
| Appendix D | Typical Trench Detail          |

# 1. Introduction

## 1.1 Project Overview

The Flat Rocks Wind Farm (FRWF) project is located approximately 260 km southeast of Perth, 30 km east of Kojonup. The proposed project consists of 18 x 4.2 MW turbines for a total installed capacity of 75.6 MW. Turbine components will be transported to site from Port of Bunbury, approximately 230 km by road.

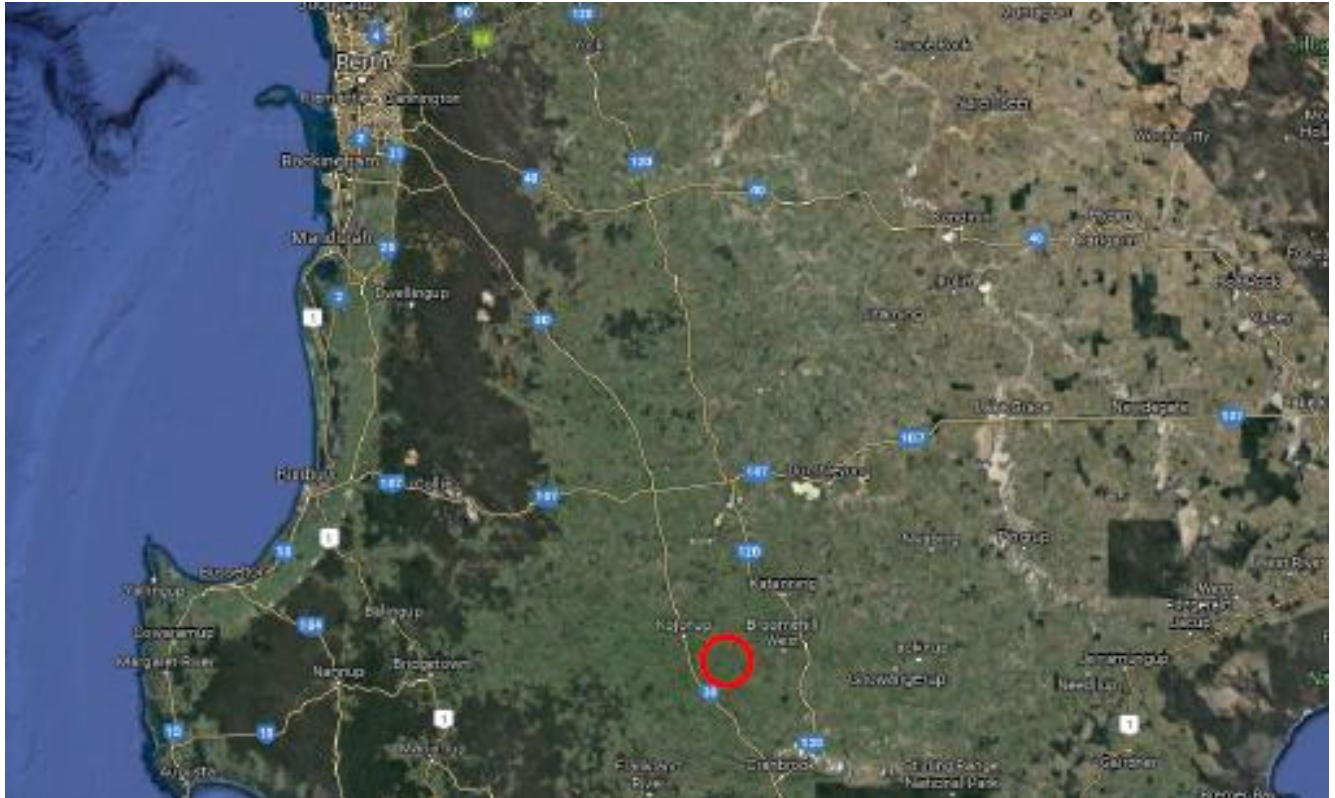


Figure 1 Location of Flat Rocks Wind Farm - Western Australia

ENEL Green Power (EGP) will be developing FRWF at the site mentioned above. FRWF will be connected to the Western Power network also known as the South West Interconnected Network (SWIN). There is an existing 132 kV Western Power Transmission line that is adjacent to the proposed wind farm substation location, seen in Figure 2. Western Power will provide a teed connection from this line into the Wind Farm substation.

EGP is intending to deliver this project through splitting up the work packages in 4 different contracts being:

1. IWC: Interconnection Works Contract with Western Power
2. OEM: Turbine Supply, Install and Commission contract with Vestas
3. EBoP: Electrical Balance of Plant contract with RJE Global
4. CBoP: Civil Balance of Plant contract with West Force

EGP will utilise an in-house project team with support from EGP's international resources and will utilise the owners engineer for support in the design review, support in compliance review, support in interface management, support in construction inspections and support in commissioning & handover activities.

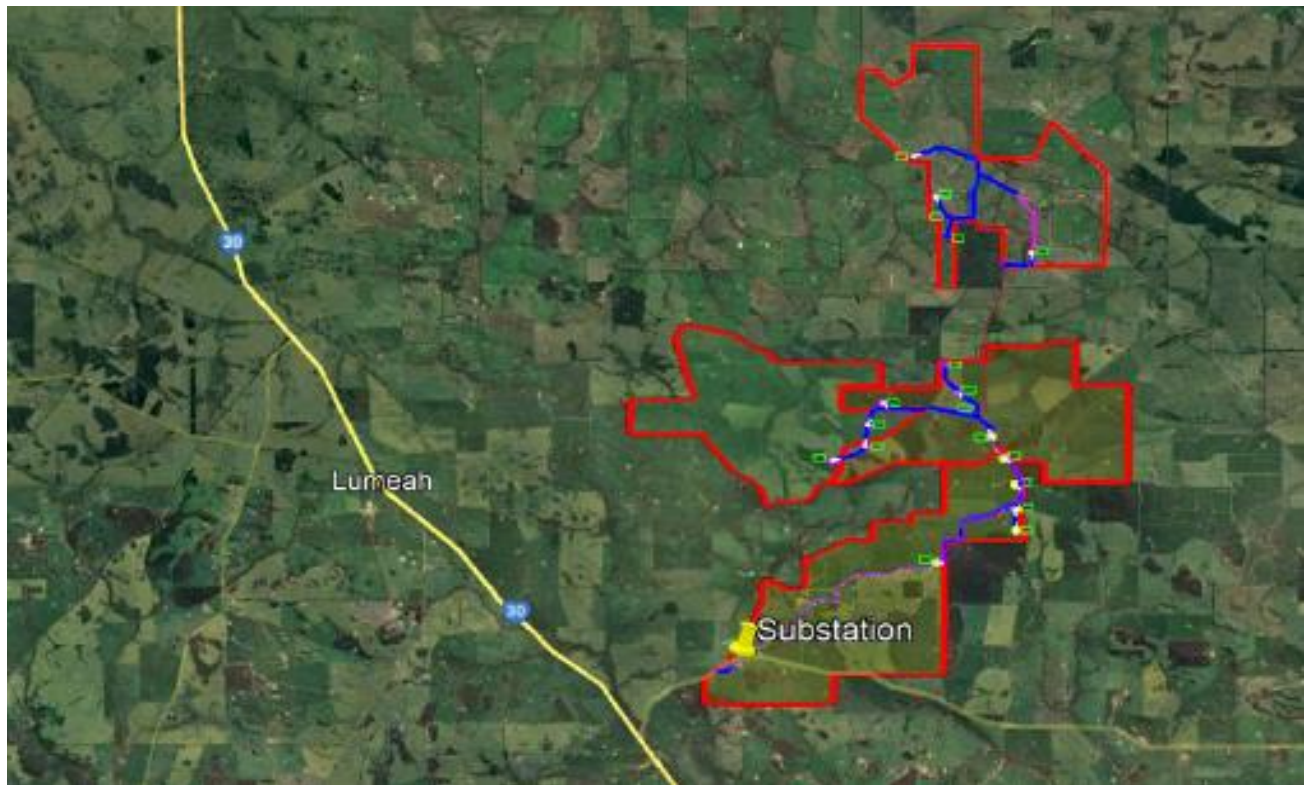


Figure 2 Flat Rocks Project Area

## 1.2 Purpose of this plan

This Construction Management Plan (CMP) covers the first phase of the FRWF project which is planned to include 18 wind turbines totalling 75.6 MW. The construction period is anticipated to last approximately 18 months.

The purpose of the CMP is to satisfy the Development Approval Condition 18 of the Shire of Kojonup (date of determination 28 September 2021) and Development Approval Condition 18 of the Shire of Broomhill-Tambellup (date of notice 22 May 2017).

The details of the CMP required for Development Approval are referenced in Table 1

Table 1 Details of Construction Management Plan requirements for Development Approval

| Development Approval Requirement  | Section Reference      |
|---|------------------------|
| The Construction Management Plan must include the following detail:   |                        |
| a. The location of temporary access / egress points and temporary service roads;  | Page 5, Section 3.1    |
| b. The location of crane hardstand areas;   | Page 8, Section 3.3    |
| c. Temporary buildings;   | Page 9, Section 3.5    |
| d. Temporary car parking areas;   | Page 10, Section 3.6   |
| e. The location of the concrete batching plant, water tanks and any construction compounds and materials storage / laydown areas; | Page 10, Section 3.7   |
| f. The location and extent of excavation required for the purpose of laying cabling;  | Page 11, Section 3.9.2 |
| g. A timetable for the removal of temporary development after completion of the construction phase;                               | Page 13, Section 4     |
| h. The management of dust and other construction impacts;   | Page 14, Section 5.1   |
| i. The management of weed infestations.   | Page 14, Section 5.2   |



## 1.3 Scope and limitations

*This report: has been prepared by GHD for Enel Green Power Australia Pty Ltd and may only be used and relied on by Enel Green Power Australia Pty Ltd for the purpose agreed between GHD and Enel Green Power Australia Pty Ltd as set out in section 1.2 of this report.*

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### Accessibility of documents

*If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.*

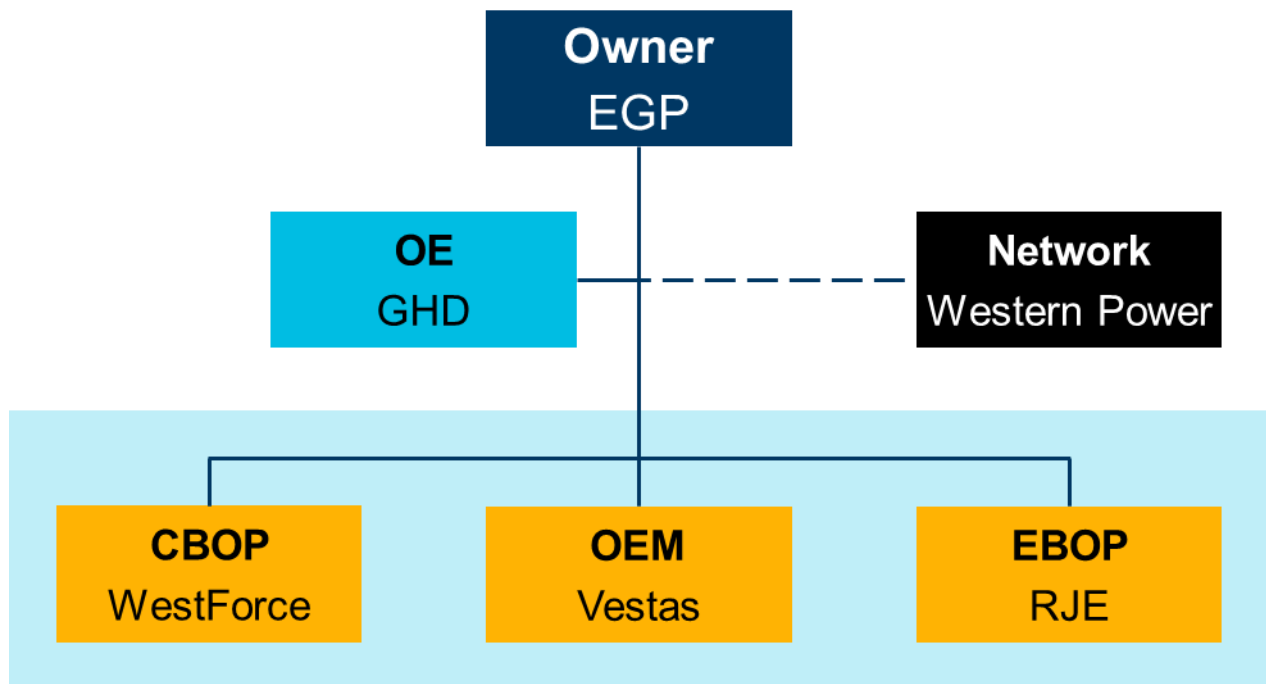
## 1.4 Definitions and Abbreviations

**Table 2** Definitions and Abbreviations

| Definition / Abbreviation | Description                                |
|---------------------------|--|
| BOP                       | Balance of Plant                           |
| CBOP                      | Civil Balance of Plant                     |
| CMP                       | Construction Management Plan               |
| CEMP                      | Construction Environmental Management Plan |
| COD                       | Commercial Operation Date                  |
| DA                        | Development Approval                       |
| DTMR                      | Department Of Transport and Main Roads     |
| EGP                       | Enel Green Power Australia Pty Ltd         |
| EBOP                      | Electrical Balance of Plant                |
| EPC                       | Engineering Procurement and Construction   |
| FRWF                      | Flat Rocks Wind Farm                       |
| HV                        | High Voltage                               |
| IC                        | Independent Certifier                      |
| IWC                       | Interconnection Works Contract             |
| MV                        | Medium Voltage                             |
| NSP                       | Network Service Provider                   |
| OE                        | Owner's Engineer                           |
| OEM                       | Original Equipment Manufacturer            |
| WFC                       | WestForce Construction                     |
| WP                        | Western Power                              |
| WTG                       | Wind Turbine Generator                     |

## 2. Project Organisation

The FRWF organisational structure is shown in the following chart:



### 2.1 Key Personnel and Contact Details

Table 3 Key Personnel and Contact Details

| Name               | Position                  | Contact         | Email                       |
|--------------------|---------------------------|-----------------|-----------------------------|
| Gabriele Mallarini | Project Execution Manager | +61 412 294 411 | Gabriele.mallarini@enel.com |
| Tomas Gibbs        | Project Manager           | +61 455 210 249 | tomas.gibbsrasquin@enel.com |
| Lionel Zhou        | Project Engineer          | +61 439 131 835 | lionel.zhou@enel.com        |
| John Price         | EGP Site Manager          | +61 427 940 771 | TBC                         |
| Darryl Byatt       | EGP HSEQ Site Rep         | +61 401 724 458 | TBC                         |

### 2.2 Work Hours

Construction work will be carried out between 6 am and 6 pm Monday to Sunday with out-of-hours work to be conducted under an approved Noise Management Plan.

Night works will be required primarily for erection of turbines and wind turbine foundation pours or as required for critical construction work.

These hours are subject to change based on the time of year, progress and EGP requirements.

## 3. Project Description

### 3.1 Site Access

#### 3.1.1 Roads/Access Track Upgrades

Temporary access roads will be constructed within the project development area. Access gates will be provided at all entry points from public roads to temporary access roads.

There are a total of five access gates to public roads:

- Tambellup West Road – To Substation and Permanent Operations and Maintenance Building
- Warrenup Road – Access to WTG08, 09, 10, 11, 16
- Warrenup Road, North of O'Neill Road – Access to Temporary Site Facilities and WTG01, 02, 03, 04, 05, 06, 07, 55
- Warranup Road, near Ngopitchup Road – Access to WTG18
- Nookanellup Road – Access to WTG13, 14, 15, 17

Temporary access roads are shown in Figure 3, with project access gates shown in Appendix A – Development Layout Plan, submitted to the council(s) under Condition 17.





Figure 3 Temporary roads and access tracks

## 3.2 Turbines

Stage 1 of the Project involves the supply and installation of 18 units of Vestas V150 4.2 MW turbines. Turbine details are included below:

Table 4 Project wind turbine characteristics

|                              | Details |
|------------------------------|---------|
| Number of turbines - Stage 1 | 18      |
| Number of turbines - Stage 2 | 24      |
| Rated capacity               | 4.2 MW  |
| Tip height                   | 200 m   |
| Hub heights                  | 125 m   |
| Rotor diameter               | 150 m   |
| Blade length                 | 73.7 m  |

The locations of the Stage 1 turbines are included in Figure 4 below. Refer to Development Plan submission as per DA Condition #17 for latest version.

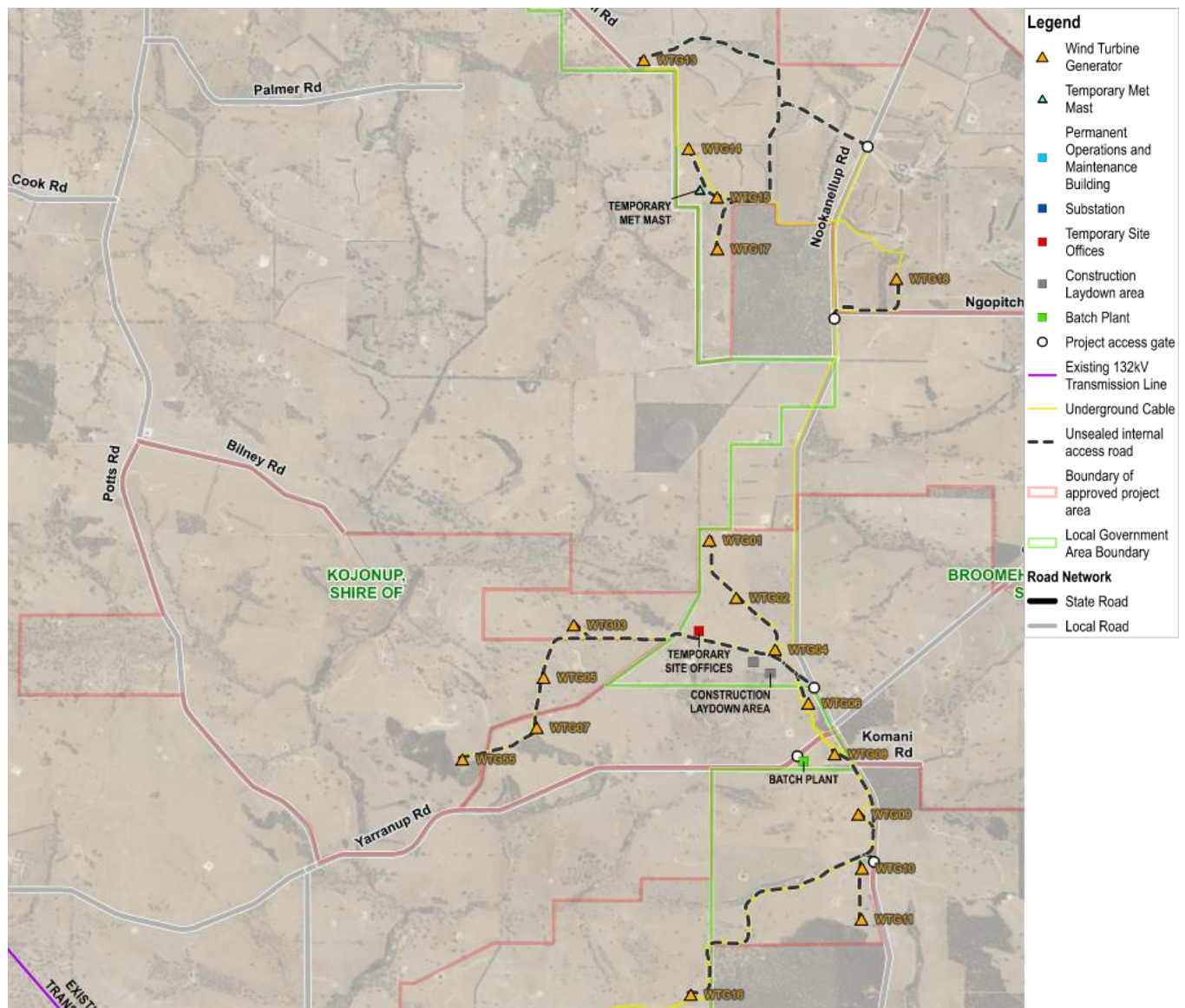


Figure 4 Turbine Layout



### 3.3 Hardstanding

There will be one crane hardstand adjacent to each WTG shown in Figure 4. Typical hardstand detail has been included in Figure 5 for information.

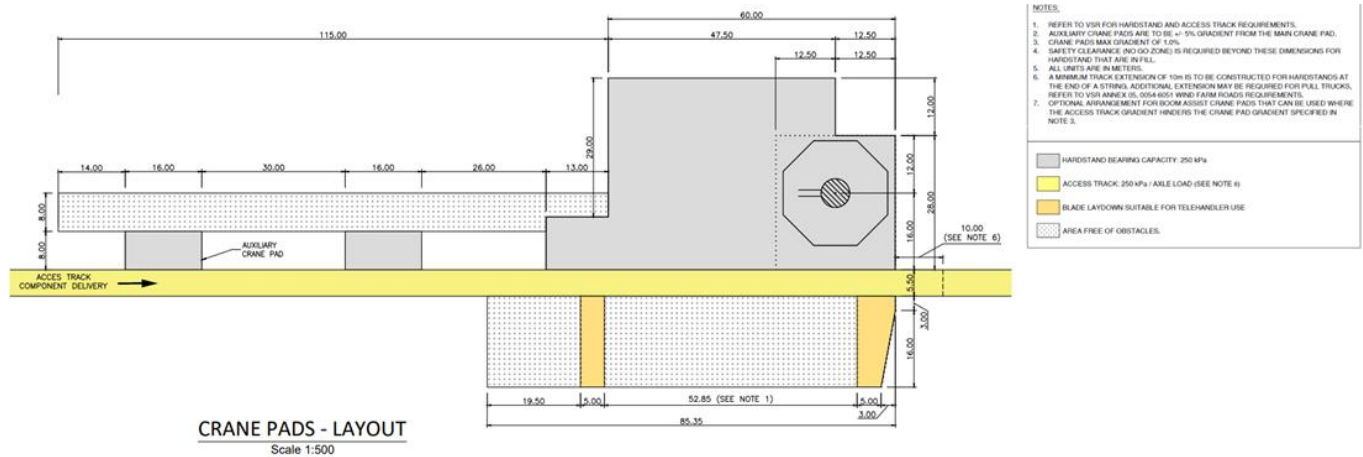


Figure 5 Typical crane hardstand and laydown

The access track will be built first, follow by the hardstand area. The turbine footing will be excavated, and once concrete has been poured, and backfilled the hardstand area will be finalised.

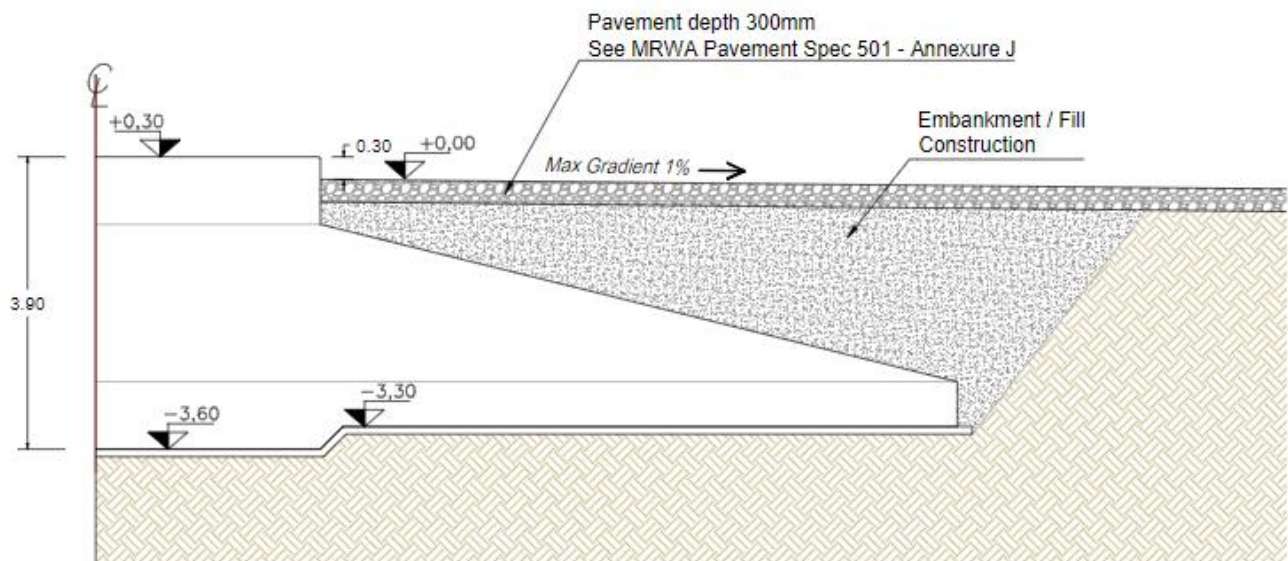


Figure 6 Typical crane paving section

### 3.4 Lifting Operations

All turbine component lifting operations will be subject to the preparation, review and approval of a lifting study. The details below are indicative only:

- Preassembly Crane: LTM1750- 3 Tower Sections (Base, Mid 1, Mid 2)
- Main Crane: LG1750SX- 2 Tower sections (Mid3, Top), Nacelle, Hub & Blades.
- Crane studies will include the planning information as below:
  - Route that transport will take to position the load for lifting;
  - Initial lifting position of the load, including radius. Lifting radius must be accurately determined.



- Final placement position of the load, including radius. Lifting radius must be accurately determined;
- Location of the crane(s) including tail swing limits;
- Route that crane(s) will take, if walking with the load, as well as associated matting requirements;
- Any utilities located within the work zone. Underground utilities – piping, ducts, etc., must be accurately located;
- Space necessary to assemble the crane; and
- Planning must include load transportation considerations, e.g., how to get the load close enough to the crane

## 3.5 Temporary Buildings & Worker Accommodation

Temporary buildings including site offices, crib room, toilets and skip bins will be established by Westforce (WFC). The temporary buildings will be located on site access road IR-C between WTG03 and WTG04 and will be accessed via Warrengup Road. Refer to Figure 7 – Laydown & Site Facilities.

No worker accommodation will be constructed within the project development area for FRWF Stage 1.

The construction contractors will mobilise site containers for tools and minor equipment storage and chemical cupboards and bunds for chemical management. Potable water and other pantry facilities will be made available at the crib room.

Site Facilities include:

- Office buildings for Contractors and Principal;
- Crib Rooms, first aid room, toilets; and
- Laydown Area which may include storage containers, workshop dome, fuel farm, and a geotech lab.

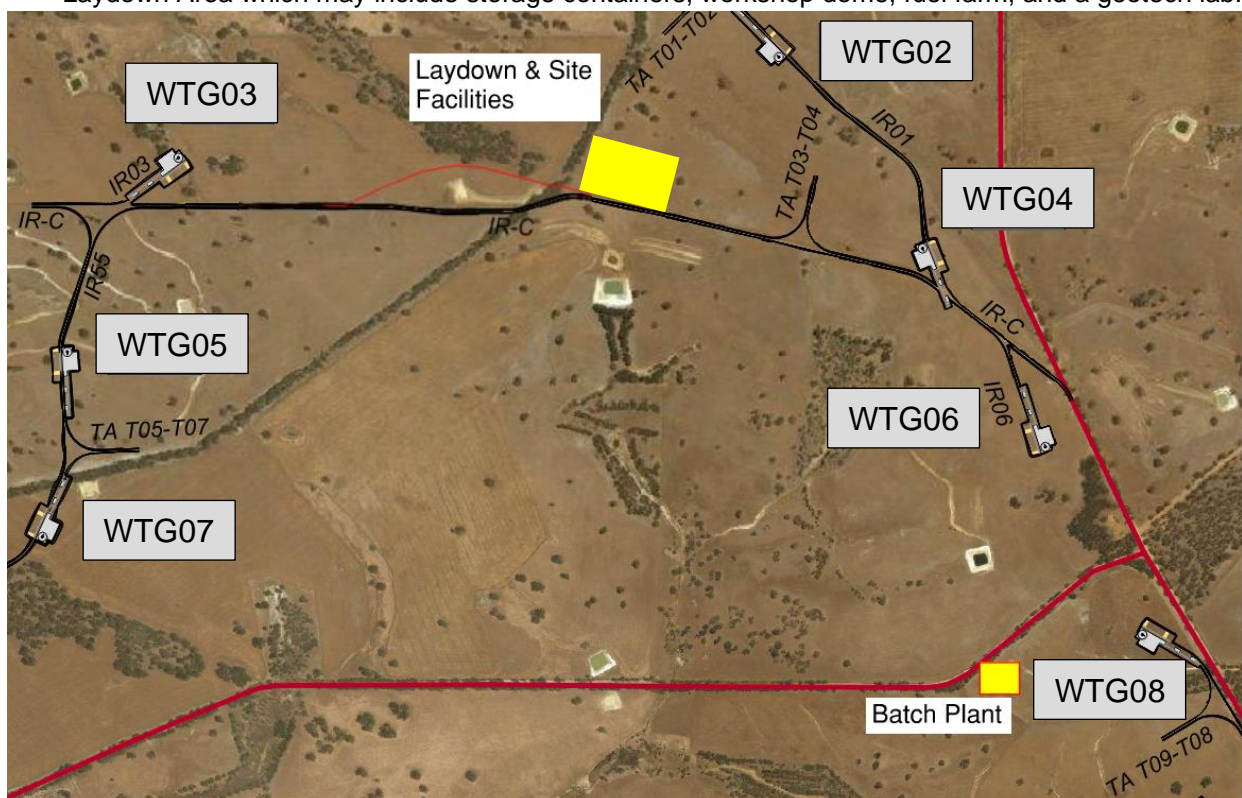


Figure 7 Location of Site Facilities and Batch Plant

Temporary buildings will also be provided at the substation / O&M including a site office with crib and toilets to facilitate the construction period.

## 3.6 Temporary Car Parking Areas

Temporary car parking areas will be provided for light and heavy vehicles in the following locations:

- Site Facilities
- Concrete Batching Plant
- O&M Building

Temporary parking for concrete trucks will be provided at the Concrete Batching Plant.

Proposed car parking bays are included in Appendix B – Site Facilities Layout and Appendix C – Concrete Batching Plant.

## 3.7 Site Facilities and Laydown

### 3.7.1 Concrete Batching Plant

A concrete batching plant will be located near WTG08 and will be accessed via Yarranup Road. The Batch Plant area layout can be found in Appendix C and will include:

- Access via Yarranup Rd, and WTG16 access road.
- Material storage areas,
- 2 x batch plants,
- Turkey nest water storage,
- Offices and crib rooms,
- Light vehicle and trucks parking
- Water tank and fuel tank.

The Concrete Batch Plant will be demobilised and removed upon completion of the Civil package (Estimated mid 2023)

### 3.7.2 Water Tanks

Water tanks will be located at the Concrete Batching Plant, indicated in Appendix C. The batch plant will use potable water which will be taken from Water Corporation Standpipes once quantities have been confirmed and agreed with Water Corporation. This water will then be stored in 3 tanks / bladders with each tank holding 200 kL of water.

For earthworks purposes, natural water will be used from landowners' dams following their approval.

### 3.7.3 Material Storage and Laydown Areas

Storage and laydown areas are utilised for receipt, temporary storage and assembly of construction supplies and equipment. Material storage and laydown areas are depicted in Appendix B at the Site Facilities. Additional storage and laydown areas will be provided on site access road IR-C between WTG03 and WTG04 (as per Figure 7) and Temporary laydown and car parking will also be included at the Substation.

The material storage and laydown areas will cater for all main construction contractors.

## 3.8 Substation/Switchyard

The Stage 1 substation is located to the South of the Project Development Area accessed from Tambellup West Road. Accompanying the Substation will be an Operation and Maintenance Building.

The substation is situated next to the existing 132 kV transmission line and is depicted in Appendix A – Development Layout Plan

## 3.9 Transmission Lines and Underground Cabling

### 3.9.1 Overhead Lines

There is an existing 132 kV Western Power Transmission line that is adjacent to the proposed wind farm substation location, seen in Figure 2. Western Power intends to provide a teed connection from this line into the Wind Farm substation.

No additional overhead lines will be constructed within the project development area for Stage 1.

### 3.9.2 Underground Cabling

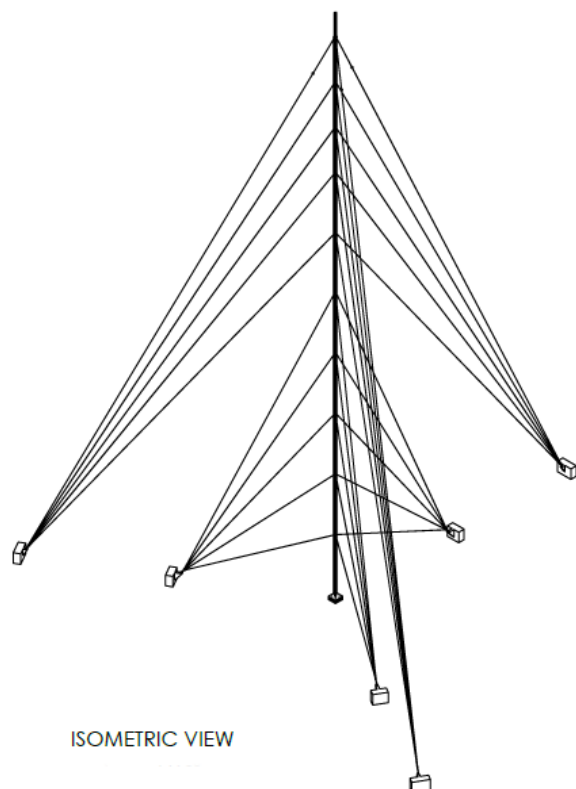
Underground cabling traverses between WTGs and the substation. There are three collector systems with associated underground cabling which feed into the substation. Trenching will be required along the lengths of the cable routes indicated in Appendix A – Development Layout Plan.

Typical cable trench details are included in Appendix D.

## 3.10 Met Masts

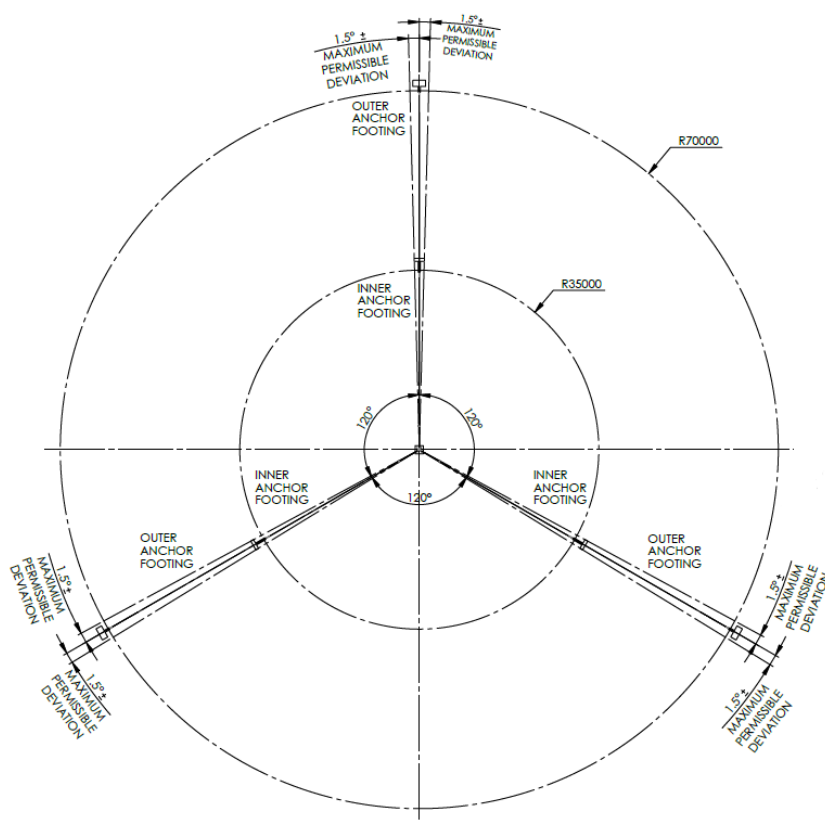
There will be three temporary meteorological masts installed as part of the FRWF1 project. The masts will be 125 m tall and will include sensors such as wind speed, wind direction and ambient temperature.

Two temporary met masts will be constructed at the sites of WTG14 and WTG15 and will be removed during construction of the turbine foundations. The third met mast will be constructed between WTG14 and WTG15 and will be removed as part of the construction demobilisation process prior to COD.



**Figure 8** Typical Met Mast isometric view





**Figure 9**      *Typical Met Mast footing layout*

## 4. Construction Sequencing

A construction timetable has been included in the following table for FRWF Stage 1

*Table 5 Construction Sequencing*

| Construction Works Breakdown                  | Anticipated Commencement | Anticipated Completion |
|---|--------------------------|------------------------|
| Site Establishment and Temporary Facilities   | August 2022              | September 2022         |
| Internal roads and Hardstands                 | September 2022           | March 2023             |
| Turbine Foundations                           | December 2022            | March 2023             |
| Cable Reticulation                            | November 2022            | June 2023              |
| Substation and Switchyards                    | December 2022            | July 2023              |
| Removal of Batch Plant (after concrete works) |                          | July 2023              |
| Wind Turbine Erection                         | March 2023               | August 2023            |
| Wind Turbine Mechanical Completion            | June 2023                | October 2023           |
| Removal of Temporary Buildings                |                          | February 2024          |

## 5. Environmental Impacts and Mitigation

### 5.1 Dust and Other Construction Impacts

Management of dust and other construction impacts will be managed by each construction contractor internally through their respective Environmental Management Plans and associated environmental processes.

The purpose of each construction contractors Environmental Management Plan is to ensure that all identified, as well as potential environmental impacts that could reasonably be expected to occur during the construction works, fall within acceptable and agreed limits.

Each construction contractor will manage dust through trailer mounted water carts that can be either placed in a stationary position or connected to heavy/light vehicles if required. The trailer mounted water cart will be used as regularly as required to suppress dust and improve air quality. Resources will be made available to ensure this function is carried out appropriately

### 5.2 Management of Weed Infestations

Management of weed infestations will be managed by each construction contractor internally through their respective Environmental Management Plans and associated environmental processes, with oversight from EGP.

Construction contractors will utilise Weed and Seed checklists, prior to entry and prior to leaving the site. Weed and seed checklists will also be completed prior to any ground engaging equipment (ie, grader, bulldozer, excavator) entering a new landowner boundary for any excavations / trenching works and prior to leaving.

The checklists will be used to track weed and seed compliance and managed internally by individual contractors to the satisfaction of EGP.

Whilst on the site construction contractors will ensure that no motor vehicles leave site laden with any material unless it is loaded in a manner that will prevent the discharge or dropping of any of the material.

Contractors will ensure that the wheels, tracks and body of all plant and equipment is clean prior to site entry so that they are weed and seed free, this shall be verified utilising weed and seed checklists. If non-compliances are detected, the plant and equipment shall also be washed prior to leaving the site.

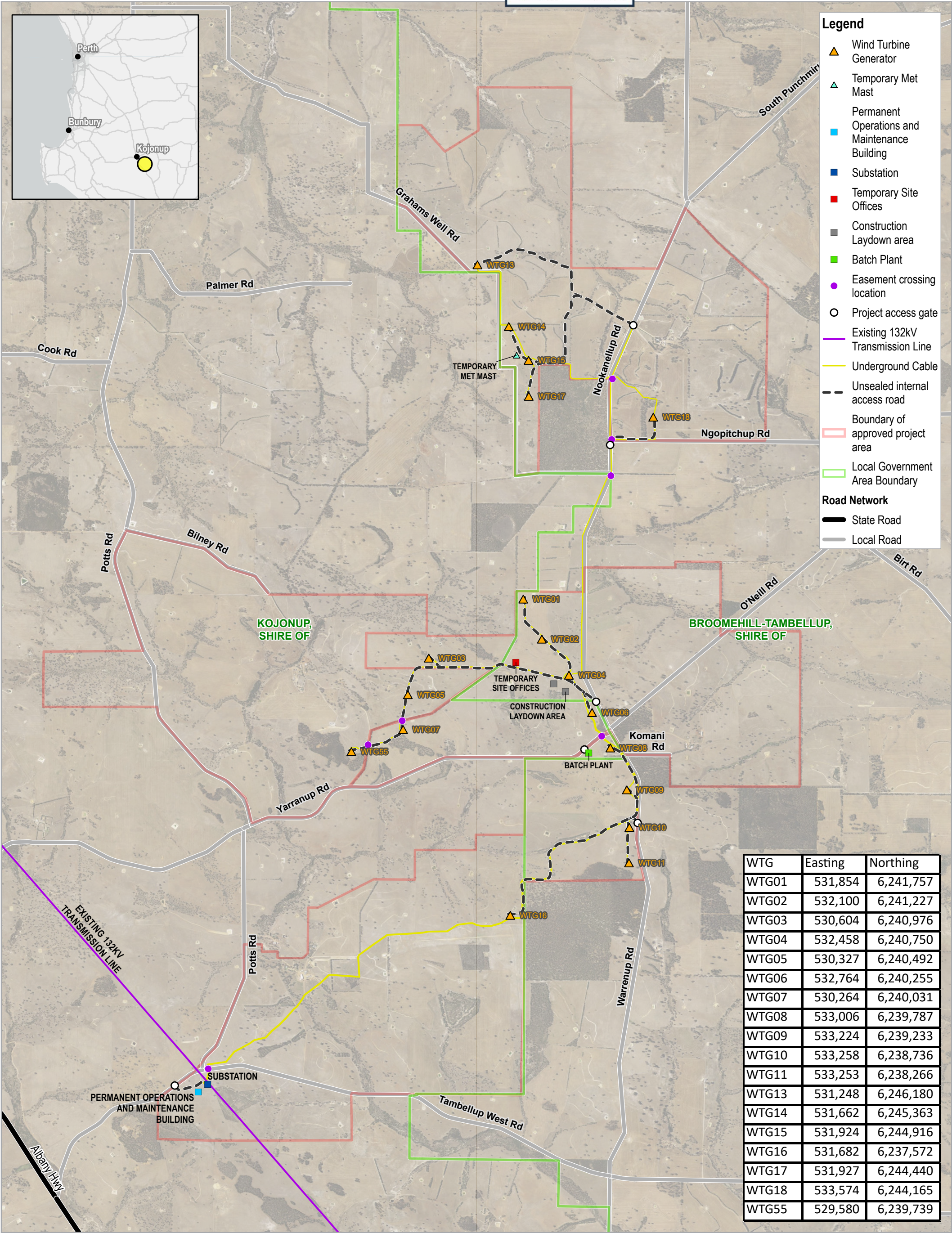


# Appendices

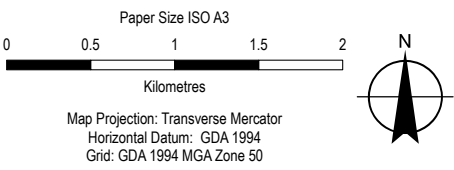
# Appendix A

## Development Layout Plan





|           |     |    |            |                  |     |     |
|-----------|-----|----|------------|------------------|-----|-----|
| REVISIONS | 0   | AK | 27.06.2022 | ISSUED FOR USE   | MM  | RS  |
|           | 1   | AK | 07.07.2022 | REISSUED FOR USE | MM  | RS  |
|           | 2   | AK | 14.07.2022 | REISSUED FOR USE | MM  | RS  |
|           |     |    |            |                  |     |     |
|           | REV | BY | DATE       | DESCRIPTION      | CKD | APP |



ENEL  
Flat Rocks Wind Farm Stage One

12574907-00000-MD-LAD-001  
Project Layout

Project No. 12574907  
Revision No. 2  
Date 14/07/2022

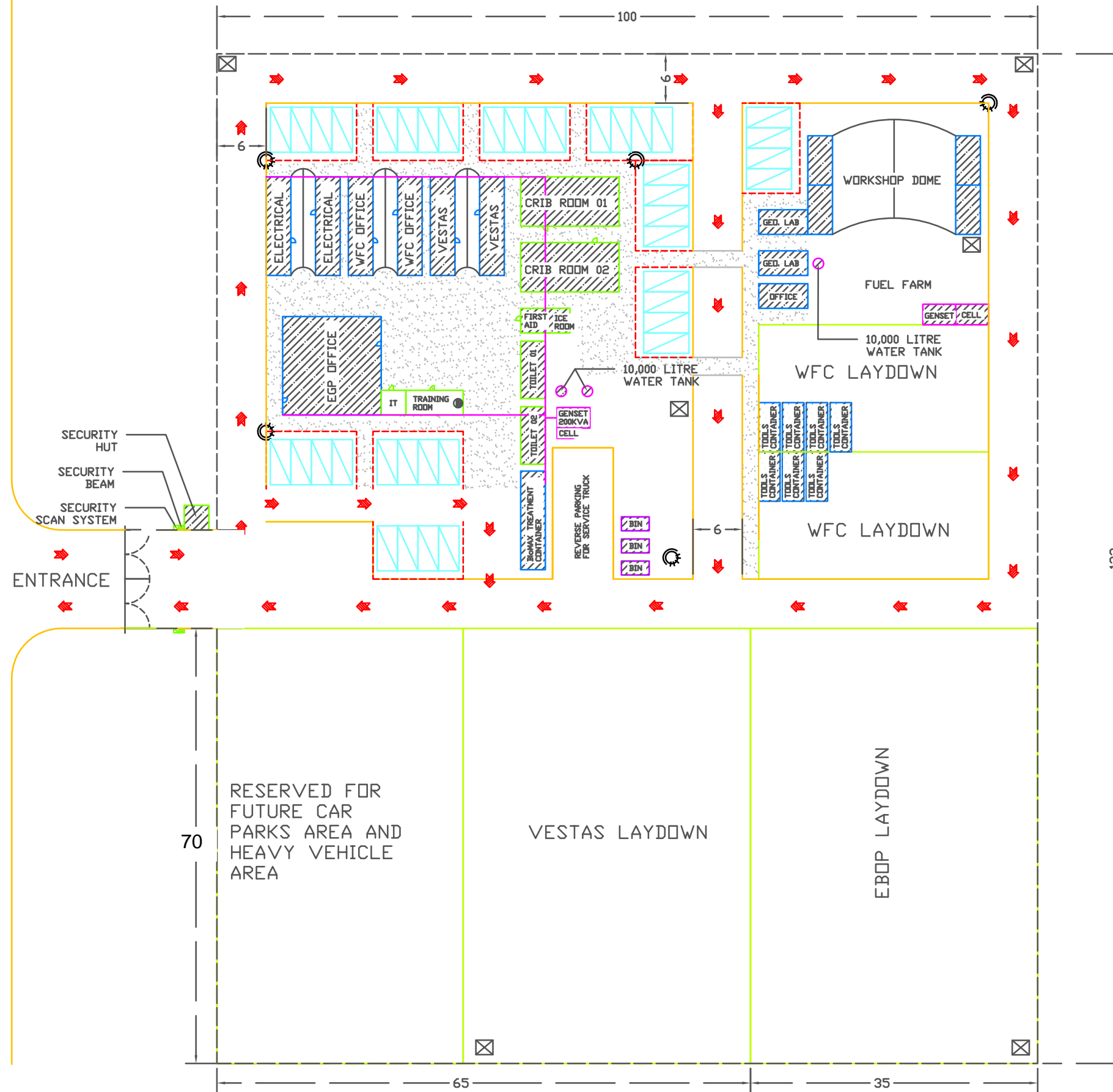


# Appendix B

## Site Facilities Layout

To WARRENOP ROAD

T16 Access Road



LEGEND

- LV BAY
- WINDROW
- TRAFFIC FLOW
- HIGH BAY LIGHTING
- PEDESTRIAN AREA
- SECURITY FENCE LINE
- SENTRY TOWER WITH CCTV
- ACCESS CARD CHECK IN WINDOW LOCATED INSIDE TRAINING ROOM

NOTE:  
ACCESS ROAD-150mm GRAVEL AND 15mm ROAD BASE  
LAYDOWN -150mm GRAVEL  
WALKWAY -100mm BLUE METAL

|      |                                |       |            |
|------|--------------------------------|-------|------------|
|      |                                |       |            |
|      |                                |       |            |
|      |                                |       |            |
|      |                                |       |            |
| A    | ISSUED FOR TENDER INFORMATION. | MW    | 16/02/2022 |
| Rev. | DESCRIPTION                    | PREP. | DATE       |



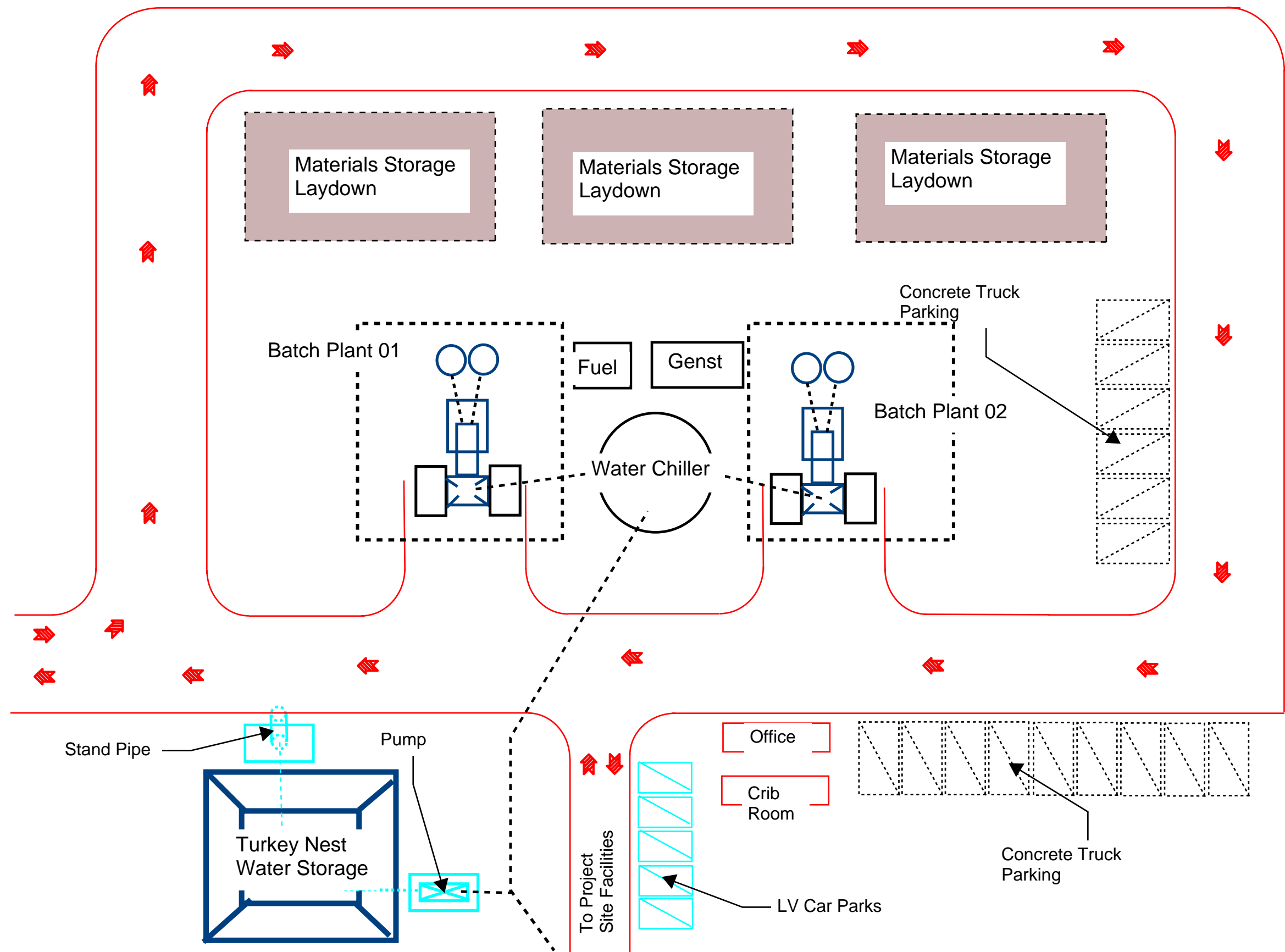
WESTFORCE CONSTRUCTION & ENEL ENERGY

|  |   |
|--|---|
| PROJECT: FLAT ROCK WIND FARM           |   |
| DRAWING No. WF2448A-GA-0001            |   |
| DWG TITLE:                             |   |
| GENERAL ARRANGEMENT                    |   |
| SITE LAYOUT AND FACILITIES ARRANGEMENT |   |
| Rev.                                   | A |

# Appendix C

## Concrete Batching Plant Layout





|      |                                |       |            |   |                              |
|------|--------------------------------|-------|------------|---|------------------------------|
|      |                                |       |            |   | PROJECT: FLAT ROCK WIND FARM |
|      |                                |       |            |   | DRAWING No. WF2448A-GA- 0004 |
|      |                                |       |            |   | DWG TITLE:                   |
|      |                                |       |            |   | GENERAL ARRANGEMENT          |
| A    | ISSUED FOR TENDER INFORMATION. | MW    | 16/02/2022 |   | Batch Plant Arrangement      |
| Rev. | DESCRIPTION                    | PREP. | DATE       | WESTFORCE CONSTRUCTION & ENEL ENERGY  | Rev. A                       |

# Appendix D

## Typical Trench Detail







| DEPARTMENT OF PLANNING, LANDS<br>AND HERITAGE |             |
|---|-------------|
| DATE  | FILE        |
| 24-Apr-2023                                   | SDAU-060-23 |

# Landscape Management Plan



# Kojonup

*One community, many choices*

Our Ref: DB.BDA.8

Dr Sarah Rankin – Managing Director

Moonies Hill Energy Pty Ltd

5 Barnfield Road

CLAREMONT WA 6010

Dear Sarah,

**MOONIES HILL ENERGY PTY LTD, LANDSCAPING PLAN, STAGING PLAN,  
AIRSERVICES NOTIFICATION, ELECTROMAGNETIC INTERFERENCE  
NOTIFICATION.**

The Shire of Kojonup Council at its 20<sup>th</sup> of September 2022 meeting approved the following motion:

“That Council:

- 1) Note the correspondence outlined in Attachment 9.4.1.2.
- 2) Note that the plan, outlined in Attachment 9.4.1.3, showing setbacks between the concrete batching plant and non-stakeholder land boundaries addresses Condition 12.
- 3) Approve the Landscaping Plan in Attachment 9.4.1.4 (Condition 22).
- 4) Note that the Staging Plan, outlined in Attachment 9.4.1.5, addresses Condition 23.
- 5) Note that the applicant has separately and appropriately addressed conditions 2 and 25.
- 6) The applicant has separately and appropriately addressed condition 24.
- 7) Note the Shire administration will separately report back to Council on the micro siting (Condition 4), Development Layout Plan (Condition 17) and the Noise Impact Mitigation Management Plan (Condition 21).

Advice Notes:

- A) Advise the Shire of Broomehill-Tambellup of the decision.”



The correspondence referred to in the motion attachments are the electromagnetic interference correspondence received from EGP and the confirmation of airservices correspondence received from EGP.

As per previous correspondence the Shire's approval of these plans is in no way a representation that the micro-siting of the locations of the turbines or their associated infrastructure are or will be acceptable.

Please note the Council has not considered the micro siting (Condition 4), Development Layout Plan (Condition 17) nor the Noise Impact Mitigation Management Plan (Condition 21) at this stage.

If you have any questions regarding this matter, please do not hesitate to contact Grant Thompson (Chief Executive Officer) through the Shire Office on (08) 9831 2400.

Regards,



Grant Thompson

**Chief Executive Officer**

19/10/2022

# FLAT ROCKS WIND FARM

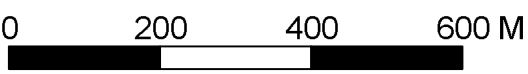
## LANDSCAPE PLAN

| Sheet no. | Drawing Title                            | Revision | Date     |
|-----------|--|----------|----------|
| LP01      | COVER SHEET                              | C        | 23/08/22 |
| LP02      | SITE PLAN                                | C        | 23/08/22 |
| LP03      | LANDSCAPE PLAN & BP2 DETAILS             | C        | 23/08/22 |
| LP04      | LANDSCAPE BUFFER BP1 DETAILS             | C        | 23/08/22 |
| LP05      | PLANT SPECIES IMAGERY & PLANTING DETAILS | C        | 23/08/22 |
| LP06      | SPECIFICATION                            | C        | 23/08/22 |
| LP07      | SPECIFICATION                            | C        | 23/08/22 |
| LP08      | RESIDENTIAL VEGETATION SCREENING OPTIONS | C        | 23/08/22 |



Location of access road, O & M building and substation

LOCALITY PLAN  
Scale: 1:10000

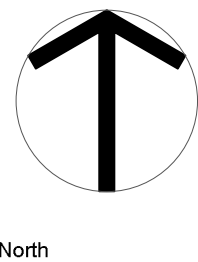


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www.moirla.com.au



Engineer:  
EGP

| No. | Date     | Revision       | By |
|-----|----------|----------------|----|
| A   | 10/06/22 | FOR REVIEW     | SR |
| B   | 5/07/22  | FOR SUBMISSION | SR |
| C   | 23/08/22 | FOR SUBMISSION | SR |

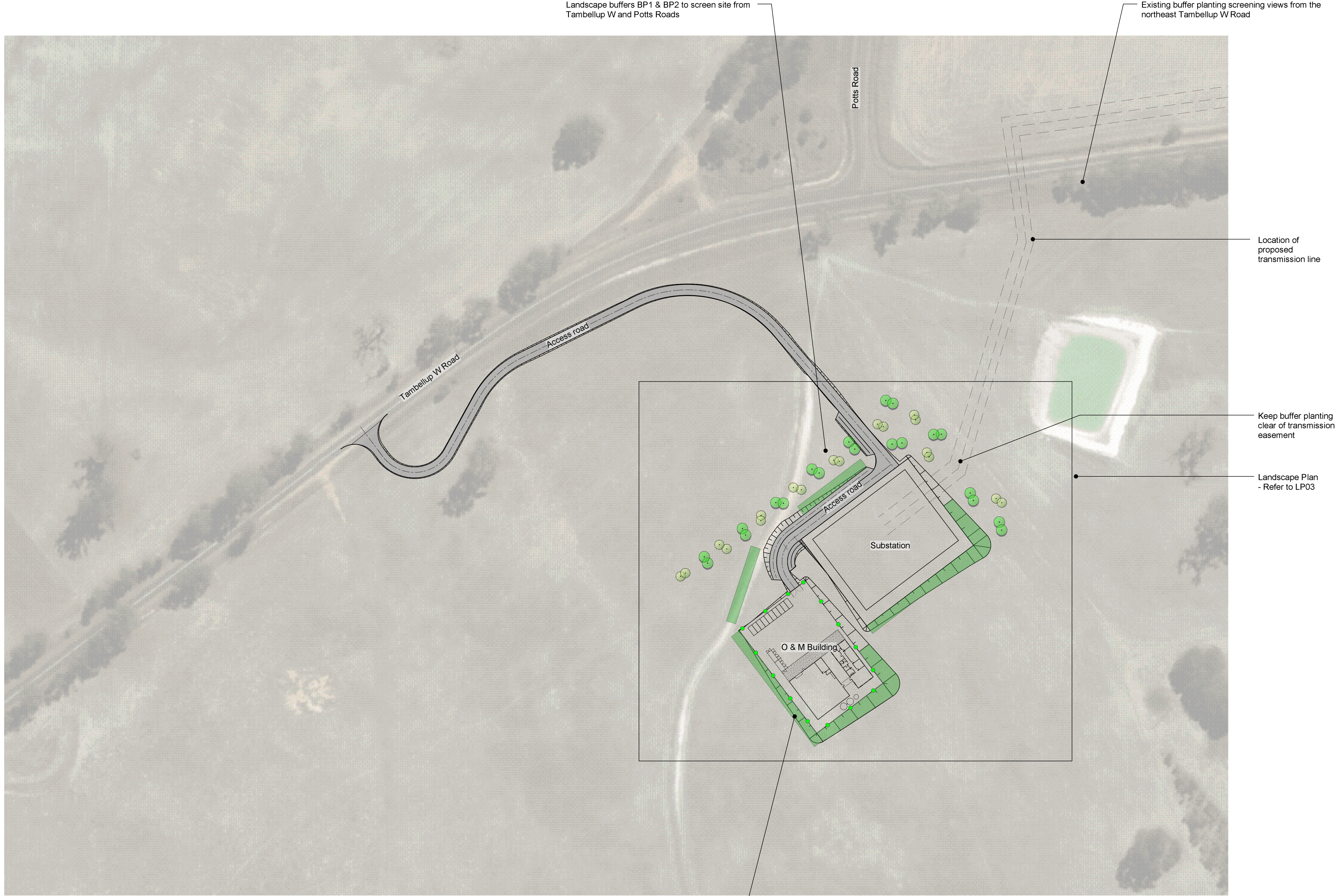


Status:  
**FOR SUBMISSION**  
Flat Rocks Wind Farm  
  
Tambellup W Road, Lumeah, WA  
  
ERM Consulting

COVER SHEET

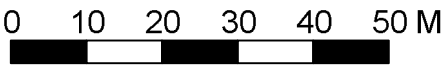
|   |                                       |
|---|---------------------------------------|
| Scale: 1:10000  | Project No. <b>2159</b>               |
| ORIGINAL DRAWING AT A1.<br>Drawn By: SR    Approved By: DM<br>Checked By: MED | Drawing No. <b>LP01</b> Rev. <b>C</b> |





- LEGEND**
- BP1 Buffer Planting Type 1  
5m wide landscape buffer to access road, O & M building and substation  
Refer to LP04
  - BP2 Buffer Planting Type 2  
Scattered tree planting  
Refer to LP03

**LANDSCAPE PLAN**  
Scale: 1:1000

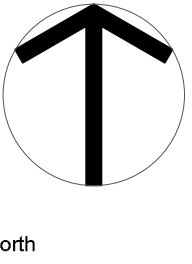


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Engineer:  
EGP

| No. | Date     | Revision       | By |
|-----|----------|----------------|----|
| A   | 10/06/22 | FOR REVIEW     | SR |
| B   | 5/07/22  | FOR SUBMISSION | SR |
| C   | 23/08/22 | FOR SUBMISSION | SR |

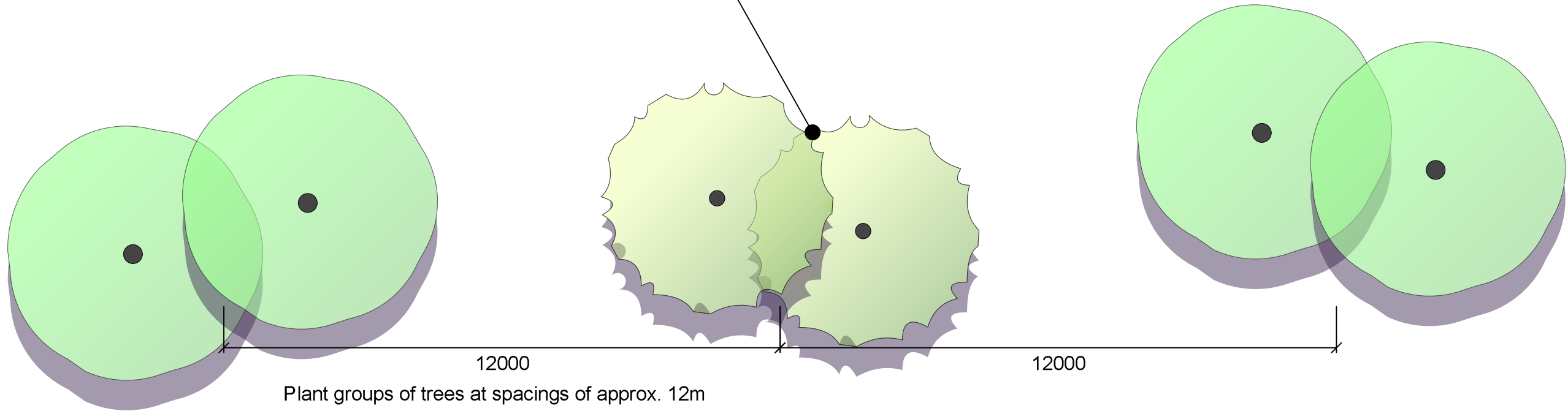


Status:  
**FOR SUBMISSION**  
Flat Rocks Wind Farm  
Tambellup W Road, Lumeah, WA  
ERM Consulting

| SITE PLAN               |                 |                  |        |
|-------------------------|-----------------|------------------|--------|
| Scale: 1:1000           |                 | Project No. 2159 |        |
| ORIGINAL DRAWING AT A1. |                 |                  |        |
| Drawn By: SR            | Approved By: DM | Drawing No. LP02 | Rev. C |
| Checked By: MED         |                 |                  |        |



Scattered planting of trees in  
groups of 2 in front of main  
buffer planting





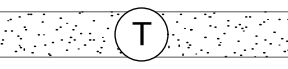
1  
LP03 TYPICAL BUFFER ZONE PLANTING PLAN - BP2  
Scale: 1:100

Planting Schedule Scattered Planting

| Code         | Botanical Name                | Common Name           | Pot Size | Mature Height | Mature Spread | Qty | Notes |
|--------------|-------------------------------|-----------------------|----------|---------------|---------------|-----|-------|
| <b>Trees</b> |                               |                       |          |               |               |     |       |
| ACA sal      | <i>Acacia saligna</i>         | Weeping-Wreath Wattle | 25 litre | 5 - 8m        | 4 - 8m        | 20  | N     |
| EUC ort      | <i>Eucalyptus orthostemon</i> | Diverse Mallee        | 25 litre | 4 - 7m        | 3 - 5m        | 18  | N     |

**NOTE:**  
CONTRACTOR IS REQUIRED TO CHECK ALL NUMBERS ON DRAWINGS AND CONFIRM WITH SCHEDULE PRIOR TO ORDERING. NUMBERS ON DRAWINGS TO TAKE PRECEDENT ALONG WITH SQUARE METRE RATES.

LEGEND

-  BP1 Buffer Planting Type 1  
5m wide landscape buffer to  
access road, O & M building and  
substation  
Refer to LP04
-  BP2 Buffer Planting Type 2  
Scattered tree planting  
Refer to LP03
-  Turf  
To be installed where shown

Landscape buffers BP1 & BP2 to screen site from  
Tambellup W and Potts Roads

Turf to embankment and  
reinstated to areas disturbed  
during construction

Fencing to perimeter  
of substation

O & M Building

Substation

Fencing to perimeter of  
substation

Turf to surrounds of substation  
and O & M building

Landscape buffer BP1 to  
embankment to screen O & M  
building and substation

Location of  
proposed  
transmission line

Keep buffer planting  
clear of transmission  
easement

turf only to base of  
transmission line

Landscape buffer BP1 &  
BP2 to screen O & M  
building and substation

Landscape buffer BP1 to  
embankment to screen  
building and substation

Buffer Planting BP2

Trees

*Acacia saligna*

*Eucalyptus orthostemon*

LANDSCAPE PLAN

Scale: 1:500

0 10 20 30 40 50 M

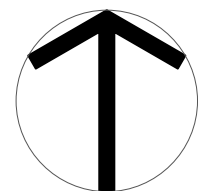


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Engineer:  
EGP

| No. | Date     | Revision       | By |
|-----|----------|----------------|----|
| A   | 10/06/22 | FOR REVIEW     | SR |
| B   | 5/07/22  | FOR SUBMISSION | SR |
| C   | 23/08/22 | FOR SUBMISSION | SR |



North

Status:

**FOR SUBMISSION**  
Flat Rocks Wind Farm

Tambellup W Road, Lumeah, WA

ERM Consulting

LANDSCAPE PLAN & BP2  
DETAILS

Scale: AS SHOWN

ORIGINAL DRAWING AT A1.

Drawn By:

SR

Approved By:

DM

Checked By:

MED

Project No.

**2159**

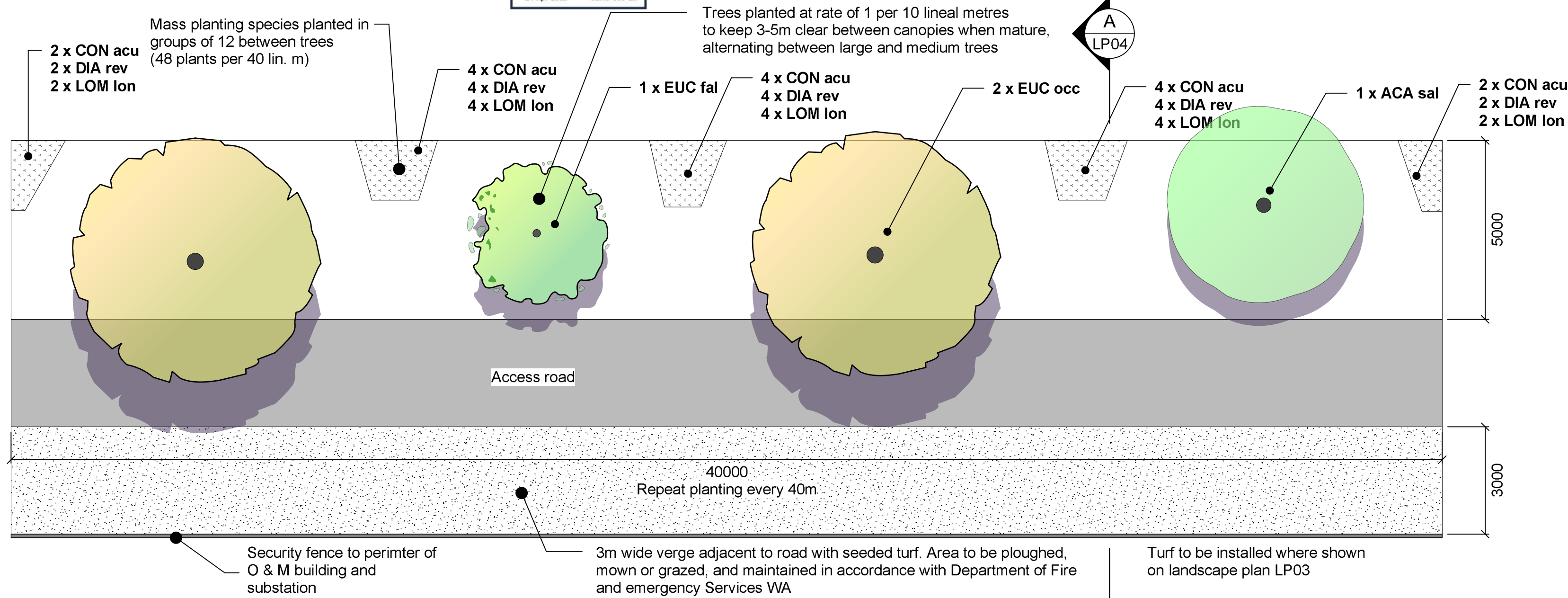
Drawing No.

**LP03**

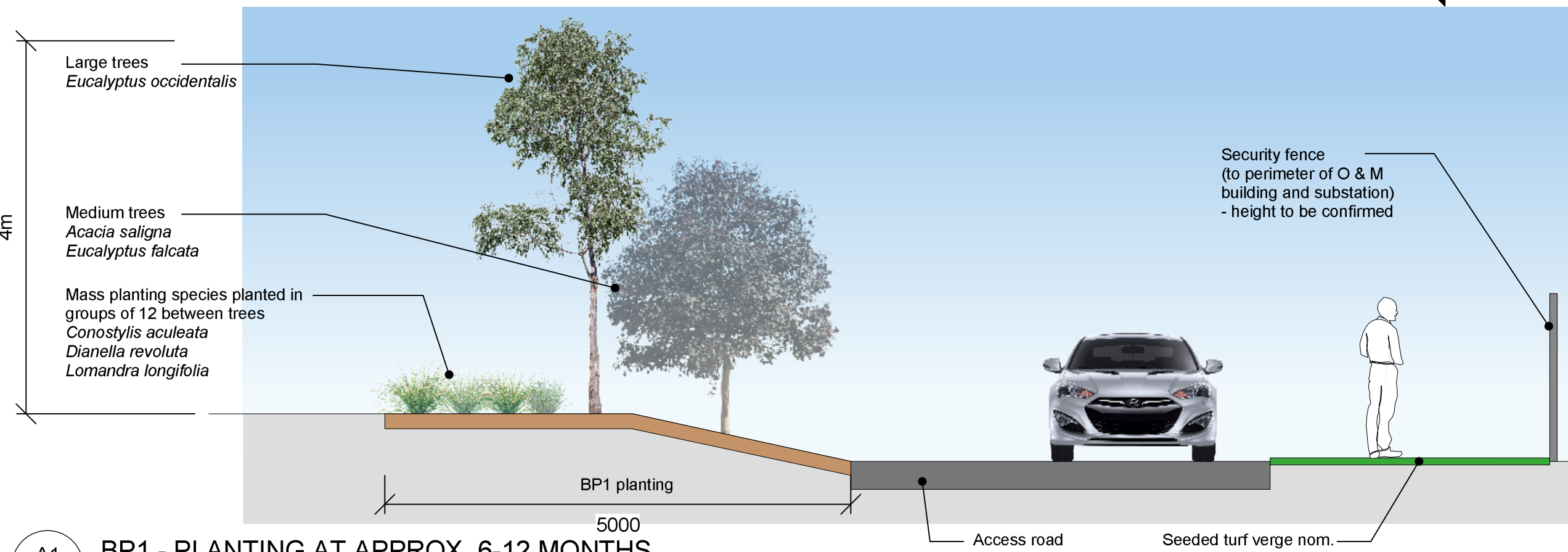
Rev.

**C**

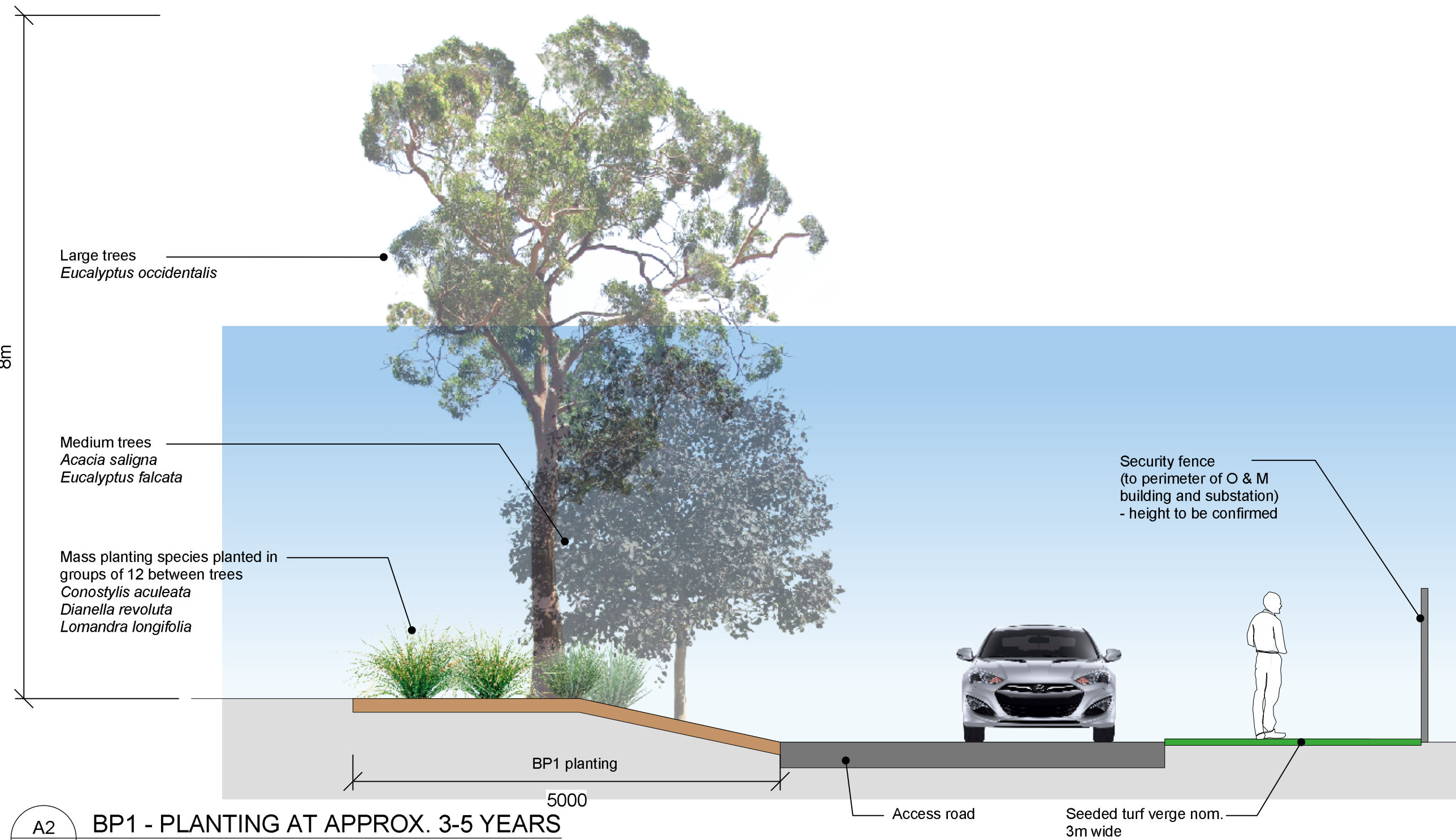




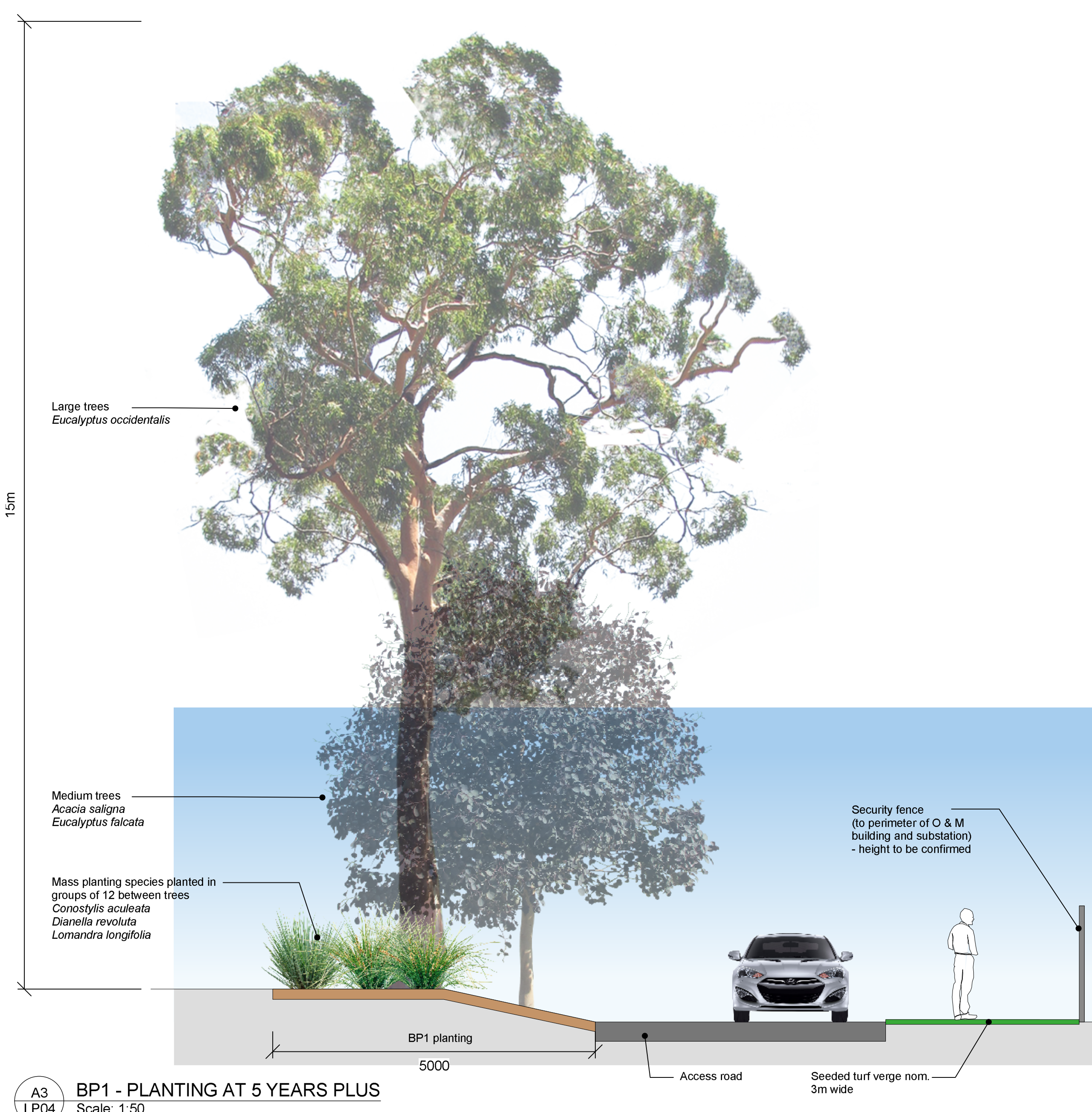
1  
LP04  
TYPICAL BUFFER ZONE PLANTING PLAN - BP1  
Scale: 1:100



A1  
LP04  
BP1 - PLANTING AT APPROX. 6-12 MONTHS  
Scale: 1:50



A2  
LP04  
BP1 - PLANTING AT APPROX. 3-5 YEARS  
Scale: 1:50



A3  
LP04  
BP1 - PLANTING AT 5 YEARS PLUS  
Scale: 1:50

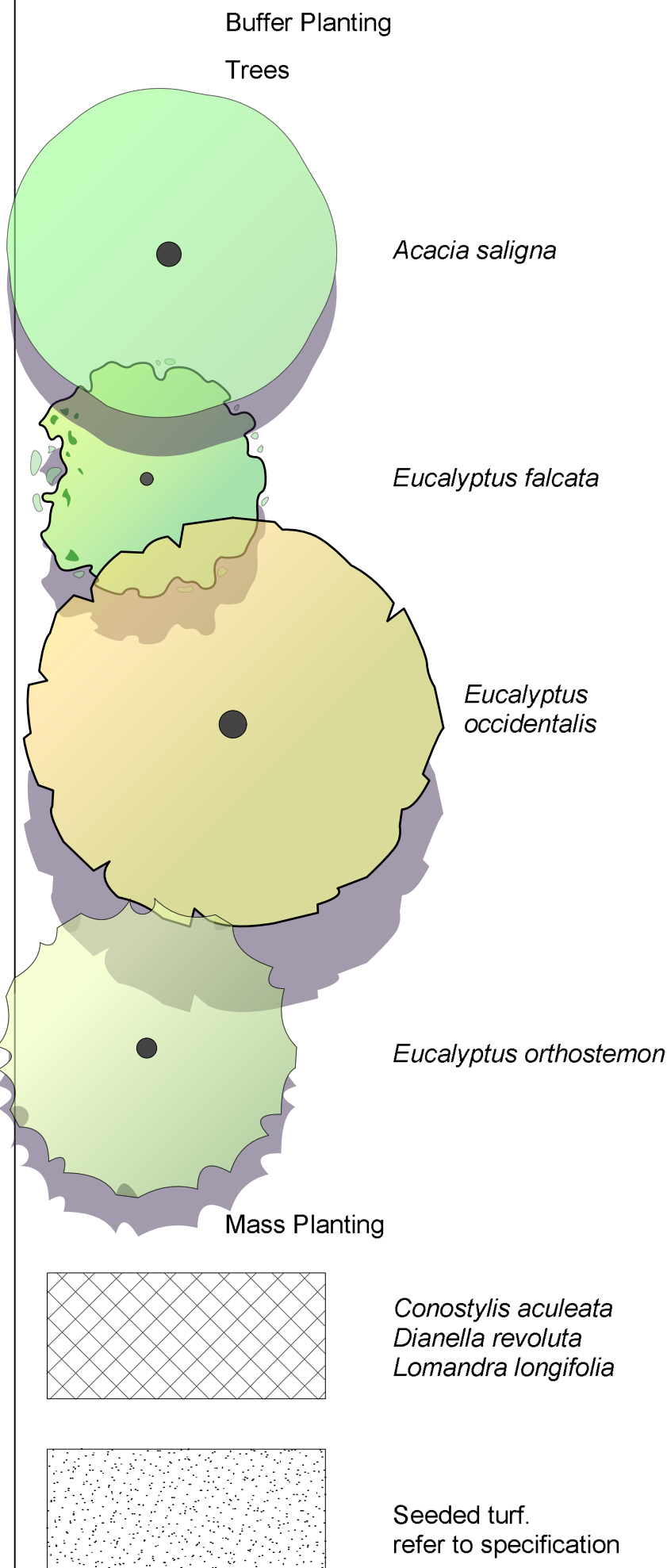
### Typical Buffer Zone Planting Schedule

| Code                 | Botanical Name                 | Common Name           | Pot Size  | Mat. Height | Mat. Spread | Qty | Notes         |
|----------------------|--------------------------------|-----------------------|-----------|-------------|-------------|-----|---------------|
| <b>Trees</b>         |                                |                       |           |             |             |     |               |
| ACA sal              | <i>Acacia saligna</i>          | Weeping-Wreath Wattle | 25 litre  | 5 - 8m      | 4 - 8m      | 8   | N             |
| EUC fal              | <i>Eucalyptus falcata</i>      | Silver Mallet         | 25 litre  | 5 - 6m      | 4 - 5m      | 8   | N             |
| EUC occ              | <i>Eucalyptus occidentalis</i> | Flat-topped Yate      | 25 litre  | 10 - 20m    | 8 - 16m     | 16  | N             |
| <b>Shrubs</b>        |                                |                       |           |             |             |     |               |
| <b>Mass Planting</b> |                                |                       |           |             |             |     |               |
| CON acu              | <i>Conostylis aculeata</i>     | Prickly Conostylis    | Tubestock | 0.45 - 0.6m | 0.3 - 0.6m  | 128 | 4 Plants/sq m |
| DIA rev              | <i>Dianella revoluta</i>       | Blueberry Lily        | Tubestock | 0.7 - 1.0m  | 0.3 - 0.6m  | 128 | 4 Plants/sq m |
| LOM lon              | <i>Lomandra longifolia</i>     | Spiny-headed Mat-Rush | Tubestock | 0.6 - 0.9m  | 0.4 - 0.6m  | 128 | 4 Plants/sq m |

Plant numbers calculated on 320lin. metres of buffer planting

**NOTE:**  
CONTRACTOR IS REQUIRED TO CHECK ALL NUMBERS ON DRAWINGS AND CONFIRM WITH SCHEDULE PRIOR TO ORDERING. NUMBERS ON DRAWINGS TO TAKE PRECEDENT ALONG WITH SQUARE METRE RATES.

### LEGEND





INDICATIVE PLANT IMAGERY

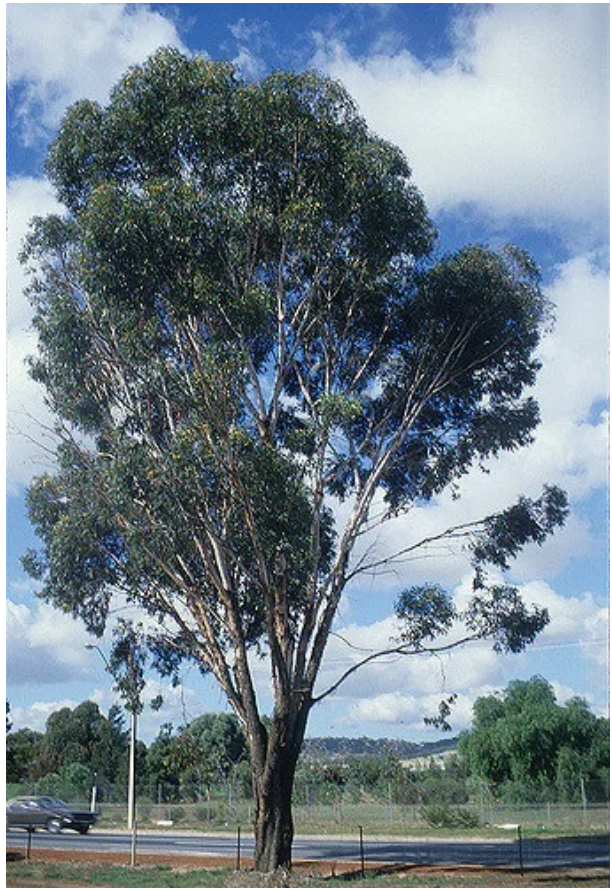
TREES



*Acacia salignus*



*Eucalyptus falcata*



*Eucalyptus occidentalis*



*Eucalyptus orthostemon*

SHRUBS



*Calothamnus quadrifidus*



*Hakea laurina*



*Melaleuca densa*



*Banksia formosa*



*Acacia myrtifolia*



*Hakea lissocarpa*

MASS PLANTING



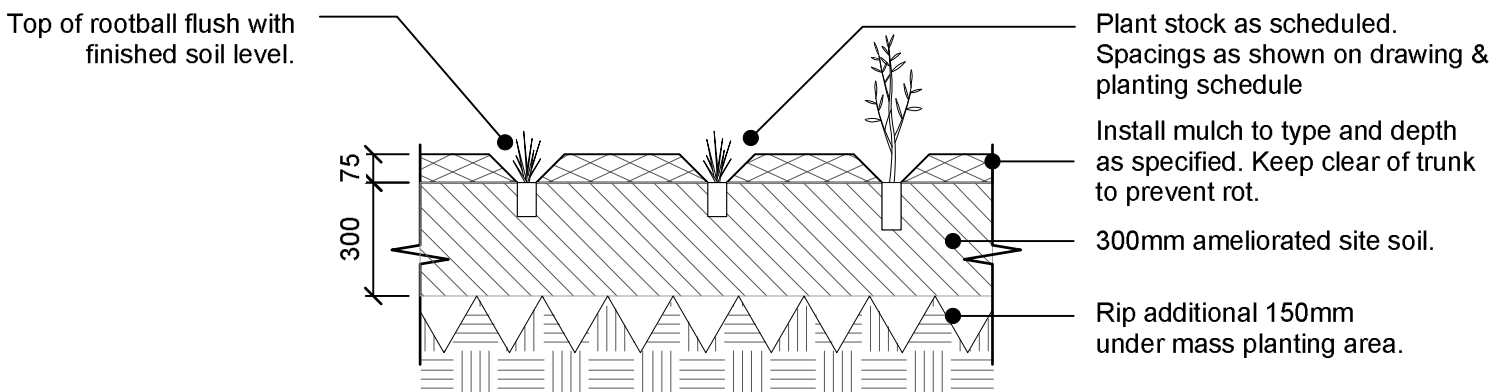
*Calothamnus quadrifidus*



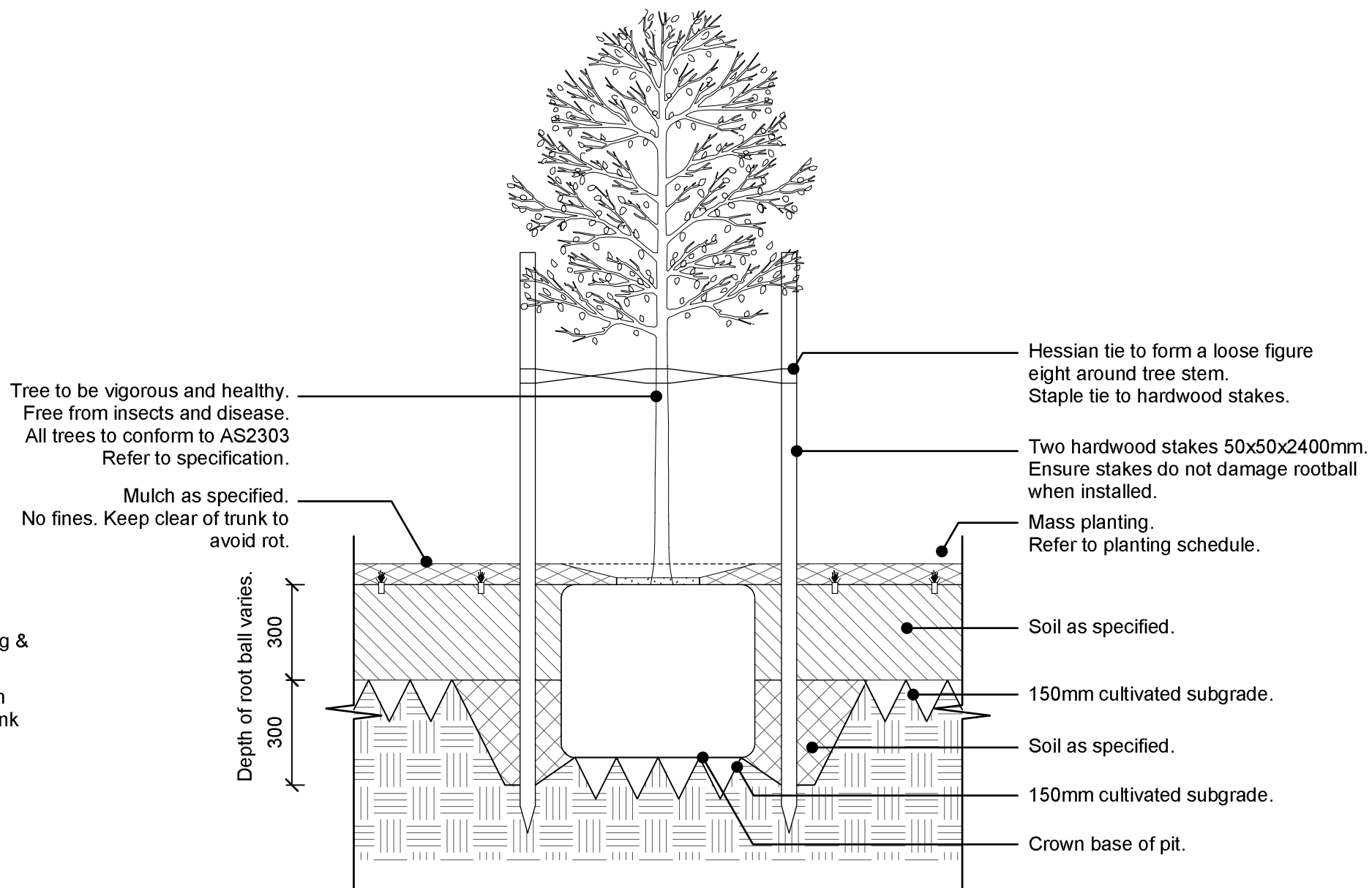
*Dianella revoluta*



*Lomandra longifolia*



1 TYPICAL MASS PLANTING DETAIL  
Scale: 1:20



2 TYPICAL TREE PLANTING DETAIL  
Scale: 1:20



SPECIFICATION

1.0 GENERAL

1.1 EXISTING SERVICES

Existing services on site include stormwater drainage, water, and associated power service conduits. Locations of all services should be established prior to excavation of planting holes and installation of trees. The drawings DO NOT indicate the extent of existing services. Existing services must be confirmed by the contractor prior to excavation. Do not excavate by machine within 1m of existing underground services without prior approval or identification of service location by the site superintendent.

1.2 PROTECTION OF EXISTING FEATURES

During installation protect all existing trees, shrubs and other specified vegetation, features and improvements, structures and utilities. Protect trees to be retained from damage from groundworks. Take necessary precautions, including the following:

**Harmful Materials:** Do not store or otherwise place bulk materials and harmful materials under or near trees. Do not place spoil from excavations against tree trunks, even for short periods. Prevent wind blown materials such as cement from harming trees and plants.  
**Damage:** prevent damage to tree bark. Do not attach stays, guys and the like to trees.  
**Work under trees:** Do not add or remove topsoil within the drip line, use hand methods such that root systems are preserved intact and undamaged. Open up excavations under tree canopies for as short a period as possible.  
**Roots:** Where it is necessary to cut tree roots, use means such that the cutting does not unduly disturb the remaining root system.  
**Compacted Ground:** Avoid compaction of the ground under trees.

2.0 MATERIALS

2.1 PLANT MATERIAL

Discrepancies within the planting schedule and the drawing should be referred to Moir Landscape Architecture for clarification. Make no substitutions unless approved. Substitutions shall not be approved unless the contractor complies with this specification. Contractor to verify quantities against plant rates and quantities on drawings prior to commencement of work.

Contractor is required to check all numbers on drawings and confirm with schedule prior to ordering. Numbers on drawings to take precedent along with square metre rates.

Plant material: Plants shall be of the species, sizes and quantities as shown on the drawing. Plants shall be vigorous, well established, of good form, not soft or forced, free from disease and insect pests. Plants shall have large healthy root systems.

Trees are to be supplied in accordance with 'AS2303:2018 Tree Stock for landscape Use'.

2.2 SOILS

Top 300mm soil to be equal to AS4419-2018 'Organic Soil' with texture to AS4419-2018 Table K1- Sandy Loam.  
Below 300mm do not incorporate organic matter. Below 300mm soil to be equal to AS4419-2018 'Soil blend' with max 5% organic matter content.  
Texture to AS4419-2018 Table K1- Sandy Loam.

2.2.1 DEFINITIONS

**Site topsoil:** Soil excavated from the site which has the following characteristics:  
Contains minimum 2% organic matter, supports plant life, and is free from unwanted matter  
Unwanted matter (in topsoil): Stones over 25mm diameter, clay lumps, weeds and tree roots, sticks and rubbish and material toxic to plants.

**Topsoil:**  
Where available use ameliorated site topsoil. Where unavailable, import topsoil from an off-site source approved by the Superintendent, equivalent to specification above.

**Source Landscape Soil:**  
Soil to be used for these landscape works shall be: Ameliorated Site Topsoil or Imported General Purpose Soil to the areas and locations as specified. Soil for the works shall be free from noxious weeds etc. Soil shall be assumed to be placed to all revegetated areas and backfill to all plantings. Unless otherwise directed by site superintendent, the landscape contractor is responsible for the removal and or disposal of all spoil or excess soil excavated in the process of implementing the landscape works.

2.2.2 SOIL TESTS

Test soil and ameliorate in accordance with soil test results. Where unavailable for reuse import suitable topsoil to support native plant growth.

**Sampling:** As recommended in AS 4419 (2018) Appendix A (when on site soil is to be used).  
**Sampling technique:** Follow sampling techniques and guidelines according to AS 4419 (2018).  
Where discrepancies arise, refer to the Superintendent for clarification prior to proceeding with any works.

The Contractor shall arrange for the following soil tests to be carried out:  
• One test of any proposed imported topsoil; and  
• Where site topsoil is to be used, one site topsoil test by an approved soil testing laboratory as specified, from topsoil stockpiles.

**Type of Soil Test Required:** The Contractor shall specify that a 'major soil test' is required, for the purpose of analysing the characteristics and recommendations for use as a landscaping topsoil for native species.

**Results:** The results of all soil tests should be submitted to the superintendent prior to work commencing.

**Lead time:** Allow a minimum of 10 full working days for completion of soil testing, and check with laboratory to ensure testing will not delay landscaping works. Supply soil tests to site superintendent once available and according to the hold and witness point schedule.

Soil test results are only valid if soil is stockpiled for less than 12 months. If soil has been stockpiled for a longer period, new tests need to be done as described in AS 4419 (2018)

2.2.3 SUBSOIL

**Excavated Planting Beds:** Where defined planting beds are indicated on the landscape drawings with specific species scheduled and no turfing shown, treat as an excavated landscape planting bed

**Excavation technique:** Excavate to backfill with ameliorated site soil or imported general purpose soil to bring to levels shown on the drawings to allow for mulching and placement of imported soil. Rip and cultivate to depths as shown on the drawings.

2.2.4 SOIL TEXTURES

Use soils described by the following terms (or their equivalents) which comply generally with the texture classifications and typical uses of AS 4419 – (2018) Table K1 Medium textured - Sandy loam

2.2.5 SOIL LEVELS

Finished soil levels shall allow turf or mulch to be finished to top of kerb, gravel pavement, existing levels or as otherwise shown on drawings.

**Consolidation**  
Tamp lightly and uniformly in 150 mm layers. Avoid differential subsidence and excess compaction and produce a finished topsoil surface which has the following characteristics:  
• Finished to design levels.  
• Smooth and free from stones or lumps of soil.  
• Graded to drain freely, without ponding, to catchment points.  
• Graded evenly into adjoining ground surfaces.  
• Ready for planting.

**Backfill Soil:** Backfill holes using ameliorated site topsoil. Stock pile site soil onsite. Confirm stockpiles of site soil with superintendent prior to placement of materials. Site soil to be free from debris and weeds.

2.2.6 ADDITIVES

Additive types and rates: The Contractor shall incorporate additives to the subsoil or topsoil at rates recommended by the soil test results. This may include but not limited to PH neutral compost, lime, gypsum, urea, potash.

Application: Where subsoil additives are recommended by the soil tests apply additives after cultivation of the subsoil.

Where site topsoil is to be stockpiled for reuse, incorporate additives as recommended in soil tests by cultivating through the topsoil. For excavated garden beds or backfill to planting holes, incorporate additives into stockpiled topsoil prior to placement. In all situations, ensure additives are thoroughly mixed through topsoil.x

2.2.7 FERTILISERS AND SOIL CONDITIONERS

**Fertiliser:** Apply fertilisers according to the manufacturer's recommendations and recommended rates. Native plant slow release fertiliser applied at manufacturers recommendation - N-P-K 17:1.6.8.7

2.3 MULCH

The use of mulch shall be limited to those areas which are specified on the plans, highly disturbed areas, and in locations where there is low erosion potential. Composted site mulch or an approved equivalent product (approved by site superintendent) spread to a depth of 75mm, is to be used. Where there is risk of mobilisation of surface materials due to weed management and/or planting works coir logs shall be used. For planting on slopes greater than 1:3 - Refer to relevant details. Depending on site conditions, coir logs may be necessary in combination with biodegradable mulch mat. All mulch to conform to AS4419-2018 with certification supplied to the Landscape Architect to verify it's compliance.

Where composted site mulch is to be used, to comply with Table 3.1 (A), 3.1(B) and 3.1(C) "Composted Product", compliance to be demonstrated according to Appendix Q of AS4454-2012 and results supplied to the Landscape Architect.

Note: this does not apply to playground softfall mulch.

2.4 TURF

Supplier: turf seed to be sourced from a local supplier.

TURF TYPE SHALL BE: Suitable for use in the Lumeah area.

3.0 CRITERIA FOR TREE STOCK ASSESSMENT

3.1 GENERALLY

Tree stock to conform to AS2303-2018  
Trees will be assessed against AS2303-2018 and rejected if not in accordance with the specification.

4.0 EXECUTION

4.1 PLANTING TIMEFRAME

Planting to generally be undertaken in autumn or spring. Confirm with local plant suppliers and contractor the best time to plant to achieve successful establishment.

4.2 EXCAVATION OF PLANTING HOLES

Locations for plants and/or outlines of areas to be planted are to be staked out at the site. Locate and mark all subsurface utility lines. Approval of the stakeout by the supervisor is required before excavation begins. Tree pits are to be excavated to the depth and widths indicated on the drawings. If the planting area under any tree is initially dug too deep, the soil added to bring it up to the correct level should be thoroughly tamped. The bottom of the planting hole shall slope parallel to the proposed grades or toward any subsurface drain lines within the planting bed.

Maintain all required angles of repose of the adjacent materials as shown on the drawings. Do not excavate compacted subgrades of adjacent pavement or structures.

Subgrade soils shall be separated from the topsoil, removed from the area, and not used as backfill in any planted or lawn area. Excavations shall not be left uncovered or unprotected. For trees and shrubs planted in individual holes in areas of good soil that is to remain in place and/or to receive amendment in the top 150mm layer, excavate the hole to the depth of the root ball and to widths shown on the drawing. (Slope the sides of the excavation at a 45 degree angle up and away from the bottom of the excavation.)

Preparation of subgrades to be inspected prior to the installation or modification of topsoil or planting mix. Till the subsoil into the bottom layer of topsoil or planting mix. Loosen the soil of the subgrade to a depth of 50 to 75 mm with a rototiller or other suitable device.

Detrimental soil conditions: The supervisor is to be notified, in writing, of soil conditions encountered, including poor drainage, that the contractor considers detrimental to the growth of plant material. When detrimental conditions are uncovered, planting shall be discontinued until instructions to resolve the conditions are received.

Obstructions: If rock, underground construction work, utilities, tree roots, or other obstructions are encountered in the excavation of planting areas, alternate locations for any planting shall be determined by the landscape architect.

4.3 PLANTING OPERATIONS

Before planting begins thoroughly water the plants and planting areas. Water plants again immediately after planting.

Trees

Plants shall be set on flat-tamped or unexcavated pads at the same relationship to finished grade as they were to the ground from which they were dug, unless otherwise noted on the drawings. Plants must be set plumb and braced in position until topsoil or planting mix has been placed and tamped around the base of the root ball. Improper tamping of the soil around the root ball may result in the tree settling or leaning. Plants shall be set so that they will be at the same depth and so that the root ball does not shift or move laterally one year later.

Determine the elevation of the root flare and ensure that it is planted at grade. This may require that the tree be set higher than the grade in the nursery. If the root flare is less than 50mm below the soil level of the root ball, plant the tree at the appropriate level above the grade to set the flare even with the grade. If the flare is more than 50mm at the centre of the root ball the tree shall be rejected.

Lift plants only from the bottom of the root balls or with belts or lifting harnesses of sufficient width not to damage the root balls. Do not lift trees by their trunk or use the trunk as a lever in positioning or moving the tree in the planting area.

Remove plastic, paper, or fibre pots from containerised plant material. Score the side of the root ball with a sharp knife and tease out roots. Immediately after removing the container, install the plant such that the roots do not dry out. Pack planting mix around the exposed roots while planting. Completely remove any waterproof or water-repellant strings or wrappings from the root ball and trunk before backfilling.

Soils and mulch

Place soil mixes, tamping lightly to reduce settlement. Ensure that the backfill immediately around the base of the root ball is tamped with foot pressure sufficient to prevent the root ball from shifting or leaning, in layers of 150mm deep.

Thoroughly water all plants immediately after planting. Apply water by hose directly to the root ball and the adjacent soil. Remove all tags, labels, strings, etc. from all plants. Following installation of stakes and ties according to the detail drawings, remove nursery/ formative stakes and ties from trees. Remove any excess soil, debris, and planting material from the job site at the end of each workday.

Fine Grading

Provide smooth transitions between slopes of different gradients and direction. Modify the grade so that the finish grade is flush with all paving surfaces or as directed by the drawings. Fill all dips and remove any bumps in the overall plane of the slope.

Staking and Guying

Stake or guy a tree as shown on the details.

Pruning

Plants shall not be heavily pruned at the time of planting. Pruning is required at planting time to correct defects in the tree structure, including removal of injured branches, double leaders, waterspouts, suckers, and interfering branches. Healthy lower branches and interior small twigs should not be removed except as necessary to clear paths and roads. In no case should more than one-quarter of the branching structure be removed. Retain the normal or natural shape of the plant. All pruning shall be completed using clean, sharp tools. All cuts shall be clean and smooth, with the bark intact with no rough edges or tears.

Pruning of trees to comply with AS4373-2007 with emphasis on deadwooding, formative pruning and crown lifting to comply with AS2303-2018

Mulching

All trees are to be mulched to the depths shown on the drawing. Mulch must not be placed within 8 cm of the trunks of trees. Spread 75mm layer mulch to all mass planting beds. Finish to the required levels. Keep mulch away from the plant stems. No mulch to creek banks.

Turf Underlay: Turf underlay used must be topsoil material, but may be general purpose topsoil in accordance with AS4419-2018. The soil mix must not contain any of the following:  
• Materials toxic to humans and plant health.  
• Plant roots of diameter greater than 12 mm.  
• Clay lumps.  
• Stones greater than 10 mm size.

5.0 PLANT ESTABLISHMENT & MAINTENANCE

5.1 SCOPE

The required maintenance period for landscaping to be well established is to be 3 years. All rubbish related to landscape works shall be removed by the landscape contractor before it is allowed to accumulate.

**Period:** The Planting Establishment Period commences at the date of Practical Completion.

**Program:** The maintenance schedule will be advised once Practical Completion has occurred.

**Log Book:** Keep a log book recording when and what maintenance work has been done and what materials, including toxic materials, have been used. Refer to reporting section.

**Recurrent Works:** Throughout the Planting Establishment Period, continue to carry out recurrent works of a maintenance nature including, but not limited to, watering, mowing, weeding, rubbish removal, fertilising, pest and disease control, staking and tying, replanting, cultivating, pruning and keeping the site neat and tidy.

**Pruning:** Pruning of trees to comply with AS4373-2007 with emphasis on deadwooding, formative pruning and crown lifting.

**Replacements:** Continue to replace failed, damaged or stolen plants for the extent of the Planting Establishment Period.

**Mulched Surfaces:** Maintain the surface in a clean and tidy condition and reinstate the mulch as necessary.

**Stakes and Ties:** Adjust or replace as required. Remove stakes & ties six months into the Planting Establishment Period.

**Site Water:** The contractor shall assume there is no site water available other than that which is provided as part of the works. The contractor shall be responsible for supplying water and/or paying for water for the duration of the works.

**Watering:** The contractor is to water the trees with industry recommended amounts for best tree establishment. Generally 25 litre trees are to be watered with approximately 4 litres of water once per week if planting has been done in either autumn or spring. If planting during late spring or late summer, or if weather is warmer, watering is to be done with approx. 4 litres of water twice a week. This is a general guide only and local nursery and contractor to be consulted for best watering practices for tree establishment. Watering of grasses and shrubs to be done at the same time as trees with amounts recommended by local nursery or contractor.

For reporting procedures refer to relevant section.

Landscape maintenance is to be done in accordance with Department of Fire & emergency Services.



This include but not limited to;  
Prune low branches as trees grow to create a 2m clear zone underneath trees.  
Remove plant material and debris that may cause build up of fuel load.

5.2 WEEDING

Any species likely to significantly invade the vegetation management area, prevent natural regeneration, or impede seed growth is to be targeted for removal. Species considered weeds within the Kojonup Shire Council area and listed under the National Significance and Biosecurity Weeds to be given priority.

Maintenance Phase 1: Construction (pre-planting)

| Actions                      | Task description  | Allocated Timeframe   | Positive indicators   | Frequency  | Contingencies  |
|------------------------------|---|---|---|--|--|
| Turf seed Spreading          | Using a spreader to achieve maximum coverage<br><br>Set appropriate spreading rate (gm/m <sup>2</sup> ) to achieve maximum coverage<br><br>Lightly roll or walk over the area to ensure good soil contact   | Ensure even spread of seed over the area for maximum coverage | Visible even dispersion over the designated area                      | Ensure seeds are in good contact with the soil<br><br>Roll over the area to ensure seeds are not blown away by a stiff breeze  | Lightly spread organic matter to protect seeds from fauna<br><br>If visible discrepancies repeat the spreading cycle                                   |
| Turf Watering                | Keep soil moist by watering regularly and gently to ensure sprouting<br><br>Reduce frequency once sprouts are visible   | After spreading the seed to 4 weeks                           | Colour of the soil must be a darker tone and feel moist to the touch  | 2-3 watering cycles to get the soil wet or moist   | If the soil appears two third lighter than when watered repeat watering cycle  |
| Mowing                       | Keep the seeded turfed area to a minimum height to ensure visual security   | First mow to occur after 8-10cm of visible sprouts            | Sprouts visible in areas  | 3-6 weeks after spreading / planting   | Mow only after turf is at a recommended height.<br><br>Mowing should occur gently to ensure as new seedling are tender                                 |
| Fertilising                  | Lightly fertilise using a quality fertiliser  | After the first mow   | Healthy growth of turf  | Until seed establishment   | Do not over fertilise<br><br>Use organic fertiliser  |
| Weed spraying (Pre-planting) | Broad acre and spot spraying of annual grasses and weeds within planting zones following relevant standards and procedures  | 4-6 weeks prior to planting                                   | Decline and reduction of live weed cover by 90%                       | Within the first two weeks of spraying inspect for effectiveness<br><br>Dated photos of effectiveness and include in report<br><br>Retain invoices if possible as evidence | Repeat spraying to achieve 90% reduction rate  |
| Pest animal control          | Inspect site for any pest animal warrens and treat as necessary   | Prior to planting   | No evidence of damage to plantings and no evidence of pests           | Monitor site weekly during establishment period for evidence of pests  | Consider effective control measure or fencing if pest animals continue to pose a threat to plantings   |
| Planting and Guarding        | Ensure planting is carried out at recommended densities within screening areas identified on the approved landscape plans.<br><br>Stake and guard all trees and shrubs with standard tree guards or equivalent<br><br>Ensure temporary guards or fencing around seeded turf to promote healthy growth | Planting and guarding to take place after installation        | Successfully staked and guarded prior to commencement of construction | Inspect locations after planting every two weeks for signs of pests and animal damage<br><br>Monitor and remove tree guards if deemed necessary                            | In dry conditions water plantings using water truck or similar methods<br><br>Use 1.5m tall guards or netting if standard tree guards are insufficient |

|  |   |   |                  |     |          |                |    |  |   |  |
|--|---|---|------------------|-----|----------|----------------|----|--|---|--|
|  | Studio 1, 88 Fern Street<br>PO Box 111<br>Islington NSW 2296<br>Phone (02) 49653500<br>admin@moirla.com.au<br>www.moirla.com.au |  | Engineer:<br>EGP | No. | Date     | Revision       | By | Status:<br><b>FOR SUBMISSION</b><br><br>Flat Rocks Wind Farm<br><br>Tambellup W Road, Lumeah, WA<br><br>ERM Consulting | <b>SPECIFICATION</b>  |  |
|  |   |   |                  | A   | 10/06/22 | FOR REVIEW     | SR |  | Scale: N/A<br>ORIGINAL DRAWING AT A1.<br>Drawn By: SR    Approved By: DM<br>Checked By: MED | Project No. <b>2159</b><br><br>Drawing No. <b>LP06</b> Rev. <b>C</b> |
|  |   |   |                  | B   | 5/07/22  | FOR SUBMISSION | SR |  |   |  |
|  |   |   |                  | C   | 23/08/22 | FOR SUBMISSION | SR |  |   |  |

Phase 2: Construction and operation phase

| Actions   | Task description   | Allocated Timeframe  | Positive indicators   | Frequency  | Contingencies  |
|---|--|--|---|--|--|
| Monitoring to achieve satisfactory growth rates | Establish a minimum of one photo point in each management zone to demonstrate growth and screening effectiveness | Every three months after plant establishment                     | Satisfactory growth is achieved as per requirements   | Document planting success every three months.<br><br>Collate and monitor photo point and compile into six monthly report   | If die back occurs determine the best performing species and use to achieve desired results                                    |
| Watering  | Regularly water juvenile plants to ensure proper establishment   | Weekly over three months following planting                      | 95% survival rate for planting vegetation following three months                                  | Monitor for signs of drought stress in plants<br><br>Document each watering cycle  | If onsite water is unavailable, watering is to be done from a water tanker   |
| Weeding   | Spot spray along planting zones to reduce weed growth  | Spray monthly for first 12 months then quarterly for three years | Screening area is 90% native vegetation   | Within the first two weeks of spraying inspect for effectiveness<br><br>Dated photos of effectiveness and include in report<br><br>Retain invoices if possible as evidence | Repeat spraying cycle if proven ineffective within 14 days   |
| Pest animal control                             | Insect site for any signs of pest animals and conduct necessary physical or chemical treatments                  | Three times annually for three years                             | No visible evidence of damage to plants   | Inspect locations after planting every two weeks for signs of pests and animal damage<br><br>Retain invoices if possible as evidence                                       | In dry conditions water plantings using water truck or similar methods<br><br>Use 1.5m tall guards or netting if damage occurs |
| Infill planting                                 | Replace any dead plants with new stock or with the best performing species                                       | Monitor throughout the three-year period                         | Failed planting to be replaced to achieve 95% success rate  | Inspect locations after planting every two weeks for signs of pests and animal damage  | If die back occurs determine surviving best performing species and use to achieve desired results                              |
| Monitor fencing                                 | Ensure fencing is in good condition for effective security of the development                                    | Quarterly after installation for three years                     | Gates and fences are in good working order and operate successfully to exclude livestock or pests | Dated photos to be included in six monthly reports   | If required undertake repair works or engage contractor to remediate any issues  |

Phase 3: Operational phase

| Actions               | Task description  | Allocated Timeframe  | Positive indicators                     | Frequency  | Contingencies  |
|-----------------------|---|--|---|--|--|
| Weeding               | Spot spray within management zones to reduce weed growth  | Spray twice annually as required or in response to weed issues | Screening area is 90% native vegetation | Within the first two weeks of spraying inspect for effectiveness | Repeat spraying cycle if proven ineffective within 14 days                   |
| Pest animal control   | Insect site for any signs of pest animals and conduct necessary physical or chemical treatments | Twice annually or as required                                  | No visible evidence of damage to plants | Inspect locations to monitor for damage                          | Implement more intensive fencing and tree guarding protocols if unsuccessful |
| Vegetation management | Managing vegetation within development site   | Inspect annually or as required                                | Assets are protected                    | Annually or as required  | Ensure vegetation management techniques are monitored                        |

6.0 REPORTING

Practical Completion Reports

Following an inspection of the completed works a 'Practical Completion Report' is to be submitted to the Principle Certifying Authority. This report will confirm that the works have been installed as per the approved plans, or outline any deviations from the plans, and any rectifications required. Monitoring of the growth, root distribution and transpiration rates of establishing species will help identify species that are successful and suitable for use in future stages or as replacement plantings.

Plant Establishment

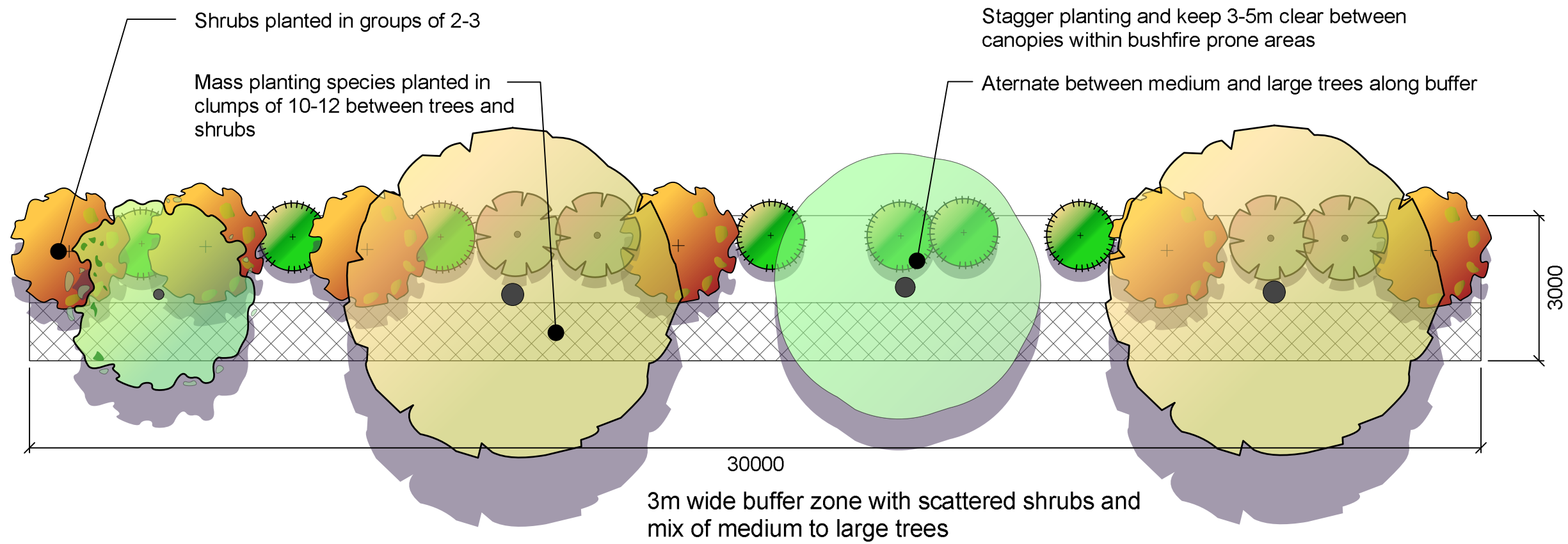
During plant establishment of the proposed landscape works, areas should be checked regularly for plant health and weed invasion. Maintenance will vary in intensity over the life of the establishment period. Regular inspections will reduce the potential for minor infestations becoming major problems. All rubbish related to landscape works shall be removed by the landscape contractor before it is allowed to accumulate. During the maintenance period the landscape contractor shall undertake the following: Regular watering, weeding, mulching, plant replacement and other activities as required to promote healthy growth.

A 'Maintenance Log' is to be completed by the contractor verifying that satisfactory maintenance of the works has been undertaken and that any necessary rectification measures have been carried out to a high professional standard. All works undertaken are to be recorded with reference to the Maintenance Schedule. The 'Maintenance Log' is to be available at anytime to the Client and Site Superintendent.

Biannual Inspections are to occur where the landscape architect is required to provide final completion certification.

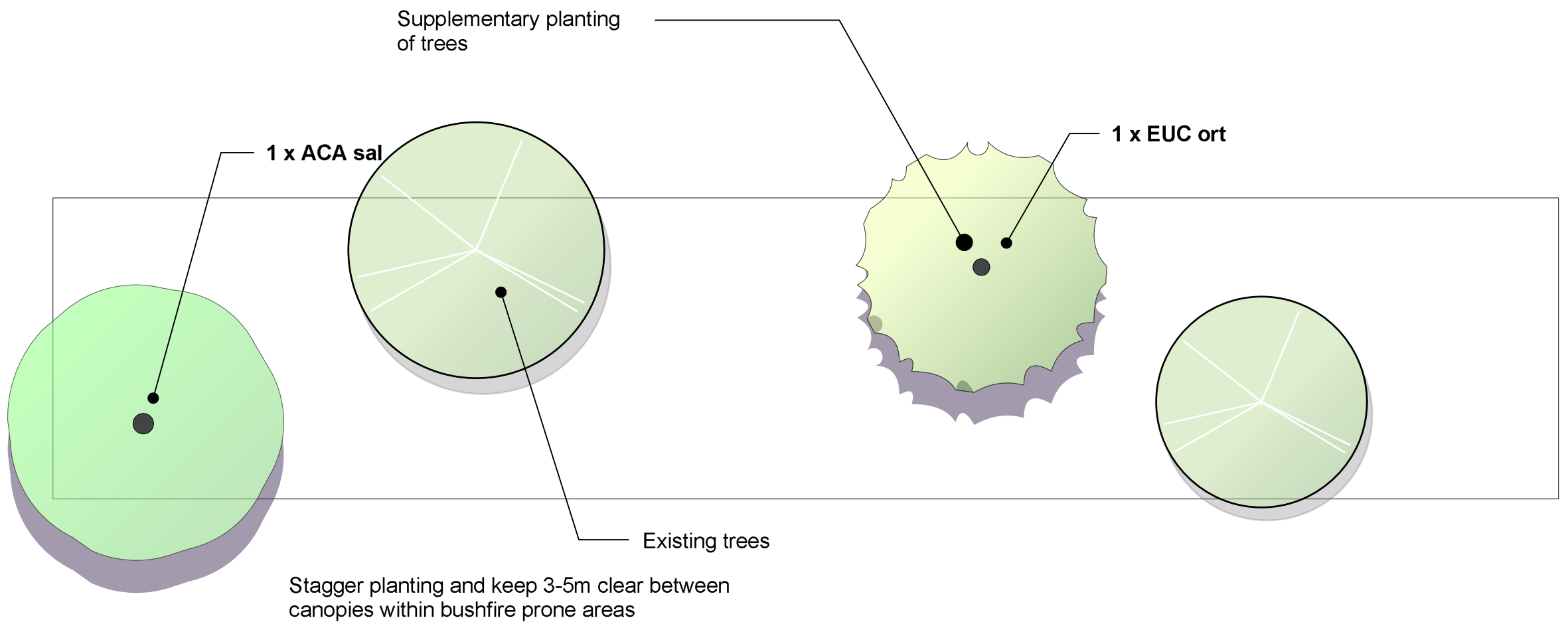


Vegetation Screening for dwellings  
Implementation of extent, type and location of vegetation screening to be subject to approval from the relevant land owner



1 TYPICAL RESIDENTIAL BUFFER ZONE PLANTING PLAN OPTION A  
LP08 Scale: 1:100

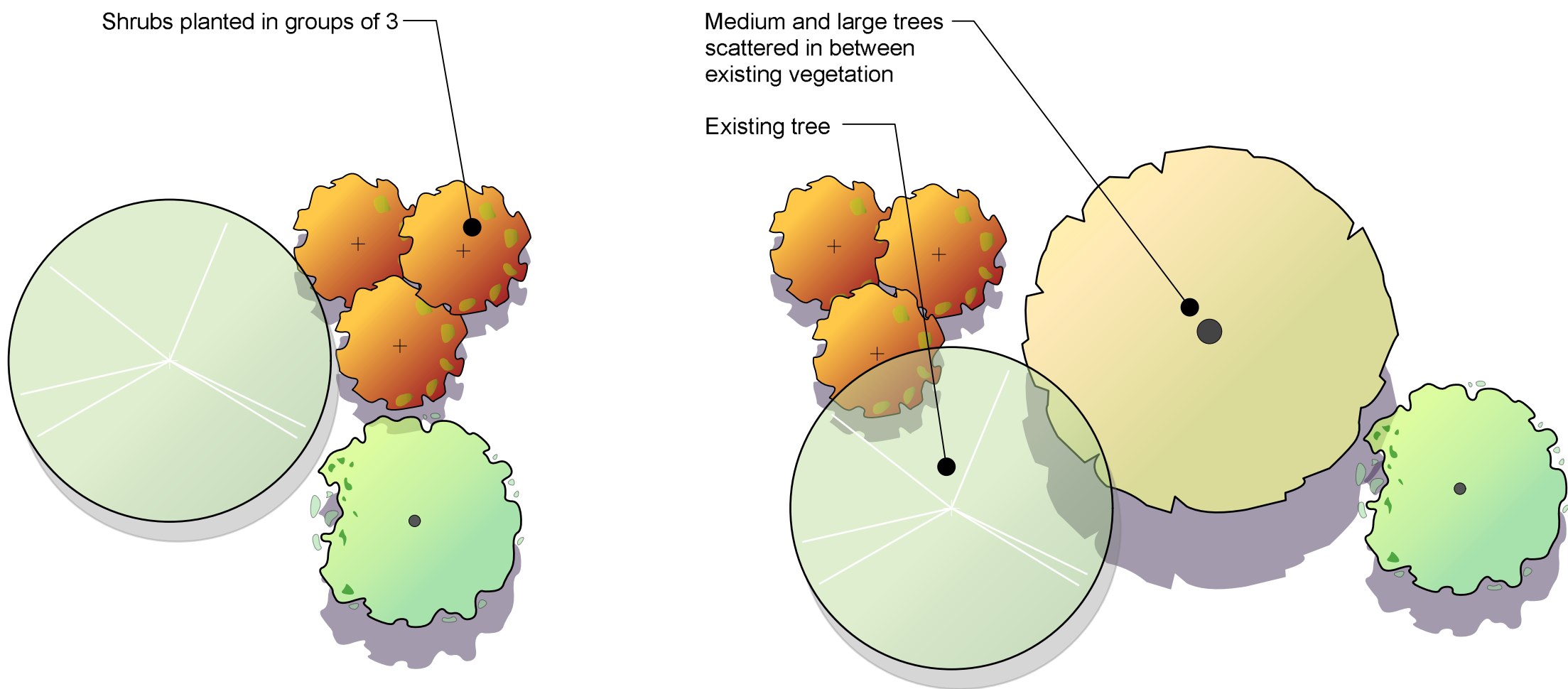
Continuous Vegetation Screening



Supplement existing planting with additional band of vegetation that extends to connect the vegetation bands to reduce visibility of the project from the dwelling into the future.

12 TYPICAL RESIDENTIAL BUFFER ZONE PLANTING PLAN OPTION B  
LP08 Scale: 1:100

Supplementary Vegetation Screening



Provide scattered screen planting set back from dwellings if the desire is to maintain fragmented views across paddocks. Staggered bands of screen planting, in rows of two, in keeping with the existing surrounding tree species.

2 TYPICAL RESIDENTIAL BUFFER ZONE PLANTING PLAN OPTION C  
LP08 Scale: 1:100

Scattered Vegetation Screening

Typical Residential Buffer Zone Planting Schedule Option A

| Code                 | Botanical Name                 | Common Name           | Pot Size  | Mature Height | Mature Spread | Qty |
|----------------------|--------------------------------|-----------------------|-----------|---------------|---------------|-----|
| <b>Trees</b>         |                                |                       |           |               |               |     |
| ACA sal              | <i>Acacia saligna</i>          | Weeping-Wreath Wattle | 25 litre  | 5 - 8m        | 4 - 8m        | 1   |
| EUC fal              | <i>Eucalyptus falcata</i>      | Silver Mallet         | 25 litre  | 5 - 6m        | 4 - 5m        | 1   |
| EUC occ              | <i>Eucalyptus occidentalis</i> | Flat-topped Yate      | 25 litre  | 10 - 20m      | 8 - 16m       | 2   |
| <b>Shrubs</b>        |                                |                       |           |               |               |     |
| CAL qua              | <i>Calothamnus quadrifidus</i> | One Sided Bottlebrush | 200mm     | 1.5 - 2.5m    | 1.5 - 2.5m    | 4   |
| HAK lau              | <i>Hakea laurina</i>           | Pincushion Hakea      | 200mm     | 3 - 5m        | 2 - 4m        | 6   |
| MEL den              | <i>Melaleuca densa</i>         | Lemon honey Myrtle    | 200mm     | 1.5 - 2.5m    | 1.0 - 2.0m    | 7   |
| <b>Mass Planting</b> |                                |                       |           |               |               |     |
| MP1                  |                                |                       |           |               |               |     |
| CON acu              | <i>Conostylis aculeata</i>     | Prickly Conostylis    | Tubestock | 0.45 - 0.6m   | 0.3 - 0.6m    | 48  |
| DIA rev              | <i>Dianella revoluta</i>       | Blueberry Lily        | Tubestock | 0.7 - 1.0m    | 0.3 - 0.6m    | 48  |
| LOM lon              | <i>Lomandra longifolia</i>     | Spiny-headed Mat-Rush | Tubestock | 0.6 - 0.9m    | 0.4 - 0.6m    | 48  |

Planting Rate

Note:  
Planting schedule is for each 30 lineal metres of planting. Numbers to be adjusted to suit extents of planting

Typical Residential Buffer Zone Planting Schedule Option B

| Code         | Botanical Name                | Common Name           | Pot Size | Mature Height | Mature Spread |
|--------------|-------------------------------|-----------------------|----------|---------------|---------------|
| <b>Trees</b> |                               |                       |          |               |               |
| ACA sal      | <i>Acacia saligna</i>         | Weeping-Wreath Wattle | 25 litre | 5 - 8m        | 4 - 8m        |
| EUC ort      | <i>Eucalyptus orthostemon</i> | Diverse Mallee        | 25 litre | 4 - 7m        | 3 - 5m        |

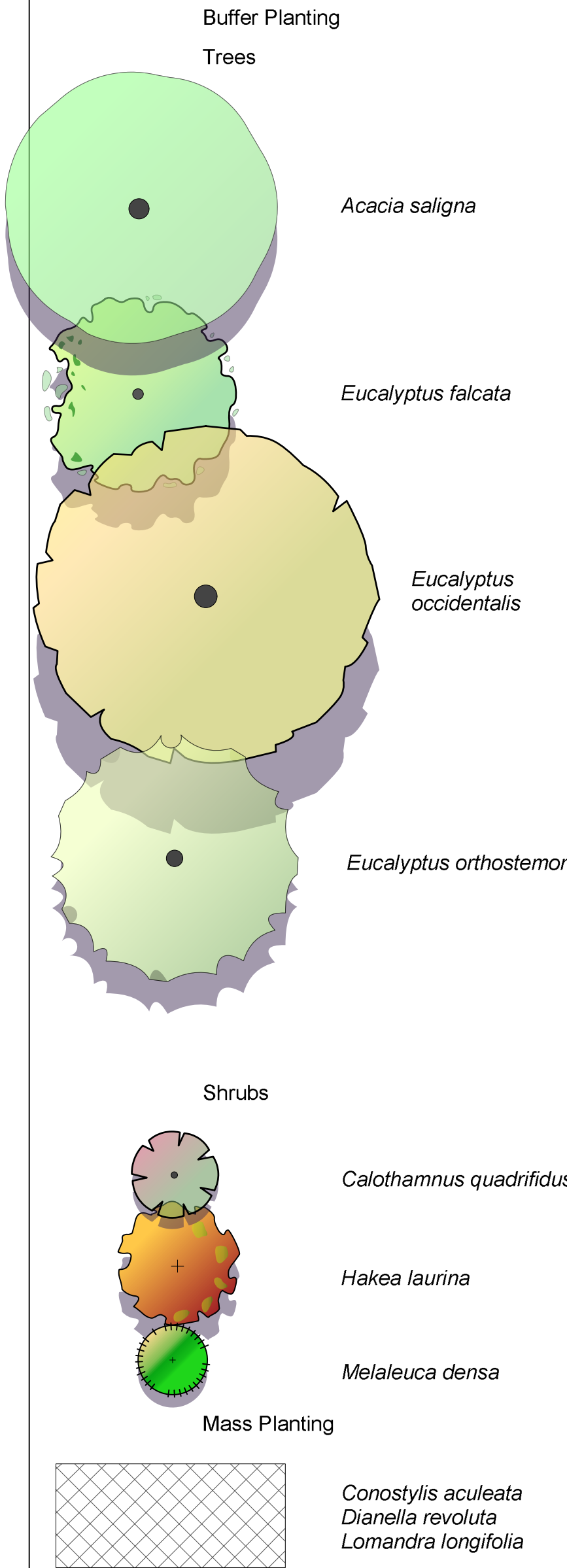
Note:  
Planting schedule is indicative only. Plant numbers to be determined on site.

Typical Residential Buffer Zone Planting Schedule Option C

| Code          | Botanical Name                 | Common Name      | Pot Size | Mature Height | Mature Spread |
|---------------|--------------------------------|------------------|----------|---------------|---------------|
| <b>Trees</b>  |                                |                  |          |               |               |
| EUC fal       | <i>Eucalyptus falcata</i>      | Silver Mallet    | 25 litre | 5 - 6m        | 4 - 5m        |
| EUC occ       | <i>Eucalyptus occidentalis</i> | Flat-topped Yate | 25 litre | 10 - 20m      | 8 - 16m       |
| <b>Shrubs</b> |                                |                  |          |               |               |
| HAK lau       | <i>Hakea laurina</i>           | Pincushion Hakea | 200mm    | 3 - 5m        | 2 - 4m        |

Note:  
Planting schedule is indicative only. Plant numbers to be determined on site

LEGEND





# Traffic Management Plan

# Traffic Management Plan

Flat Rocks Wind Farm

CW1200337 / 304900741



Prepared for  
ENEL Green Power Australia Pty Ltd

3 August 2022



now



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Date Approved 3/08/2022

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|---------|----------------|-------------------------|-------------|-------------|
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| B       | 14/07/2022     | FOR ISSUE               | BS          | RJC         |
| C       | 3/08/2022      | FOR ISSUE               | BS          | RJC         |

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Our report is based on information made available by the client. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Cardno is both complete and accurate. Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, changes may occur to the site conditions, the site context or the applicable planning framework. This report should not be used after any such changes without consulting the provider of the report or a suitably qualified person.



## Table of Contents

|     |   |    |
|-----|---|----|
| 1   | Introduction  | 1  |
| 1.1 | Background  | 1  |
| 1.2 | Objective   | 1  |
| 1.3 | Related Documents                                     | 2  |
| 1.4 | Development Approval Condition                        | 2  |
| 2   | Existing Site Context                                 | 3  |
| 2.1 | Development Area and Locality                         | 3  |
| 2.2 | Existing Road Hierarchy                               | 4  |
| 2.3 | Existing Speed Zones                                  | 4  |
| 2.4 | Existing Road Seal Condition                          | 5  |
| 2.5 | Existing Traffic Volumes                              | 5  |
| 2.6 | Existing Road Users within Study Area                 | 6  |
| 2.7 | Crash History   | 7  |
| 3   | Proposed Development                                  | 8  |
| 3.1 | Site Layout (Stage 1)                                 | 8  |
| 3.2 | Temporary Access Roads (Private Land) and Access Gate | 9  |
| 4   | Haulage Routes  | 10 |
| 4.1 | External Route – Port of Bunbury to development area  | 10 |
| 4.2 | Local Government Roads                                | 11 |
| 4.3 | Restricted Access Vehicles (RAV)                      | 12 |
| 5   | Traffic Assessment                                    | 13 |
| 5.1 | Site Inspection                                       | 13 |
| 5.2 | General Existing Road Condition                       | 13 |
| 5.3 | Upgrades and modifications along Haulage Route        | 14 |
| 5.4 | Vegetation Management                                 | 16 |
| 6   | Traffic Management                                    | 17 |
| 6.1 | Construction Period and Working Hours                 | 17 |
| 6.2 | Estimated Traffic Generation                          | 17 |
| 6.3 | Vehicle Scheduling                                    | 18 |
| 6.4 | Heavy Vehicle Management                              | 18 |
| 6.5 | Restricted Access Vehicles (RAV) Management           | 18 |
| 6.6 | Use of Escort Vehicles                                | 18 |
| 6.7 | School Bus  | 19 |
| 6.8 | Farm Vehicles   | 19 |
| 7   | Safety Plan   | 20 |
| 7.1 | Occupational Health and Safety                        | 20 |
| 7.2 | Training and Site Induction                           | 20 |
| 7.3 | Public Notification                                   | 20 |

|   |     |  |    |
|---|-----|--|----|
|   | 7.4 | Worksite Traffic Management                        | 21 |
|   | 7.5 | Measures to Ensure Safe Residential / Rural Access | 21 |
| 8 |     | Monitoring, Inspections & Auditing                 | 22 |
|   | 8.1 | Monitoring and Inspection                          | 22 |
|   | 8.2 | Road Signs Audit                                   | 22 |
|   | 8.3 | Road Quality Audit                                 | 22 |

## Tables

|           |  |    |
|-----------|--|----|
| Table 1-1 | Development Approval Condition                   | 2  |
| Table 2-1 | Traffic Volume of Precinct Vicinity              | 5  |
| Table 6-1 | Estimated Construction Period Traffic Generation | 17 |

## Figures

|            |   |    |
|------------|---|----|
| Figure 2-1 | Site Location and greater area  | 3  |
| Figure 2-2 | Local Road Network Hierarchy  | 4  |
| Figure 2-3 | Speed Zones   | 4  |
| Figure 2-4 | Road Seal Condition in Study Area                                       | 5  |
| Figure 2-5 | School Bus Route (2022)   | 6  |
| Figure 3-1 | Development Layout Plan   | 8  |
| Figure 3-2 | Temporary Access Road WTG locations                                     | 9  |
| Figure 4-1 | Light vehicles Route  | 11 |
| Figure 4-2 | Heavy vehicles Route  | 11 |
| Figure 4-3 | RAV Network – MRWA HVS Network Map                                      | 12 |
| Figure 5-1 | Wind Blade Transport Dimension  | 14 |
| Figure 5-2 | Warrenup Road – Private Access Road (WTG08, 09, 10, 11, 16)             | 14 |
| Figure 5-3 | Warrenup Road – Private Access Road (WTG01, 05, 06, 04, 05, 06, 07, 55) | 15 |
| Figure 5-4 | Warrenup Road – Private Access Road (WTG18)                             | 15 |
| Figure 5-5 | Warrenup Road – Private Access Road (WTG13, 14, 15, 17)                 | 16 |

# 1 Introduction

## 1.1 Background

Cardno now Stantec has been commissioned by Enel Green Power Australia Pty Ltd to prepare a Traffic Management Plan (TMP) for the construction of the proposed Flat Rocks Wind Farm Stage 1 (development area). The proposed FRWF is located approximately 265km southeast of Perth and 25 km southeast of Kojonup Town, abutting various lots within the Shire of Kojonup and Shire of Broomehill-Tambellup.

## 1.2 Objective

This TMP has been prepared to address the Development Approval Condition 20 set out in both Shire of Broomehill-Tambellup (IPA12112235) and Shire of Kojonup (OCR8220-DB.BDA.8), which covers a total of 18 turbines (Stage 1).

Condition 20 of the DA approvals extracted below:

*“Prior to commencing any works, the Application is to lodge a Traffic Management Plan for approval by the local government. The Traffic Management Plan is to be prepared by a suitably qualified traffic consultant and in the context of the construction phase of the development is to include –*

- (a) Haulage routes;
- (b) Heavy vehicle movements scheduling;
- (c) Use of escort vehicles;
- (d) Interaction with other road uses, for example, school bus routes;
- (e) A Pre-Construction Road Condition Report along the proposed haulage routes, and the obligation to prepare a Post-Construction Road Condition Report once construction is complete.”

This TMP aims to:

- > Provide a safe environment for all persons working on and traffic travelling along Local Governments’ roads within the project scope (**Study Area**), which includes:
  - Tambellup West Road (between Albany Highway and Great Southern Highway)
  - Warrenup Road (SLK 0.00 – SLK 18.50)
  - Ngopitchup Road (SLK 3.32 – SLK 3.00)
  - Yarranup Road (SLK 8.51 – SLK 13.76)
  - Potts Road (SLK 13.6 – SLK 16.98)
- > Minimise impact of the works required for the Flat Rock Wind Farm on the road network and adjacent landowners / occupiers.
- > Cater for the needs of all road users
- > Communicate the arrangements for, and impacts of, any activities affecting traffic.

All contractors and subcontractors are required to conform to the requirements of this TMP, and in specific instances may be required to produce, to the Relevant Authority’s satisfaction, a sub- TMP to demonstrate compliance and mitigation of impact to the local community.



### 1.3 Related Documents

This TMP has reference to and should be read in conjunction with the following related documentation as part of the broader Flat Rocks Wind Farm Project:

- > Flat Rocks Wind Farm Route Study – EX Port of Bunbury by Rex J Andrews Engineered Transportation (Rev 4 – 13/07/2022)
- > Flat Rocks Wind Farm DRAFT Construction Management Plan by GHD Pty Ltd (Rev B – 07/07/2022)

### 1.4 Development Approval Condition

The following **Table 1-1** summarises the requirements of the condition and relative traffic management references in this TMP report.

Table 1-1 Development Approval Condition

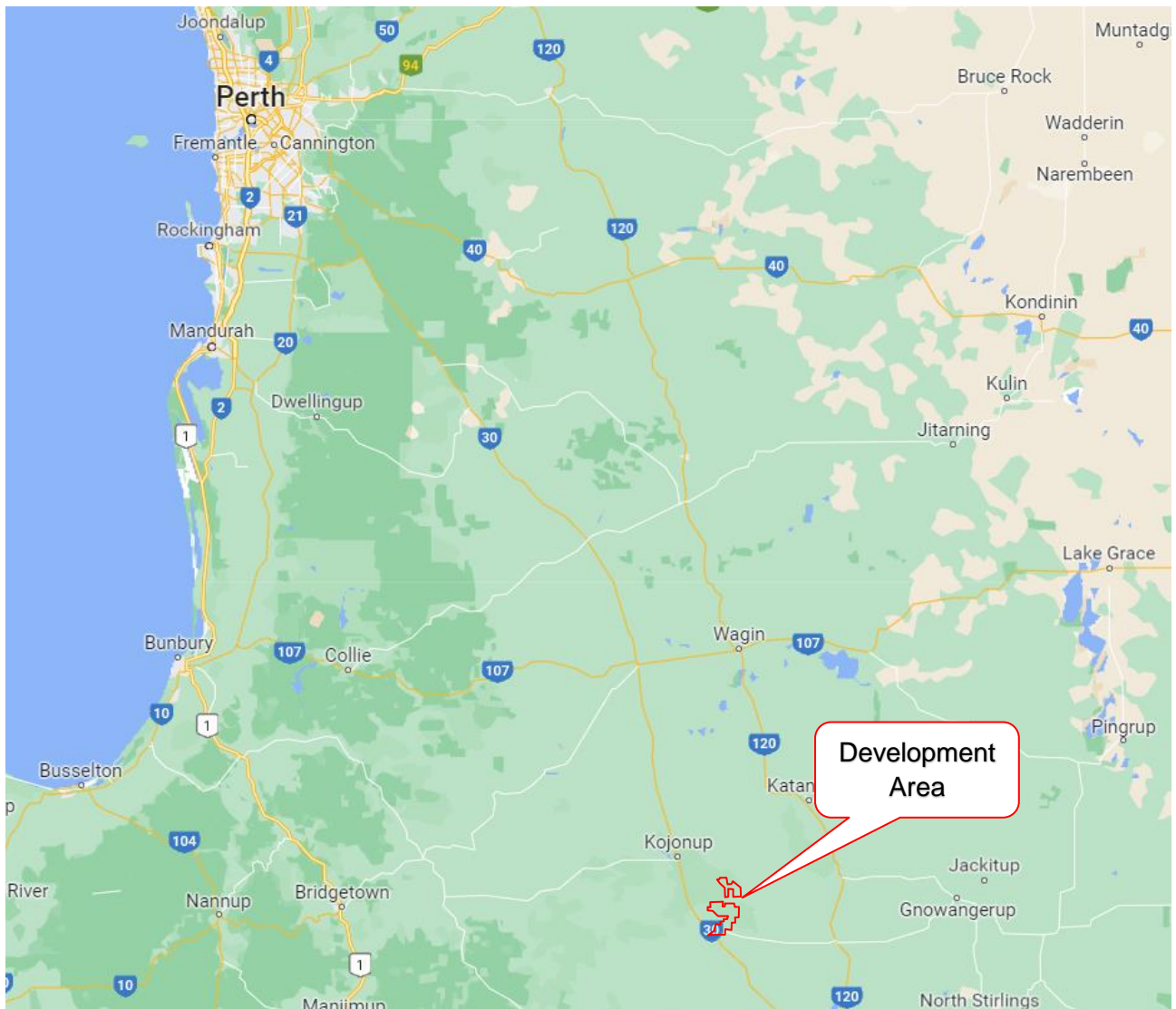
| Number | Planning Permit Requirement Details   | TMP Reference                                 |
|--------|---|---|
| 20     | Prior to commencing any works, the Applicant is to lodge a Traffic Management Plan for approval by the local government. The Traffic Management Plan is to be prepared by a suitably qualified traffic consultant and in the context of the construction phase of the development is to include - |   |
|        | (a) Haulage routes  | <b>Section 4</b>                              |
|        | (b) Heavy vehicle movements scheduling;   | <b>Section 6</b>                              |
|        | (c) Use of escort vehicles;   | <b>Section 6</b>                              |
|        | (d) Interaction with other road uses, for example, school bus routes;   | <b>Section 2, 6</b>                           |
|        | (e) A Pre-Construction Road Condition Report along the proposed haulage routes, and the obligation to prepare a Post-Construction Road Condition Report once construction is complete.  | To be issued prior to construction start date |

## 2 Existing Site Context

### 2.1 Development Area and Locality

The development area is located approximately 265km southeast of Perth and 25 km southeast of Kojonup Town, abutting various lots within the Shire of Kojonup and Shire of Broomehill-Tambellup.

Figure 2-1 Site Location and greater area

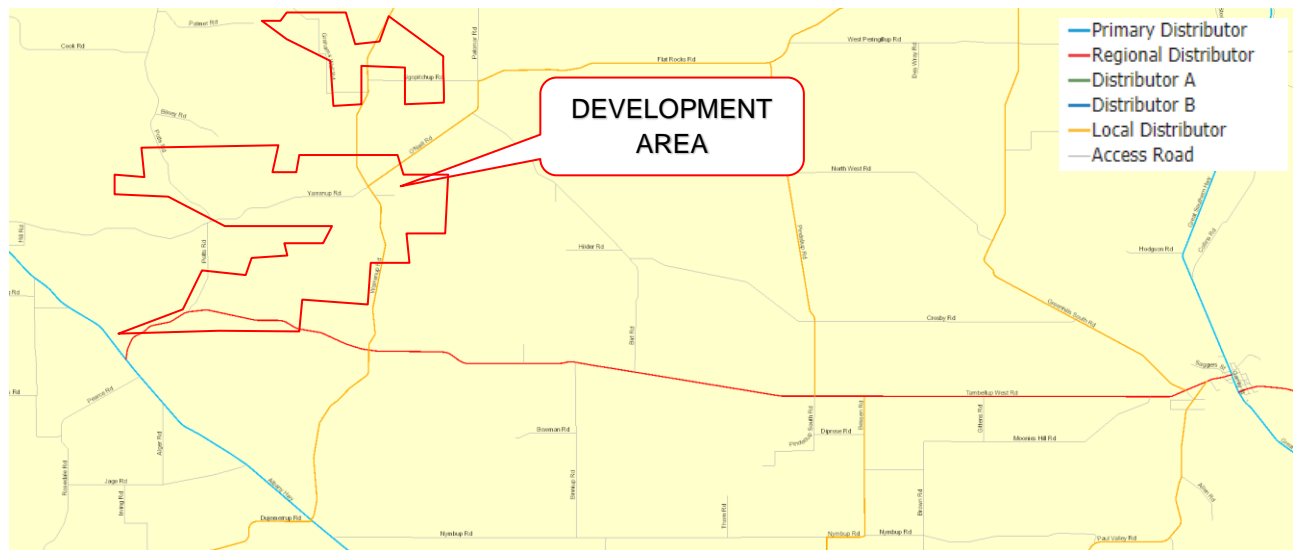


Source: Google Map

## 2.2 Existing Road Hierarchy

The road hierarchy of the road network in the vicinity of the development area is shown in **Figure 2-2**.

Figure 2-2 Local Road Network Hierarchy



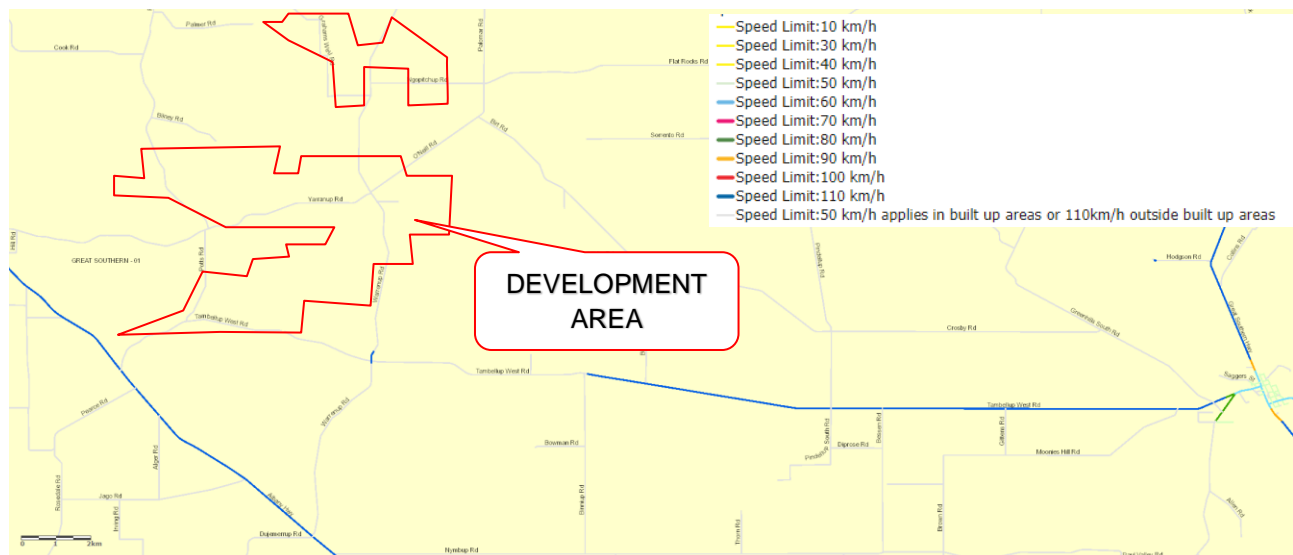
Source: Road Information Mapping System ([mainroads.wa.gov.au](http://mainroads.wa.gov.au))

## 2.3 Existing Speed Zones

The existing posted speed limit on Albany Highway, Great Southern Highway and eastern section of Tambellup West Road are 110km/h. Other access roads are not speed posted and default to 10km/h (outside of built-up areas). It is noted that speed limit signs are currently provided along Tambellup West Road only.

The posted speed limit of the road network in the vicinity of the development area is shown in **Figure 2-3**.

Figure 2-3 Speed Zones



Source: Road Information Mapping System ([mainroads.wa.gov.au](http://mainroads.wa.gov.au))



## 2.4 Existing Road Seal Condition

The existing road seal condition of the road within the Study Area is shown in **Figure 2-4**.

Figure 2-4 Road Seal Condition in Study Area



## 2.5 Existing Traffic Volumes

Traffic volumes on the road network in the vicinity of the development area has been sourced from the *Main Roads WA Traffic Map* and summarised in the table below.

Table 2-1 Traffic Volume of Precinct Vicinity

| Road  | Traffic Direction | Year of Data | Average Daily Traffic Volume                      |
|---|-------------------|--------------|---|
| Albany Hwy (North of Tambellup West Rd)         | North / South     | 2018/19      | 1,038 N & 1,055 S<br>Total = 2,093 VPD (12.9% HV) |
| Albany Hwy (South of Tambellup West Rd)         | North / South     | 2021/22      | 915 N & 996 S<br>Total = 1,911 VPD (26.8% HV)     |
| Tambellup West Road (East of Albany Hwy)        | East / West       | 2019/20      | 25 E & 28 W<br>Total = 53 VPD (20.8% HV)          |
| Great Southern Highway (north of Toolbrunup Rd) | North / South     | 2019/20      | 256 N & 255 S<br>Total = 511 VPD (23.5% HV)       |

Source: MRWA Traffic Map

## 2.6 Existing Road Users within Study Area

### 2.6.1 Light Vehicles

The light vehicles along the Local Government roads are expected to be used by local traffic (farm access) only, with minimal regional traffic. During the site inspection, the majority of the light vehicles were identified along Tambellup West Road with one vehicle spotted along Warrenup Road (south of Tambellup West Road).

### 2.6.2 Pedestrians and Cyclists

Pedestrian and cycling facilities are not provided on the road network. The inspection team did not observe any pedestrian or cyclists during the site inspection. It is expected that the demand for active transport facilities within the area is very low or nonexistence.

### 2.6.3 Farm vehicles

During the site inspection, the inspection team only observed one farm vehicle (tractor trailer) on the road. It is expected that the existing roads are currently used by occasional farm vehicles conducting day-to-day activity. However, it is noted that heavy vehicle volumes related to farming activity is seasonal and for example, will likely be higher during the summer months for harvest transportation.

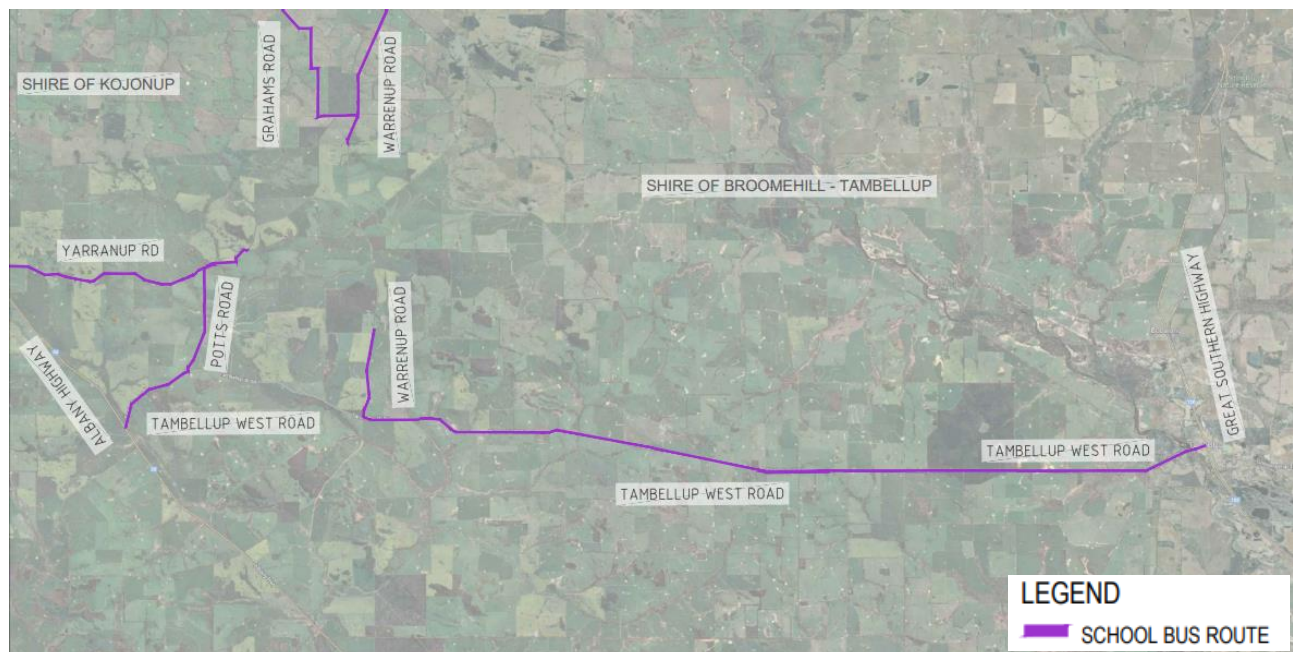
### 2.6.4 Public transport services

Cardno now Stantec has contacted Kojonup Bus Service and was informed that the road network in the vicinity of the development area is not serviced by public bus services. Only school bus services are provided as required.

### 2.6.5 School Bus services

Cardno now Stantec contacted the *School Bus Services* and was provided information of the current school bus services. The current (2022) school bus routes in the vicinity of the development area is extracted from *Landgate Locate – public map viewer* and shown in **Figure 2-5**. It is noted that the school bus services generally operated between 6am – 8am and 3pm – 5pm on weekdays.

Figure 2-5 School Bus Route (2022)



## 2.7 Crash History

A study of the recent crash history has been conducted for the following roads within the Study Area.

- > 3030297 (Tambellup West Rd) (0 to 29.45)
- > 3100026 (Tambellup West Rd) (0 to 5.62)
- > 3030058 (Warrenup Rd) (0 to 20.27)
- > 3100034 (Yarranup Rd) (8.51 to 13.76)
- > 3100019 (Potts Rd) (13.46 to 16.98)

Historical crash data sourced from Main Roads WA Crash Map tool shows no crash data was recorded within the Study Area for the previous five-year period to the end of December 2021





### 3.2 Temporary Access Roads (Private Land) and Access Gate

Temporary access roads will be constructed within the development area, with access gates at entry points from public (LG) roads listed below:

- > Tambellup West Road – To substation and Permanent Operation and Maintenance Building
- > Warrenup Road (South of Yarranup Road) – Access to WTG08, 09, 10, 11, 16
- > Warrenup Road (North of O’Neil Road) – Access to temporary site facilities and WTG01, 02, 03, 04, 05, 06, 07, 55
- > Warrenup Road (intersection of Ngopitchup Road) – Access to WTG18
- > Warrenup Road (South of Nookanellup Road) – Access to WTG13, 14, 15, 17

Figure 3-2 Temporary Access Road WTG locations



Source: Construction Management Plan, GHD



## 4 Haulage Routes

This TMP covers the local roads between the two State Roads (Albany Highway and Great Southern Highway) leading to the development area only.

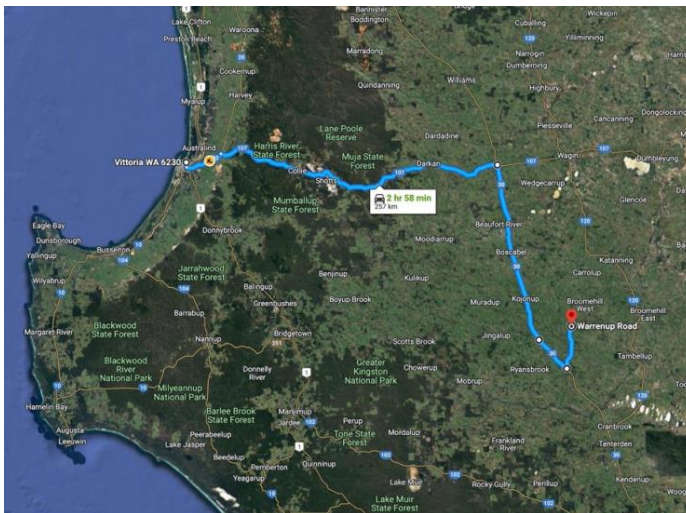
### 4.1 External Route – Port of Bunbury to development area

In reference to *Transport of Wind turbine equipment Route Study report prepared by Rex J Andrews Engineered Transportation*, the main turbine components (blades and towers) will be transported from the Port of Bunbury with the respective proposed route discussed below.

Two transport routes have been proposed for different WT components as identified in *RJA's Route Study Report*. Both routes proposed to enter the development area via Albany Highway and Warrenup Road intersection, in line with proposed construction heavy vehicle route. For detailed planning of the external route please refer to *RJA's Route Study Report (Rev 4)*.

#### 4.1.1 Route 1a: Loads under 5.2m in overall height

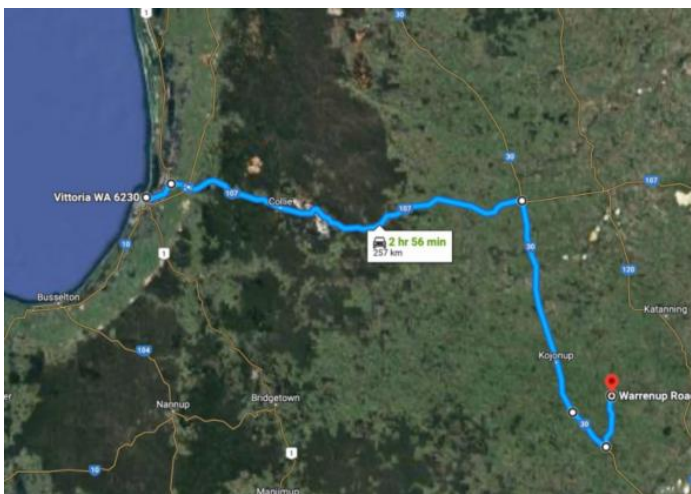
The proposed haulage route is via Leschenault Dr, Estuary Dr, Koombana Dr, Robertson Dr, S Western Hwy, Coalfields Hwy, Albany Hwy, Warrenup Road, with a total distance of approximately 257km.



Source: RJA Route Study

#### 4.1.2 Route 1b: loads over 5.2metres in overall height

The proposed haulage route is via Leschenault Dr, Estuary Dr, Koombana Dr, Forrest Hwy, Raymond Rd, S Western Hwy, Coalfields Hwy, Albany Hwy, Warrenup Road, with a total distance of approximately 257km.



Source: RJA Route Study



## 4.2 Local Government Roads

### 4.2.1 Personnel Vehicle Routes (Light vehicles)

It is expected that the majority of light vehicles traffic will access the development area via Albany Highway / Tambellup West Road intersection, and via Great Southern Highway / Tambellup West Road intersection.

Figure 4-1 Light vehicles Route



### 4.2.2 Construction Vehicle Routes – Heavy Vehicles

It is noted that construction materials will be sourced from multiple locations outside of the development area.

At this stage, it is expected that majority of the heavy vehicles will access the development area from Albany Highway, via Warrenup Road, with some light vehicle deliveries accessing the development area via Great Southern Highway and Tambellup West Road.

Figure 4-2 Heavy vehicles Route

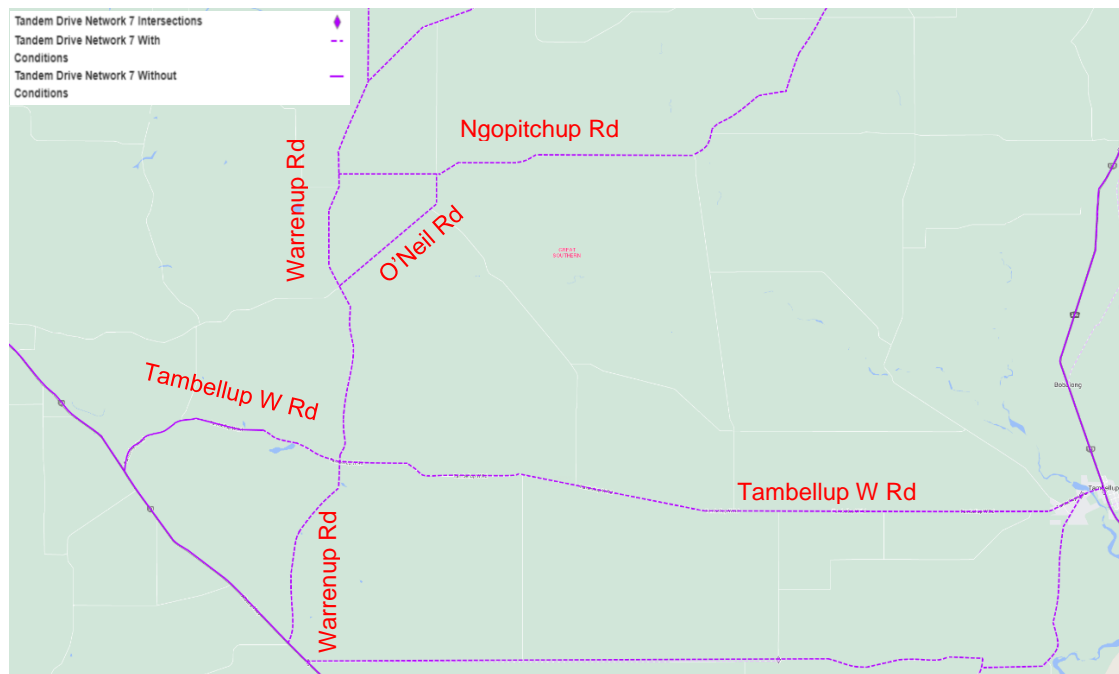


## 4.3 Restricted Access Vehicles (RAV)

### 4.3.1 Current RAV Network

The intended haulage routes for construction materials as discussed in **Section 4.2.2** are currently RAV 7 approved routes with and without condition as shown in **Figure 4-3**.

Figure 4-3 RAV Network – MRWA HVS Network Map



The existing RAV 7 network conditions of the proposed haulage routes are extracted from *MRWA HVS Network Map* and summarised below:

#### 4.3.2 Tambellup West Road (3030297) [SLK 0.00 – 29.45]

- > RAV vehicles' headlights to be switched on at all times – from the intersection of Great Southern Highway & North Terrace & Grarrity Street to the Kojonup LGA Boundary.

#### 4.3.3 Warrenup Road (3030058) [SLK0.00 – 20.27]

- > Maximum speed 80 km/h
- > Direct radio contact must be maintained with other restricted access vehicles to establish their position on or near the road (suggested UHF channel 40).
- > Headlights to be switched on at all times
- > No operation on unsealed road segment when visibly wet, without road owner's approval.
- > Low Volume (LV): When travelling at night, the RAV must travel at a maximum speed of 40km/h and display an amber flashing warning light on the prime mover.

#### 4.3.4 Ngopitchup Road (3030049) [SLK0.00 – 3.32]

- > Maximum speed 40 km/h
- > Direct radio contact must be maintained with other restricted access vehicles to establish their position on or near the road (suggested UHF channel 40).
- > For single lane road, the road must not to be entered until driver has established via radio contact that there is no other RAV on the road travelling in the oncoming direction.
- > Headlights to be switched on at all times
- > Low Volume (LV) When travelling at night, the RAV must travel at a maximum speed of 40km/h and display an amber flashing warning light on the prime mover.

## 5 Traffic Assessment

### 5.1 Site Inspection

Cardno now Stantec team visited the Site on 4<sup>th</sup> July 2022. At the time of the site visit, the weather was sunny with dry surface on the majority of the roads.

### 5.2 General Existing Road Condition

The road condition on sealed roads was generally acceptable with minor defects; unsealed roads were generally in poor condition with minor to medium corrugations throughout the entire length of roads. The following summarises the general road condition and suitability as a haulage route. ***A detailed road condition report will be provided in the Pre-construction Road Condition Report.***

#### 5.2.1 Tambellup West Road

Tambellup West Road is sealed with sufficient width and line marking. The road geometry is suitable for all vehicles including high-wide loads.

#### 5.2.2 Warrenup Road

Warrenup Road is sealed to the south of Tambellup West Road, and is unsealed north of Tambellup West Road. Warrenup Road is generally wide enough to accommodate heavy vehicle deliveries, including high-wide loads. Some locations where trees are located too close to the road (SLK 7.5), or with tree branches overhanging over the road carriageway (SLK 13.0) may need to be trimmed prior to high-wide load access.

#### 5.2.3 Potts Road

Overhanging tree branches and trees located near the road carriageway are more significant along Potts Road. Major tree trimming may be required to accommodate large vehicle traffic. The road forms a vertical crest due to table drain on both sides of the road, reducing its effective width and is suitable for light vehicles and small heavy vehicles only.

#### 5.2.4 Yarranup Road

Road condition similar to Potts Road, with reduced road width (~4m) due to table drain on both sides of the road. Tree branches overhanging the road carriageway may need to be trimmed and is suitable for light vehicles and small heavy vehicles only.

#### 5.2.5 Ngopitchup Road

Road width suitable for one-way traffic only, with trees on both sides of the road. Trees may need to be removed to accommodate turning movements of high-wide loads.



### 5.3 Upgrades and modifications along Haulage Route

It is noted that at current stage, all heavy vehicles will travel along Warrenup Road to access the temporary access roads as suggested in **Section 3.2**. Swept path analysis for the largest truck (Wind blade transportation) was conducted along the intended haulage route to identify if any modifications such as tree removal is required. A custom Wind blade transport has been created for this swept path analysis, with a similar dimension to the *Blade diagram: V150* extracted from *RJA Route Study* report and is shown below in **Figure 5-1**.

Figure 5-1 Wind Blade Transport Dimension

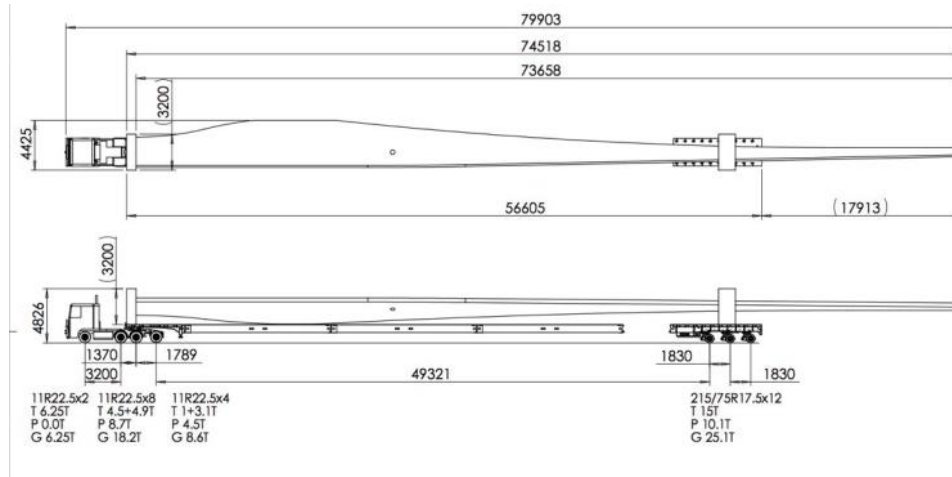


Figure 5-2 Warrenup Road – Private Access Road (WTG08, 09, 10, 11, 16)



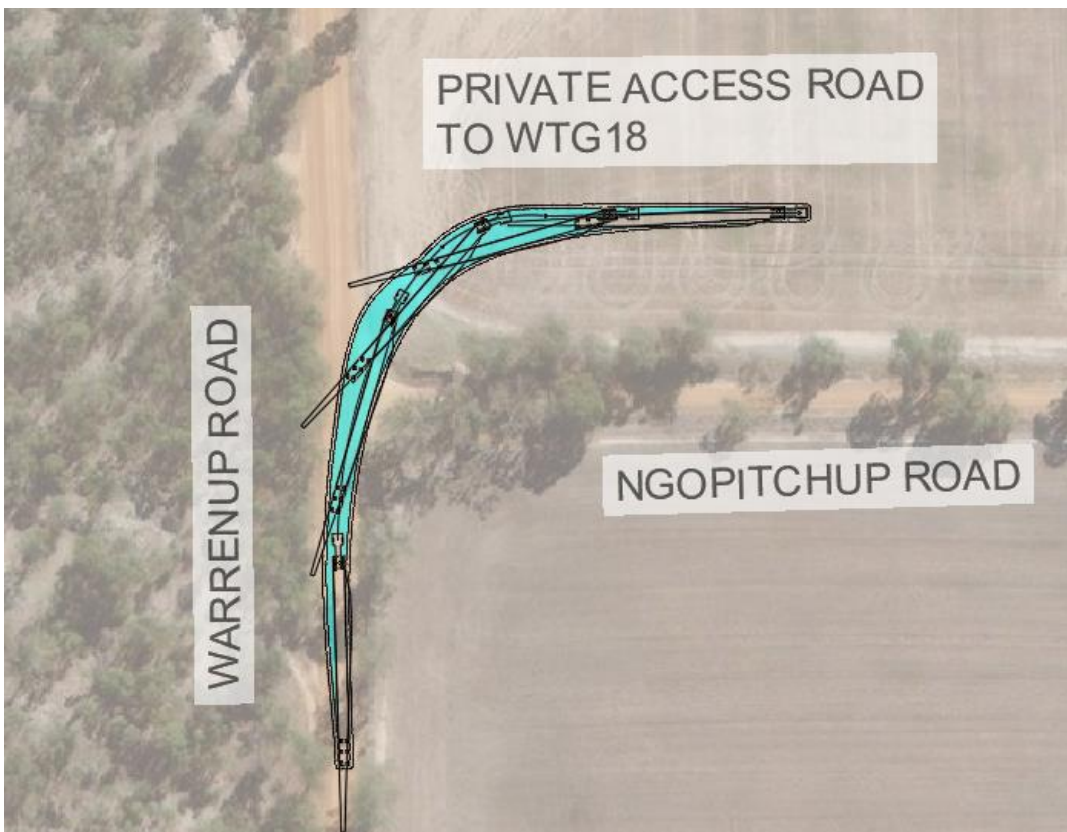
Swept path analysis in **Figure 5-2** shows that existing trees within the (red) marked area may need to be removed at the proposed intersection into private access road to WTG08, 09, 10, 11, 16 via Warrenup Road.

Figure 5-3 Warrenup Road – Private Access Road (WTG01, 05, 06, 04, 05, 06, 07, 55)



Swept path analysis in **Figure 5-3** shows that existing trees within the (red) marked area may need to be removed at the proposed intersection into private access road to WTG01, 02, 03, 04, 05, 06, 07, 55 via Warrenup Road.

Figure 5-4 Warrenup Road – Private Access Road (WTG18)



It is noted that a private access road will be created to access WTG18 instead of using the existing Ngopitchup Road access. **Figure 5-4** shows an indicative swept path where existing trees are avoided.

Figure 5-5 Warrenup Road – Private Access Road (WTG13, 14, 15, 17)



As shown in **Figure 5-5**, the proposed intersection for Private Access Road to WTG13, 14, 15, 17 is clear of existing trees and vegetation, with wide turning radius which could accommodate a high-wide load such as the wind blade transportation.

## 5.4 Vegetation Management

Main Roads WA has advised that all proposals for vegetation management, including trimming and/or removal of native vegetation within the road reserves (particularly within MRWA road reserves), should refer to *MRWA Specification 301 – Vegetation Clearing and Demolition* and any other relevant documents.



## 6 Traffic Management

### 6.1 Construction Period and Working Hours

Based on the indicative information provided by the client and respective contractors, the construction of the wind farm will start in Q3 2022, with expected peak construction activity from November 2022 to February 2023. Detailed construction timelines shall refer to the Construction Management Plan prepared by GHD Pty Ltd.

Construction work will be carried out between 6am and 6pm, 7 days a week with potential night works for critical construction work. Out-of-hours work will be conducted under an approved Noise Management Plan.

### 6.2 Estimated Traffic Generation

During the construction phase, traffic generated by the site will generally include but not limited to the following activities:

- > Construction / staff / personnel travelling to and from the site.
- > Raw materials for construction (i.e. sand, cement, fuel, steel) transported to the site.
- > Major wind turbine components and substation equipment (i.e. transformers, turbine tower sections, turbine generators, nacelles and blades) transported to the site.
- > Excavation and construction of the foundations and hardstands for the wind turbines.
- > Erection of the wind turbine components and towers.
- > Trenching and installation of electric cabling and stringing.
- > Operational equipment and buildings
- > Water tanks for fire-fighting

The estimated day-to-day traffic generation during the peak construction activities periods are summarised in **Table 6-1**. It is noted that this represent the potential worst-case scenarios, assuming all construction activities occurred simultaneously.

Table 6-1 Estimated Construction Period Traffic Generation

| Vehicle Type  | Vehicle per day (VPD) | Estimated Trip Generation (2-way trip) |
|---|-----------------------|--|
| Road trains (53m)   | 2                     | 4 trips                                |
| Articulated vehicles (truck/prime with trailer)   | 10                    | 20 trips                               |
| Rigid Trucks (including concrete truck – during concrete pour day)  | 15                    | 30 trips                               |
| Watercart   | 2                     | As required                            |
| Light vehicles – contractors / construction personnel travelling to, from and within the development area | multiple              | Depending on construction activities   |

All vehicles will travel to and from the site using the haulage route proposed in **Section 4**.

## 6.3 Vehicle Scheduling

### 6.3.1 Wind Turbine Components delivery and erection

It is also understood that the Wind Turbine (WT) component delivery and erection are to commence reasonably soon after completion of the initial site footing and access works. All construction related travels along the WT component delivery route shall be notified and prohibited during the delivery of WT components to minimise unnecessary traffic congestions.

### 6.3.2 Other deliveries during the construction phase

Various work phases may overlap with each other and be undertaken alongside each other where the construction schedule permits.

## 6.4 Heavy Vehicle Management

As part of this TMP, it is proposed that all heavy vehicles (including rigid trucks) should comply with the following conditions (in line with existing MRAW RAV network conditions) when accessing and egressing the development area on Local Government roads:

- > Travel at maximum speed (in line with RAV condition):
  - Warrenup Road: 80km/h (40km/h when travelling at night)
  - Ngopitchup Road: 40km/h at all times
- > Travelling at night is not encouraged and should be avoided. However, if required, all construction related heavy vehicles must display an amber flashing warning light when travelling at night.
- > Maintain direct radio contact to establish their position on or near the road (suggested UHF channel 40)
- > Headlights to be switched on at all times

## 6.5 Restricted Access Vehicles (RAV) Management

As noted in **Section 4.3.1**, the Study Area is currently approved for vehicles up to Tandem Drive 7 for Tambellup West Road and Warrenup Road only. All RAV vehicle access will be limited to the currently approved RAV network.

If the use of RAVs greater than Tandem Drive 7 is required, the contractor will be responsible to submit a *Route Assessment Application* in accordance with the *MRWA Guidelines for Approving RAV Access*.

## 6.6 Use of Escort Vehicles

Pilot and escort vehicles shall be provided for all high-wide load deliveries on Local government roads. Requirements for a pilot and escort vehicle shall be in reference to and in accordance with *Main Roads WA Oversize Vehicle & Pilot Vehicle General Requirements*.

It is expected that the pilot and escort vehicle team on the external route leading to the development area will continue to be at service until the high-wide load (blades and towers) are delivered to the respective turbine locations.

## 6.7 School Bus

The contractors will liaise with and come to an agreement with school bus provider (School Bus Services – 08 9326 2063) to establish a traffic schedule to avoid potential conflicts with school bus during its morning and afternoon routes.

No truck movements associated with the haulage of material will be undertaken on roads during the times that the school bus services travel the area. Delivery can be resumed once the school bus driver confirms all school drop-off/pick-ups have been completed.

On the rare occasion where the school bus movements occur outside of the typical established times, truck drivers servicing the site will use UHF communication to communicate with the bus driver to ensure school bus operation is not impacted. A maximum speed limit of 40km/h will be required for any trucks that may inadvertently operate in proximity to the school bus service.

## 6.8 Farm Vehicles

The contractors will liaise with the farm owners to establish the use of UHF communication, especially during summer months where heavy vehicle volumes related to farming activity is likely to be higher. Farmers within the development area will be advised to follow the heavy vehicle management set out in **Section 6.4** of this report and maintain two-way UHF communication to reduce the risk of congestion. The schedule of high-wide-load delivery or construction activities that will take up the entire road width shall be distributed to the residents and farming community in the vicinity of the development area to avoid any unnecessary congestions or conflict. This information must include a contact number that residents can call to check on planned activity.



## 7 Safety Plan

### 7.1 Occupational Health and Safety

All persons and organisations undertaking works or attending the site have a duty of care under statute and common law to themselves, their employees, and all site users, lawfully using the site, to take all reasonable measures to prevent accident or injury.

The contractor shall prepare an OSH Risk Assessment and Treatment Register in for OSH hazards associated with the contract.

The OSH Risk Assessment and Treatment Register shall be prepared using competent occupational safety and health persons. The OSH Risk and Treatment Register shall be authorized by the Contractor's representative and the OSH MR, with the completed OSH Risk Assessment and Treatment Register forming part of the OSH Management Plan.

Further, should a formal OSH Management Plan not be prepared, it is expected that OSH hazards in the traffic environment be managed accordingly:

- > Personal Protective Equipment (PPE) is to be worn at all times (high visibility clothing, appropriate footwear, sun protection, etc.).
- > All plant and equipment must have suitable flashing lights and reversing alarms to warn motorists and personnel on foot of their presence.
- > Procedures must be in place to effectively communicate the TMP and safety requirements to personnel and ensure that all pre-start inductions are conducted.

### 7.2 Training and Site Induction

#### 7.2.1 Driver Induction Training

Prior to commencing construction activities, heavy vehicle drivers of rigid trucks and RAV involving in the construction activities are required to undertake a driver induction. The induction course will need to be developed early to ensure that it is ready prior to construction activity (including any site preparation works) commencing. Irregular and one-off drivers of pick-ups and deliveries would be considered exempt to this induction requirement.

The induction course would cover:

- > Suitable and permitted routes to and from the site.
- > Applicable traffic management procedures that will need to be in place prior to approaching or departing the site (if required).
- > Communications and notification procedures.
- > Speed restrictions (on the road network and the site).
- > Safety procedures (during transportation and in the event of an incident / emergency)

### 7.3 Public Notification

Further to correspondence with Main Roads WA and Local Governments, the following public notification should be conducted prior to the construction:

- > Radio advertisements.
- > Newspaper advertisements.
- > Letter drops to be delivered to all properties in the vicinity of the development area which display a letterbox, including service stations and road houses.
- > Variable Message Boards (VMS) are to be positioned on Albany Highway to alert vehicles of the OSOM loads travelling on the highway.

## 7.4 Worksite Traffic Management

Works personnel will be advised in advance of the location of entry and exit points within the works zone. Traffic controllers will be used to control traffic where construction vehicles entering or departing the work zone are likely to create a hazard for motorists.

## 7.5 Measures to Ensure Safe Residential / Rural Access

Residents and relevant stakeholders will be notified of construction commencing prior to the start date. Property access is to be maintained where possible, and it is understood that works will not require blocking property access at any point in the project. However, if blocking property access becomes unavoidable, proper notice will be given to the affected landowners, with consultation to arrange a suitable outcome and minimise disruption.

An internal management strategy will be established within the development area. This strategy will form part of the site induction that will be undertaken by all personnel on-site.

The following key items are to be implemented:

- > Driving at appropriate and intended speeds on all roads
- > Radio communication between construction vehicles available at all times.
- > All loads to be correctly restrained.
- > Warning signage to be provided critical areas/intersection points.

It is also noted that on-site parking will be provided within the construction compound, to provide a dedicated safe area where personnel can access their vehicles.

## 8 Monitoring, Inspections & Auditing

### 8.1 Monitoring and Inspection

In order to ensure the effectiveness of the TMP, the plan must be monitored and traffic management works inspected regularly.

The aim of the TMP is to reduce the impact of the construction traffic on the surrounding road network. Hence it is important to monitor that this is being achieved to reflect any physical or operational changes to the road network.

The monitoring of the TMP should generally occur:

- > Before the start of work activities;
- > During operation of construction works; and
- > Conclusion of any operations occurring at the end of any work activities.

The TMP should also be updated if any notable changes affecting the expected or actual traffic volumes generated by site works occur, or if changes to working hours, delivery scheduling or other factors of consequence affecting site traffic and transport are proposed.

### 8.2 Road Signs Audit

Regular audit and maintenance of existing signs should be conducted to ensure all guide posts, hazard markers and signs are functional as per existing condition. Temporary removal of Shire or MRWA assets for construction purposes shall be reinstated as soon as practicable, in accordance with the latest MRWA requirements and guidelines.

### 8.3 Road Quality Audit

With respect to *Condition 20* of the DA Condition, a Road Condition Report (dilapidation report) is to be prepared prior to the commencement of the project and following completion of the works (on Local Governments' roads).

The pre-construction road condition assessment report is being prepared and will be issued to relevant authorities prior to the commencement of construction works.

A post-construction road conditions assessment will also be undertaken and compared against the pre-construction assessment to determine what, if any, rehabilitation works are required on Council's road.