

Burrendong Wind Farm Amendment Report

APPENDIX A.1

Updated Project Description



1. Project Description

This updated Project description provides a detailed overview of the proposed amended wind farm layout and associated infrastructure components. Additionally, an explanation of the activities related to the construction, operation, maintenance, and decommissioning phases of the Project.

1.1. Project Overview

A summary of the key Project elements and description is provided in Table 1-1.

Table 1-1: Project Overview

Project Element	Summary of the Project
Number of wind turbines	70
Wind farm capacity	400 to 500 MW
Wind turbine capacity	6 to 8 MW per turbine
Location	Approximately 30 km west of Mudgee in the Central West region of NSW
Local Government Areas	Dubbo Regional Council and Mid-Western Regional Council
Operational life	30 years
Project Site area	27,086 ha
Development Corridor	1,322 ha
Development Footprint	730.73 ha
Ancillary infrastructure	Internal roads and tracks, crane hardstands, collector substations, Operations and Maintenance (O&M) facility, underground and overhead medium voltage electrical reticulation, high voltage overhead powerline, high voltage switchyard and permanent met masts
Temporary Ancillary Infrastructure	Site office & primary construction compound, Temporary Workforce Accommodation Facility (TWAF), construction compounds, concrete batching plants, mobile rock crushing plant and temporary met masts
Subdivision	- Lot: 124/756871 for switchyard - Lots: 16/756903, 49/756919 and 17/756903 for separate land tenure for Project and proposed pumped-hydro infrastructure
OSOM transport routes	From the Port of Newcastle to near Dunedoo via the Golden Highway - Route 1 (blades): via Saxa Road and Goolma Road; Route 2 (other OSOM): via Castlereagh Highway to Gulgong and Goolma Road
Primary (Wind Farm) site access	Via western end of Burrendong Dam Road, Yarrabin –main wind farm access and will be used for the majority of the wind farm construction, and throughout operation
Secondary (Switchyard) site access	Via southern end of Tara Road, Mumbil –construction and O&M of the connection switchyard, poles and powerline on the western side of the Macquarie River
Local road upgrades	Realignment, resurfacing and sealing of Twelve Mile Road, Yarrabin Road and Burrendong Dam Road
State and local road intersection upgrade	Intersection between (classified) Goolma Road and (local) Twelve Mile Road Added pavement to facilitate BAH treatment and OSOM blade transport vehicle
Construction workforce	250 FTE (peak) 15 FTE O&M of TWAF
Construction duration	24-30 months
Operational workforce	12 FTE
Normal Hours of operation	Construction & Decommissioning: Mon – Fri 7AM to 6PM, Sat 8AM to 1PM Operation: continuous 24 hours/day
Capital investment	Estimated Development Cost \$537 million

1.2. Project Area

The Project Site covers an area of 27,086 ha and is located approximately 30 km West of Mudgee covering both the Dubbo Regional Council and Mid-Western Regional Council LGAs (refer to Figure 1-1). Within the Project Site a Development Corridor has been defined with a maximum area of 1,322 ha consisting of the wind farm area and transport corridor road upgrades (refer to Figure 1-2). The development corridor covers 169 cadastral lots as listed in Table 1-2 and Table 1-3.

Several environmental constraints have been identified within the Project Site (Figure 3 1 of the EIS; ELA 2023a). Effort has been made by the Proponent throughout the evolution of the Project layout to avoid identified environmental constraints where possible (Figure 2 15 of the EIS; ELA 2023a). Further discussion of Project design, including how the Proponent has implemented the design hierarchy of avoid, minimise, mitigate and offset is provided in Section 7 of the EIS and Amendment Report (ELA 2023; ELA 2026a).

- **Agricultural Land:** Land capability is characterised by underlying geological features, soil grouping, slope, and topography. The classification of land is based on biophysical features that determine the limitation and hazards of that land. Limitations to land capability include water and wind erosion, soil structure decline, soil acidification, salinity, waterlogging, shallow soils, rockiness, and mass movement. Land capability mapping shows the Project Site is predominately mapped as LSC Classes 5, 6 and 7, with smaller areas of LSC classes 3 and 4. There is no BSAL soil within the Project Site.
- **Major watercourses:** Several watercourses intersect the Project Site, ranging from 1st – 9th order watercourses (in accordance with the Strahler system). The proposed Development Corridor (access tracks) will be required to cross four (4) 3rd order watercourses, four (4) 4th order watercourses and one (1) 9th order watercourse.
- **Native Vegetation and Threatened Species:** The Project Site borders Lake Burrendong and contains native vegetation and TECs within its boundary. Several threatened species have been identified within the Project Site (Section 6.3 of the Amendment Report). Throughout the iterative design process, locations of native vegetation and threatened species have been avoided where possible, further reducing potential impacts.
- **Aboriginal Heritage:** No previously recorded Aboriginal sites were present within the Project Site. The Project Site can be characterised as a primarily stock grazing area with limited timber getting. The majority of the Project Site and surrounds contain steep terrain, and the WTGs are proposed on ridges and spur crests, which are typically rocky and highly exposed to the elements. During the field surveys, and desktop assessment 116 Aboriginal Sites were identified within the Project Site, of which 20 were of moderate or high significance. The remaining sites were considered to have low significance (ELA, 2026c). Additionally, of the 116 Aboriginal Sites, 44 sites are within the Development Corridor. However, only 31 may be directly impacted by the Development Footprint.
- **Nearby Landowners:** The Proponent has identified a total of 43 non-associated receivers within 4.95km of any proposed WTG. The location of these receivers was used to form the basis of technical assessments such as the Landscape and Visual Impact Assessment (Section 6.1 of the Amendment Report) and Noise and Vibration Impact Assessment (Section 6.2 of Amendment Report).

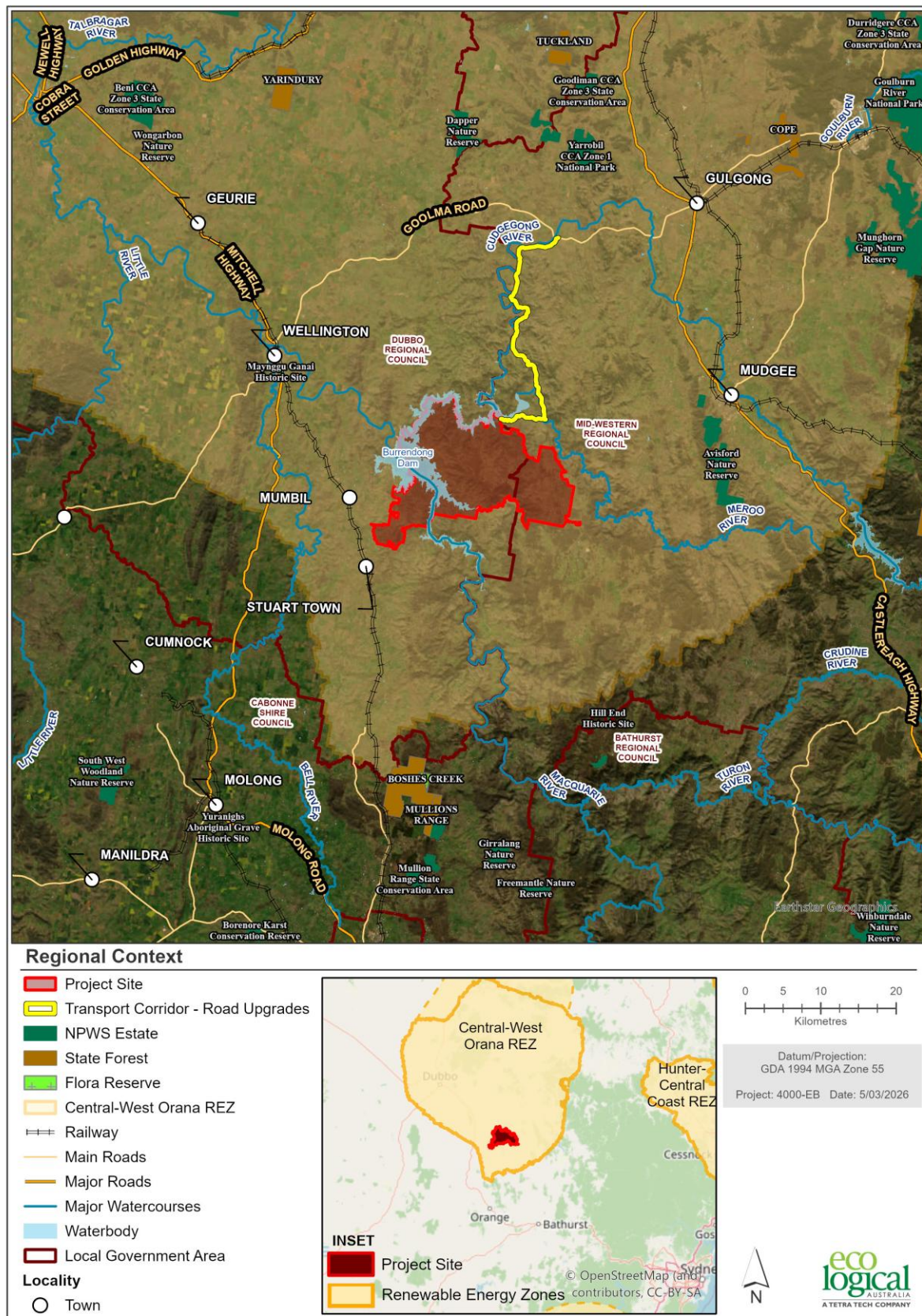


Figure 1-1: Regional Context of the Project

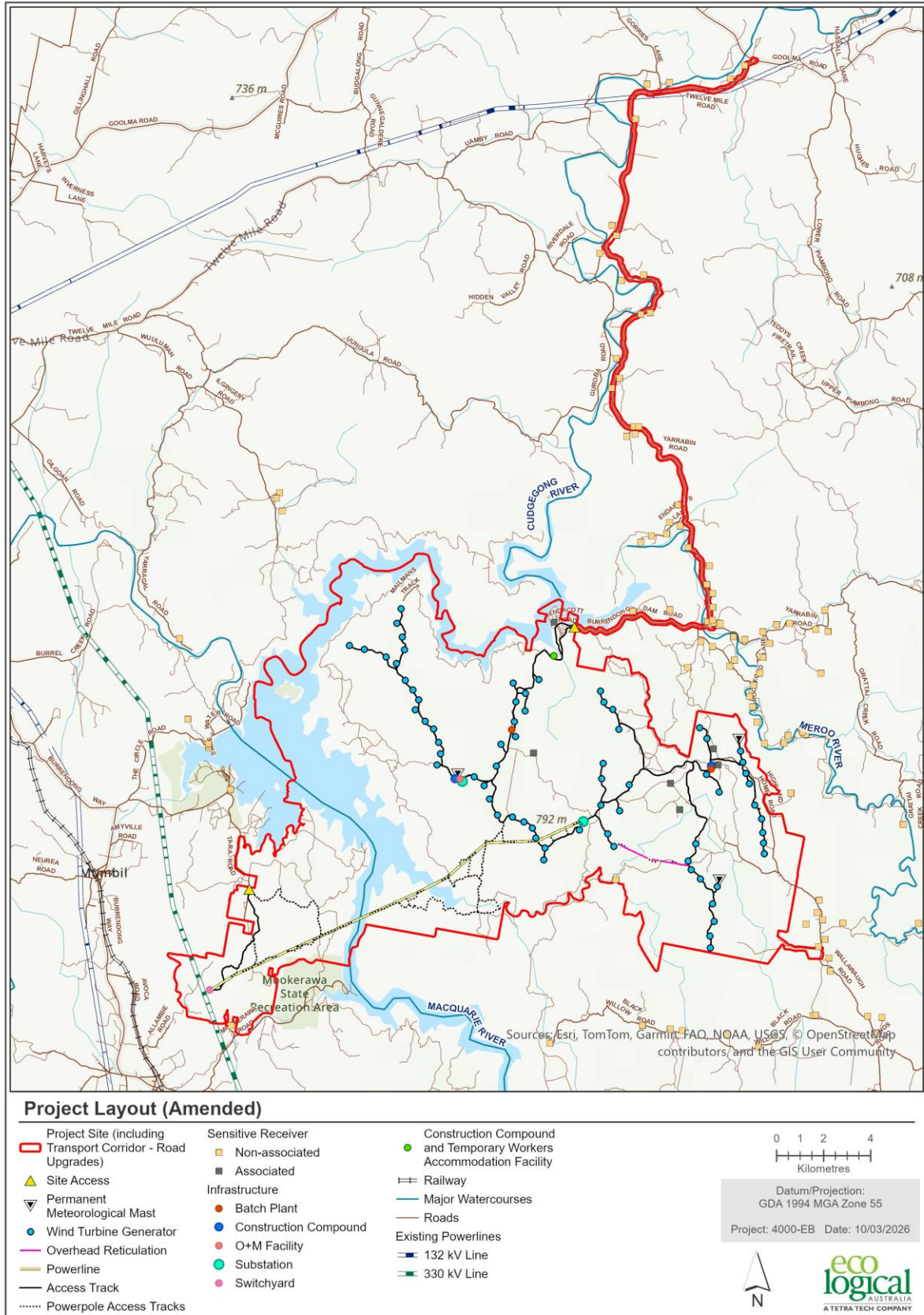


Figure 1-2: Amended Project Layout

Table 1-2 and Table 1-3 present the land parcels associated with the Project's Development Footprint and Development Corridor.

Table 1-2: Wind Farm Area

#	Lot/DP	#	Lot/DP
1	2/786247	49	352/1180382
2	66/42197	50	42/756887
3	29/756872	51	351/776208
4	11/756903	52	10/756903
5	12/756903	53	14/756903
6	15/756903	54	6/756872
7	352/776208	55	2/1226628
8	21/756903	56	41/756887
9	37/756872	57	47/756872
10	38/756872	58	17/1148721
11	41/756872	59	18/1168862
12	42/756872	60	1/1173984
13	43/756872	61	6/240821
14	5/756872	62	62/257246
15	1/1069444	63	63/257246
16	58/257246	64	310/44173
17	281/44173	65	54/756872
18	51/756872	66	55/756872
19	38/756887	67	57/756872
20	1/913536	68	16/756903
21	248/40724	69	17/756903
22	252/41327	70	18/756903
23	255/41327	71	19/756903
24	260/41975	72	5/756903
25	261/41975	73	6/756903
26	269/41976	74	2/756915
27	273/721743	75	26/756915
28	275/721744	76	3/756915
29	179/743408	77	31/756915
30	124/756871	78	32/756915
31	163/756871	79	67/756915
32	177/756871	80	68/756915
33	182/756871	81	9/756915
34	195/756871	82	1/756919
35	27/756871	83	17/756919
36	272/756871	84	19/756919
37	41/756871	85	34/756919
38	59/756871	86	38/756919
39	118/756871	87	39/756919
40	30/756871	88	47/756919
41	39/756871	89	48/756919

#	Lot/DP	#	Lot/DP
42	1/1227846	90	49/756919
43	2/1227846	91	1/1221538
44	6/1227846	92	2/1221538
45	7/1227846	93	24/756903
46	8/1227846	94	2/807931
47	3/1227846	95	3/807931
48	4/1227846	96	2/1267264

Table 1-3: Road Upgrades

#	Lot/Plan	#	Lot/Plan
97	6/255732	134	2/255732
98	1/788518	135	5/255732
99	3/788518	136	2/601087
100	2/1083951	137	1/449109
101	1/1087887	138	79/756891
102	11/1098620	139	80/655051
103	2/1199081	140	66/756891
104	3/1199081	141	40/756902
105	4/1199081	142	1/756902
106	7/1199081	143	6/843109
107	1/130808	144	31/756902
108	2/130808	145	1/1146129
109	45/40656	146	11/702662
110	20/756902	147	112/1166561
111	15/756922	148	3/255732
112	16/756922	149	1/446123
113	2/843109	150	10/756902
114	3/843109	151	1/1130715
115	5/843109	152	2/1130715
116	1/869050	153	3/1130715
117	2/869050	154	4/255732
118	1/221173	155	1/1220186
119	2/22/1173	156	132/756922
120	2/231505	157	2/1146129
121	160/756891	158	18/756922
122	96/756891	159	43/40633
123	7300/1148268	160	2/229937
124	7305/1148490	161	34/756872
125	7301/1148954	162	67/756891
126	7300/1149023	163	1/780706
127	7301/1149665	164	10/702663
128	44/40633	165	1/601087
129	46/40656	166	3/1083934
130	2/720394	167	35/756902

#	Lot/Plan
131	185/727153
132	2/788518
133	1/255732

#	Lot/Plan
168	7/255732
169	5/1083934

2. Project Layout and Design

2.1. Project Elements

Descriptions of each Project element is provided in this section. The details of the infrastructure and elements to be installed or constructed (i.e. WTG model) will be confirmed during the detailed design process to be undertaken post consent and finalised prior to the commencement of construction. Detailed design will allow the most suitable types of infrastructure to be identified and deployed for use in the Project.

The dimensions in Table 2-1 represent the approximate dimensions proposed for Project elements and infrastructure for the Project. Table 2-3 and Table 2-4 provide the location of the ancillary infrastructure.

Table 2-1: Project Elements including dimensions and quantity

Project element	Details	Approximate dimensions	Approximate quantity	Figure/table
WTGs	WTG tip height	Up to 250 m	70	
	Rotor diameter	Up to 180 m		
	Uppermost blade tip	Up to 250 m		Figure 1-2
	Lowermost blade tip	70 m		Table 2-2
	Tower (hub) height	Up to 160 m		
	WTG foundation excavation	35 m diameter		
Ancillary Infrastructure	Internal Access Tracks	5.5 m wide	79 km	Figure 1-2
	Powerline construction tracks	4 m wide	39 km	
	Substations	100 m x 200 m	2	Figure 2-2 Table 2-3
	Switchyard	100 m x 200 m	1	Figure 2-1 Table 2-3
	Operation and Maintenance facility	150 m x 70 m	1	Figure 2-2 Table 2-3
	33kV overhead powerline		3 km	
	33kV power poles	20 m height	12 km	Figure 1-2
	33kV underground reticulation/cabling		57 km	
	330kV overhead powerline		17 km	Figure 1-2
	330kV power poles	35 - 50 m height	45	
	Permanent meteorological masts	Up to 160 m height	3	Table 2-3
Temporary Facilities	Concrete batching plant	200 m x 100 m	2	Figure 2-3 Table 2-4
	Mobile rock crushing plant	20 m x 15 m	2	N/A
	Temporary Workers Accommodation Facility	420 m x 200 m	1	Figure 2-4 Figure 2-5 Table 2-4

	Main Construction Compound and Site Office	Within TWAF area	1	Figure 2-4 Figure 2-5 Table 2-4
	Construction Compounds	50 m x 50 m 35 m x 35 m	1 1	Figure 2-2 Figure 2-7 Table 2-4
	Temporary meteorological mast	110 m height	2	Table 2-4

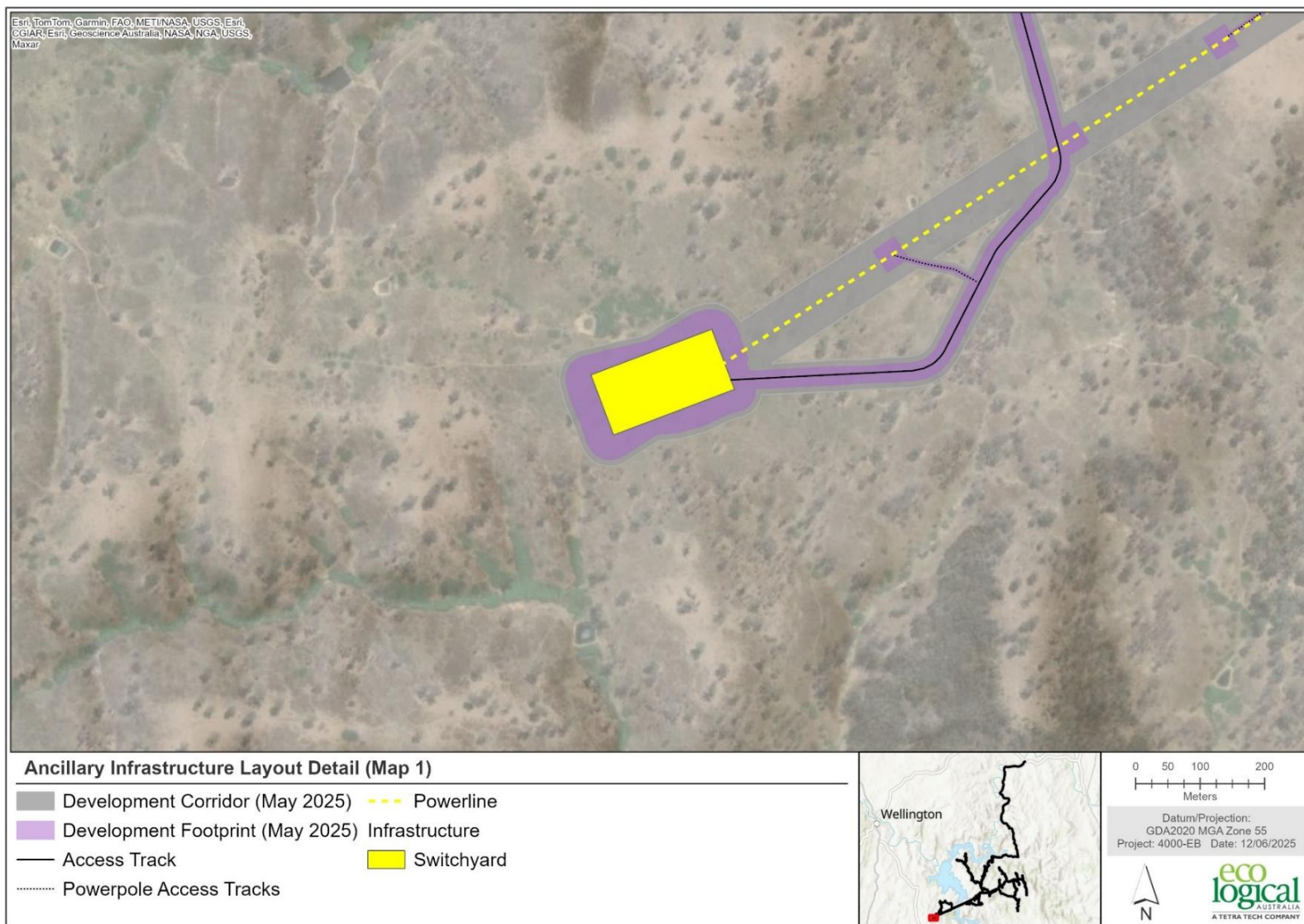


Figure 2-1: Ancillary Infrastructure -Switchyard

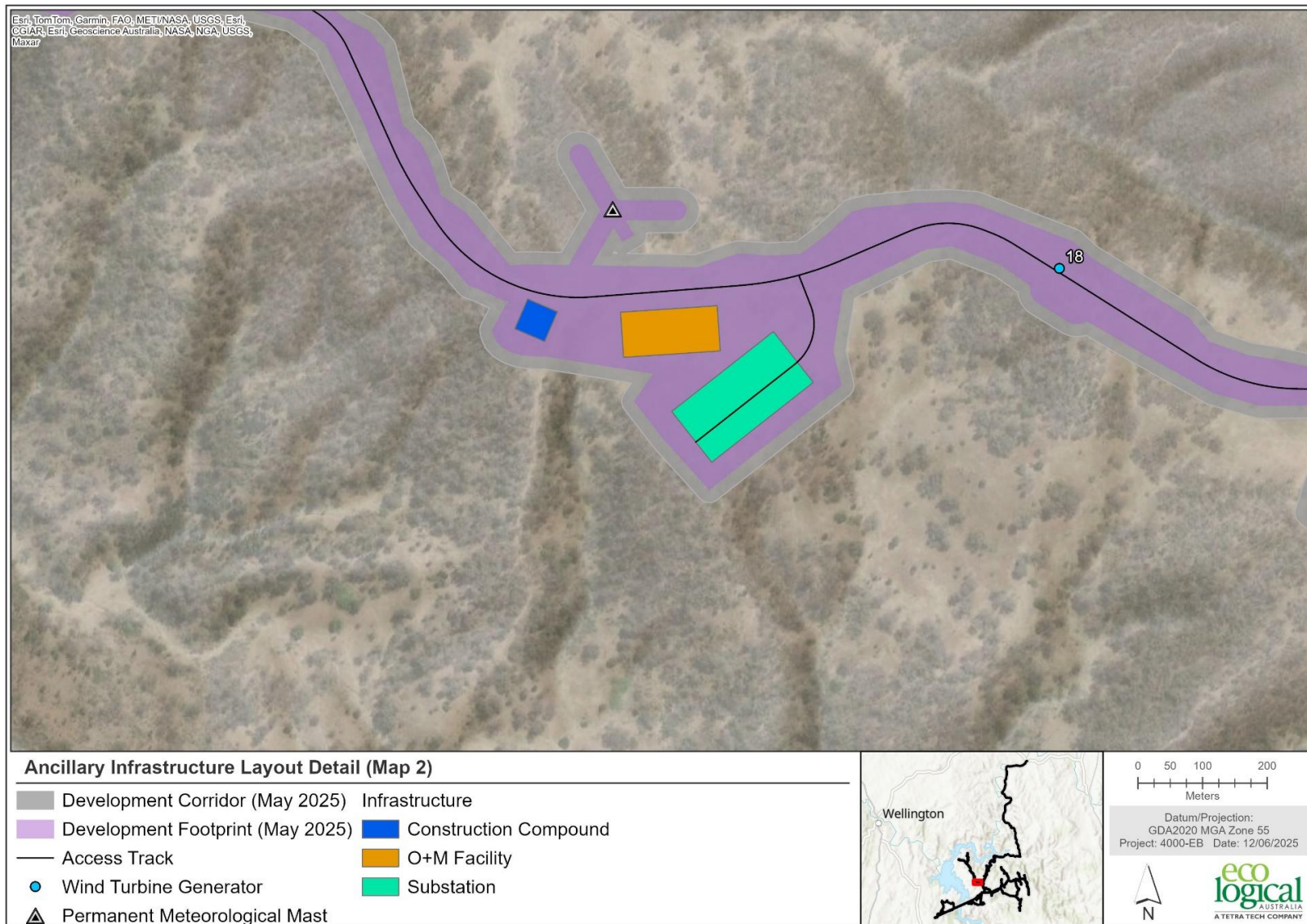


Figure 2-2: Ancillary Infrastructure - O&M Facility, Substation and Construction Compound

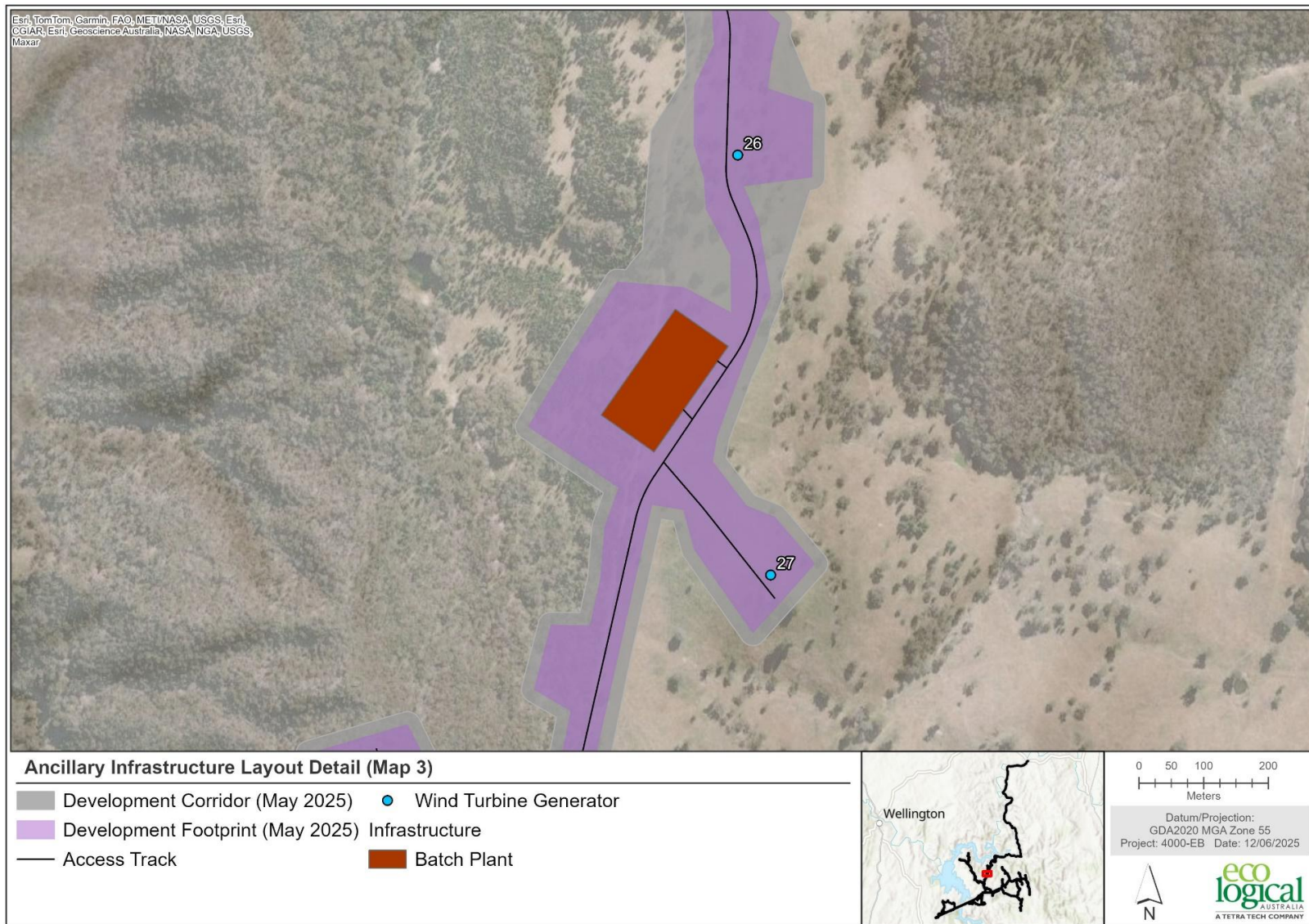


Figure 2-3: Ancillary Infrastructure - Batch Plant

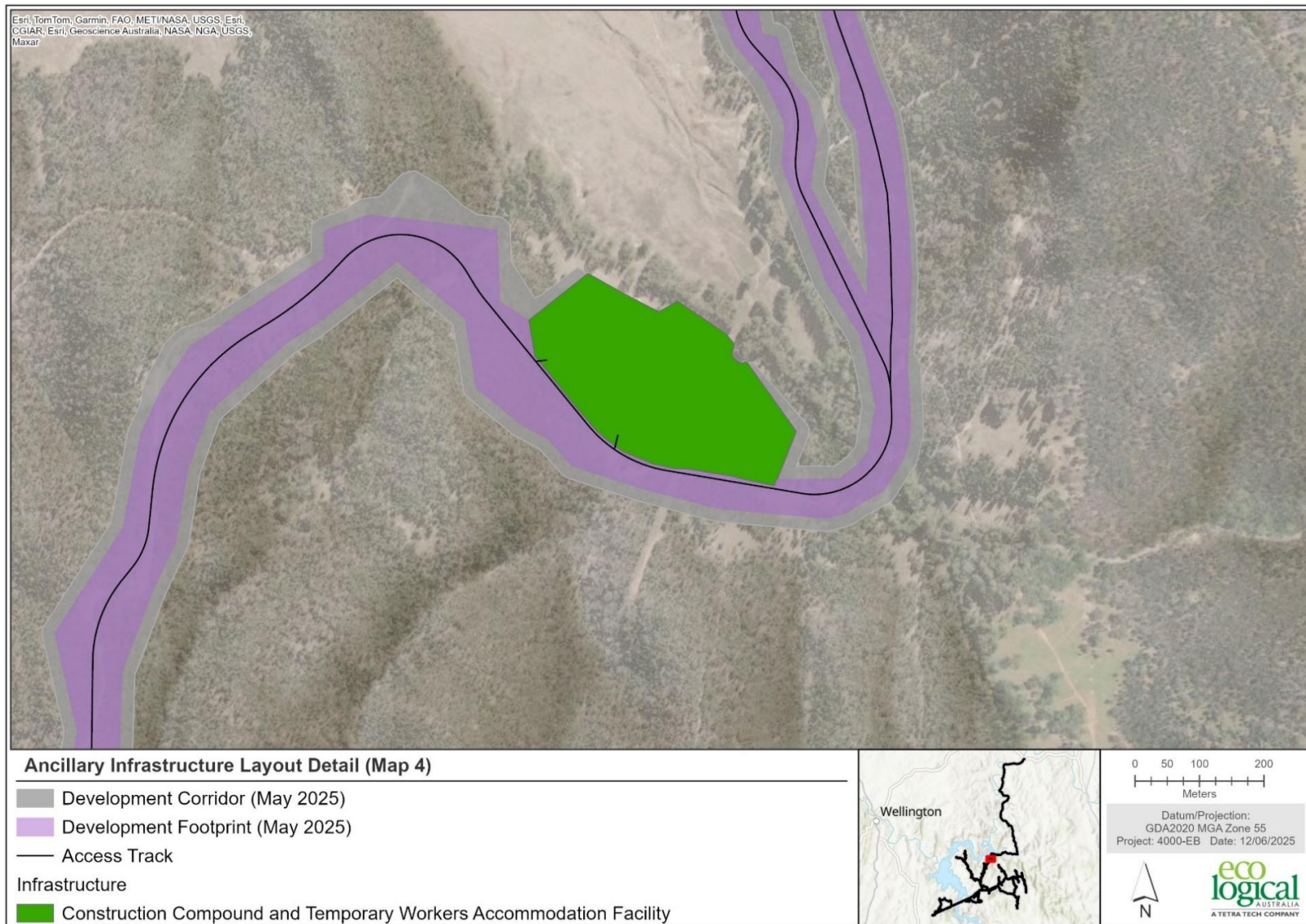


Figure 2-4: Ancillary Infrastructure - Construction Compound and TWAF

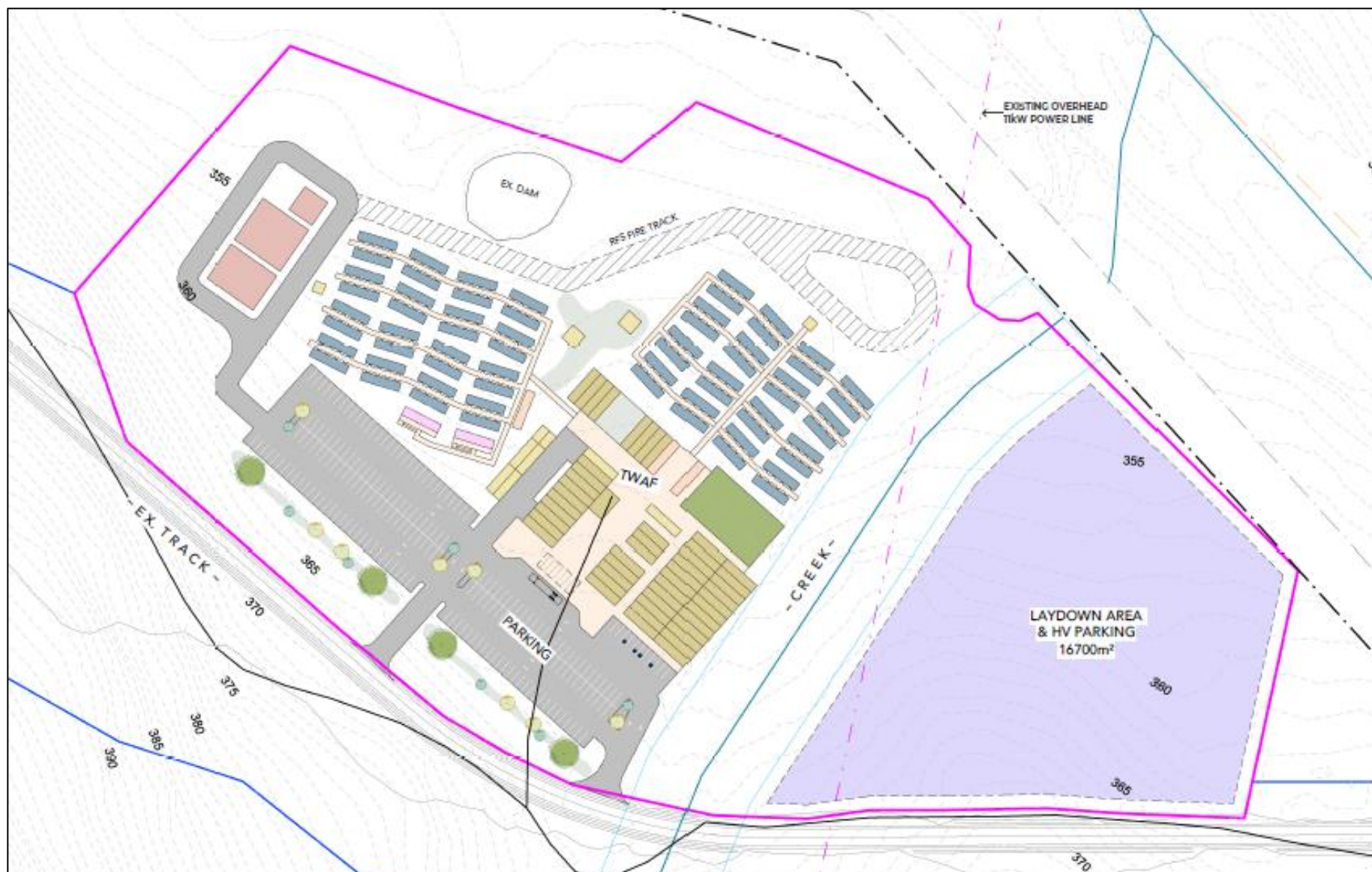


Figure 2-5: Ancillary Infrastructure - Construction Compound and TWAF Area - Detailed

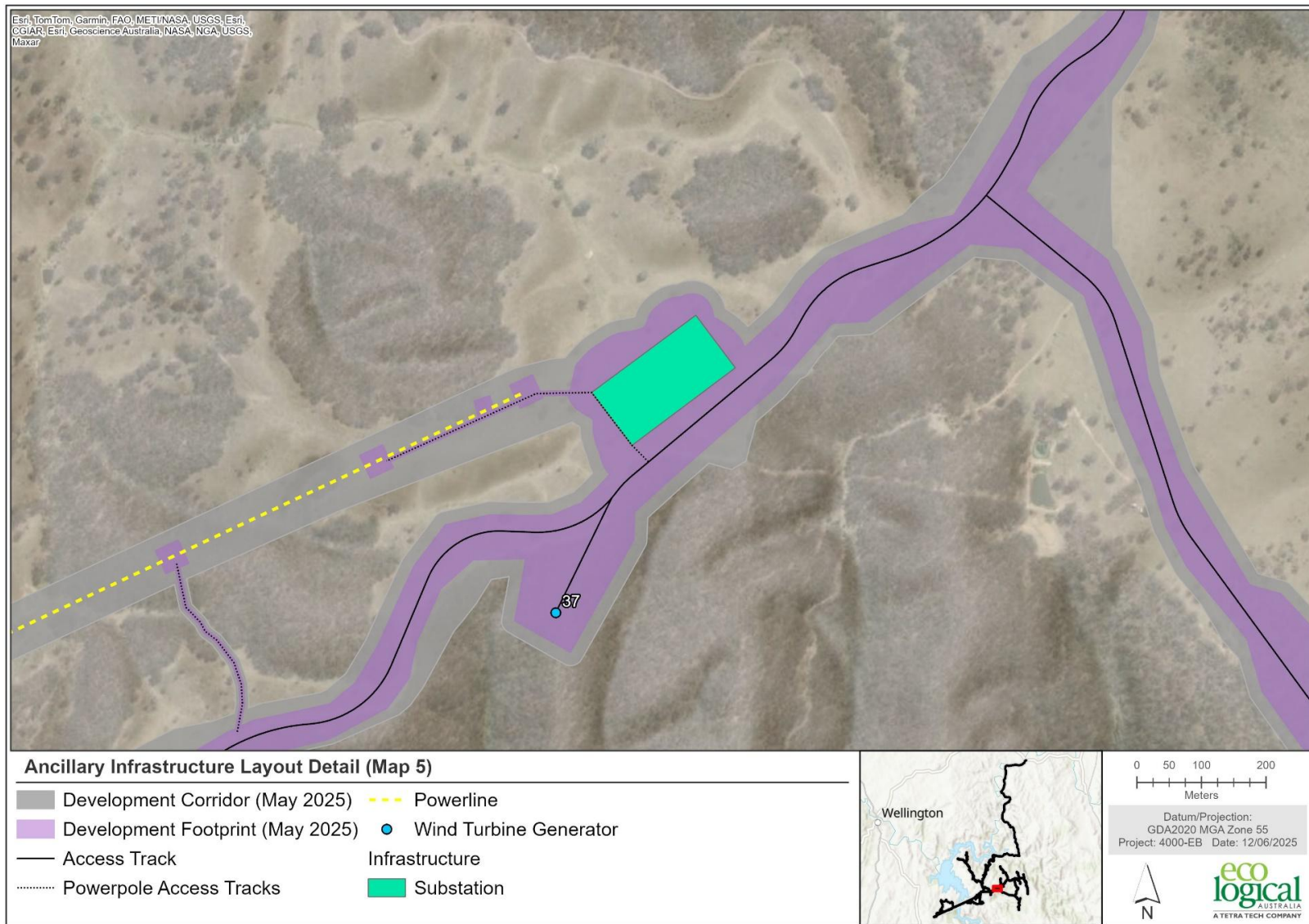


Figure 2-6: Ancillary Infrastructure - Substation

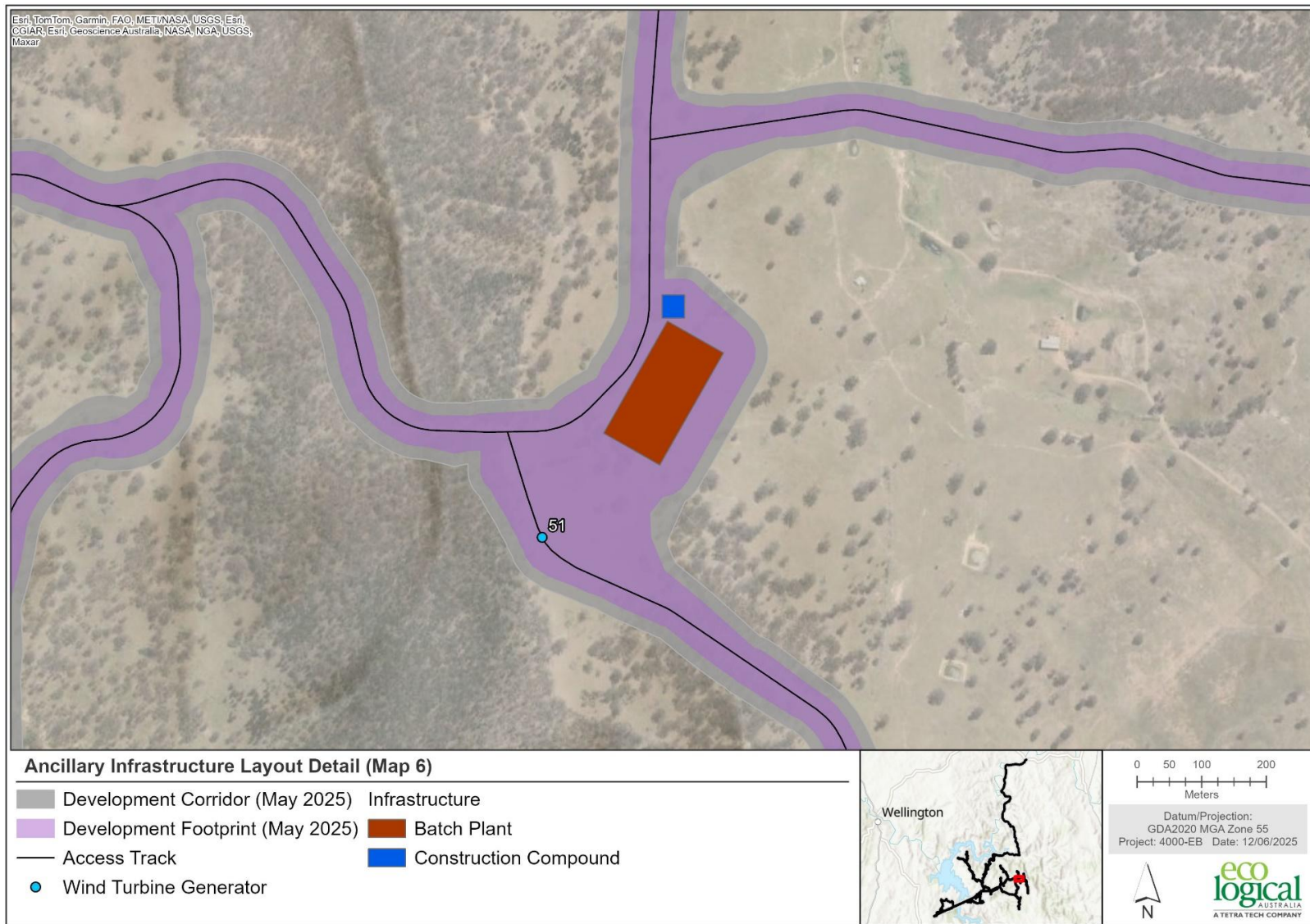


Figure 2-7: Ancillary Infrastructure - Batch Plant and Construction Compound

2.2. Wind Turbine Generators

The WTG market is continuously evolving with a trend towards larger, higher capacity WTGs, which reduces the cost of the energy produced. The Project has therefore been designed to accommodate a WTG of up to 250 m from the ground to upper blade tip. The coordinates for the WTGs are shown in Table 2-2.

The WTGs will be three-bladed, with the rotor and nacelle mounted on a tower with an internal lift. Figure 2-8 below displays an illustration of a WTG, detailing the component parts.

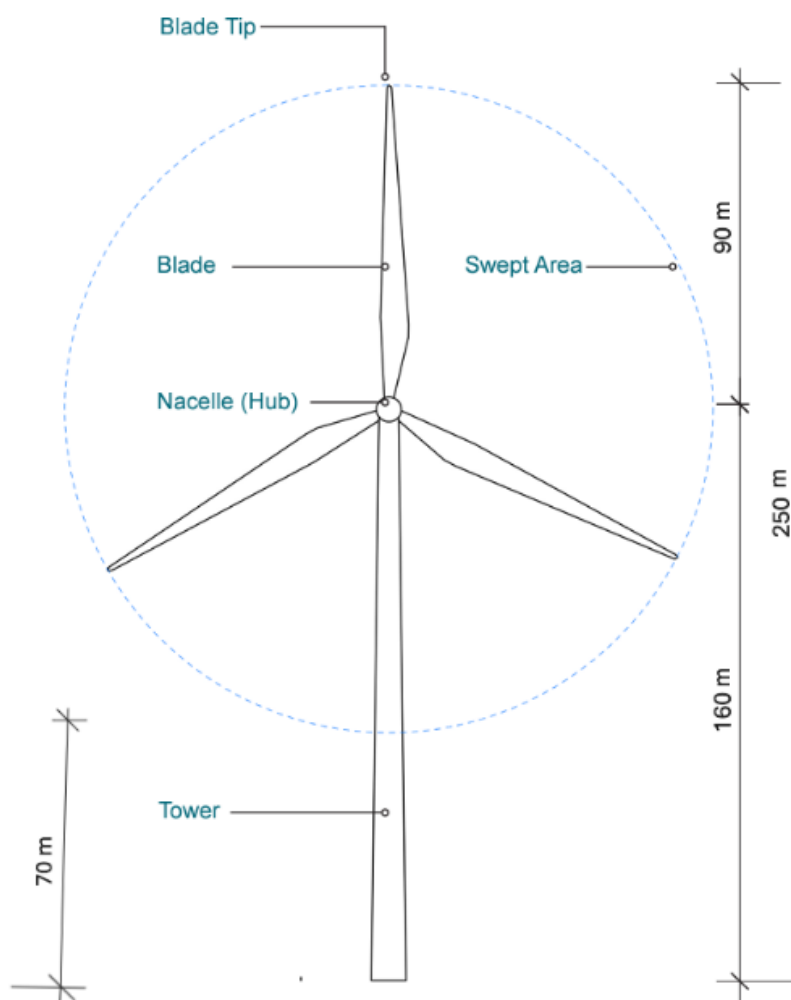


Figure 2-8: Components of a WTG

FOUNDATIONS

The WTG tower would be mounted on a reinforced concrete foundation, requiring removal of rock and subsoil at its base (Figure 2-9). It will be necessary for detailed geotechnical surveys to be carried out pre-construction to finalise the foundation design.



Figure 2-9: Concrete and steel reinforced WTG foundation

HARDSTAND

A hardstand and crane pad will be constructed adjacent to each WTG location to provide a temporary storage area for the WTG components and a base to assemble and operate the installation cranes (Figure 2-10).



Figure 2-10: WTG Hardstand and Crane Pad

TOWERS

The WTG supporting structure is typically a tapered tubular steel tower (Figure 2-11). The number of tower sections will depend on the WTG model and tower height selected. An internal lift provides access from the from the ground level to the nacelle at the top of the tower.



Figure 2-11: WTG tower section and installation cranes

NACELLE

The nacelle of a WTG sits at the top of the tower and houses the generator, gearbox (if used), electrical converters, generator transformer and control systems. The control system ensures that the wind turbine always faces into the wind and adjusts the blade pitch angle to regulate rotational speed and power output. The nacelle also houses a winch to assist in lifting maintenance equipment or smaller replacement parts to the nacelle.

ROTOR AND BLADES

The WTGs are equipped with a rotor comprising three blades and a hub. The Project has been designed for rotors of up to 180 m diameter, however it is possible that the selected turbine model will have slightly larger rotors but remain within the assessed 250 m tip height limit. WTG blades are made from fibreglass and carbon fibre reinforced epoxy materials. Lighting conductors are incorporated along the length of each blade (Figure 2-12).



Figure 2-12: Example WTG Blade

Table 2-2: WTG Coordinates

#	Easting	Northing	#	Easting	Northing
1	705018	6388683	36	711081	6378009
2	704832	6388072	37	712592	6379268
3	705064	6387474	38	713802	6379107
4	705153	6386949	39	714070	6378579
5	702819	6387115	40	713490	6385191
6	703454	6386965	41	713643	6384718
7	704374	6386628	42	714014	6384400
8	704812	6386348	43	714280	6383560
9	705187	6385634	44	714716	6381191
10	705509	6385238	45	713615	6382099
11	705754	6384807	46	713542	6381449
12	705616	6384385	47	714305	6380092
13	706033	6383905	48	713509	6380332
14	706394	6383566	49	717716	6383623
15	706615	6383009	50	718026	6383163
16	706688	6382517	51	718008	6381636
17	706545	6382042	52	718545	6380890
18	708114	6381540	53	719460	6382624
19	708551	6381161	54	719550	6382157
20	709068	6381997	55	719678	6381688
21	710873	6385665	56	719837	6381249
22	709785	6385530	57	720060	6380324
23	710301	6385084	58	720343	6379738
24	710288	6384343	59	720395	6379158
25	709900	6384731	60	720429	6378715
26	709830	6383888	61	720459	6378268
27	709881	6383238	62	717544	6378680
28	709254	6382926	63	717224	6377955
29	708774	6380587	64	717351	6377585
30	709120	6379905	65	717749	6377182
31	709745	6379823	66	718469	6376867
32	710240	6379610	67	718274	6376134
33	710598	6379349	68	718326	6375378
34	710746	6378936	69	718150	6374762
35	711139	6378510	70	718175	6374252

Coordinate reference system: GDA94 MGA Zone 55

2.3. Permanent Ancillary Infrastructure

Ancillary infrastructure refers to all wind farm infrastructure except for the WTGs, and includes substations, O&M compounds (including offices and car park), electrical infrastructure (including underground and overhead electricity transmission lines), 3 permanent meteorological masts, hardstands, and internal roads. The location of the proposed ancillary infrastructure is presented in Table 2-3.

Table 2-3: Proposed Ancillary Infrastructure Locations (centroid coordinates)

Ancillary Infrastructure	Easting	Northing
Substation	712760	6379629
Substation	707625	6381342
Switchyard	696877	6372464
O & M Facility	707513	6381443
Permanent Met Mast 1	707423	6381631
Permanent Met Mast 2	719387	6383103
Permanent Met Mast 3	718551	6377118

Co-ordinate reference system: GDA94 MGA Zone 55

INTERNAL ACCESS TRACKS

Internal access tracks will be constructed within the wind farm site to enable the construction, operation and decommissioning of the Project. The tracks will be unsealed with a trafficable width of approximately 5.5 m. The track width will be wider on corners.

Access tracks approximately 4 m wide will be used to install overhead powerline power poles. The powerline construction tracks follow the alignment of existing farm tracks to reduce the track footprint.

SUBSTATIONS

Up to two collector substations will be constructed within the wind farm site. Underground electrical cabling (33 kV) will connect each of the individual wind turbines to a substation. The substations will include a number of 33/330 kV power transformers as well as the associated control, electrical protection, telecommunication equipment and amenities. A security fence and bushfire Asset Protection Zone will be maintained around the substation (Figure 2-13).



Figure 2-13: Wind Farm substation, switchyard and O&M Facility example

HIGH VOLTAGE POWERLINE

A 330 kV overhead pole-mounted powerline will connect the wind farm substation(s) to the grid connection point at the switchyard (Figure 2-14).



Figure 2-14: 330kV overhead powerline construction

SWITCHYARD

A 330 kV connection switchyard will be constructed adjacent to the existing Transgrid Wellington to Mt Piper transmission line (Line #72). Transgrid will build, own and operate the 330 kV switchyard (Figure 2-13).

OPERATIONS AND MAINTENANCE

An O&M facility will be established to manage the ongoing operation and maintenance of the wind farm. The facility will include an equipment laydown area, vehicle parking, office, amenities, workshop and spares storage shed (Figure 2-13).

PERMANENT METEOROLOGICAL MASTS

Three guyed meteorological masts and associated instrumentation will be installed to facilitate the operation and performance monitoring of the wind farm. The height of the masts will match the hub height of the wind turbines.

TELECOMMUNICATIONS FACILITIES

Telecommunication facilities providing for transmission of voice, data, image, graphic and video information are proposed to be installed on-site at standalone locations or onto wind farm infrastructure such as permanent masts.

The telecommunications facilities including (if required) masts and the guy wires that secure them may need to be located outside of the Development Corridor, however they will remain within the Project Site.

The final number and location of the Telecommunications Facilities will be determined post-approval, post-WTG selection and following the detailed design in discussion with the relevant telecommunications service provider.

UTILITY SERVICES

The Project will be connected to TransGrid’s transmission network and when not generating will draw a minor amount of electricity from the grid. Backup and emergency power at the Substations may be supplied by a local distribution line, on-site batteries and/or a standalone diesel generator. Two separate and independent telephone communications facilities (optic fibre and microwave) will be required to be installed between the Substations as required by the Australian Energy Market Operator (AEMO) to enable safe remote monitoring and control of the Project. Mobile telephone coverage is available on some of the ridgelines and plateaus with limited or no service available on most of the valley floor. Although the Project will not rely on this form of communication, it can be assumed that members of the construction, O&M teams will communicate using both mobile telephones and radios.

Operational water requirements will be provided to the proposed facilities and auxiliary services building from a storage tank designed to collect water from roof drainage and augmented by potable water delivered by tankers. An approved septic system or composting system will be installed to treat minor quantities of wastewater, subject to securing the relevant authorisation. Other waste will be classified and removed from the Project Site to an approved facility (landfill, recycling etc).

Water supply for the TWAf will be via bulk water deliveries via tanker trucks from approved off-site sources, which will be determined during the detailed design phase of the Project, with potential options including licensed extraction from the Macquarie River, Cudgegong River, Burrendong Dam, or other approved water supply operators in the region. Delivered water will be stored in dedicated water storage tanks strategically located across the TWAf to support daily operational demands. Storage capacity will be designed to accommodate fluctuations in water use and to ensure uninterrupted supply during peak construction periods (Barnson 2025).

SIGNAGE

Traffic signage required as part of traffic safety during construction will be installed by the contractor, in compliance with relevant regulations and in accordance with any permits obtained for traffic management.

Signage will be erected at critical locations from the outset of construction, directing all vehicles associated with the construction to the Project Site office. Additional signage would be located close to the Project Site, providing information about the Project, the companies involved and essential safety information and telephone numbers.

Consultation with relevant local Councils and Transport for NSW (TfNSW) will be initiated to determine final signage locations.

2.4. Temporary Ancillary Infrastructure

A number of temporary facilities will be established during the construction phase of the Project. These facilities will be removed and the impact areas rehabilitated following completion of the commissioning of the wind farm. The locations of the temporary ancillary infrastructure is shown in Table 2-4.

Table 2-4: Temporary Ancillary Infrastructure (centroid coordinates)

Temporary Facilities	Easting	Northing
Site office and construction compound	711512	6386681
Temporary workers accommodation	711512	6386681
Construction compound	718212	6381995

Temporary Facilities	Easting	Northing
Construction compound	707305	6381461
Batch Plant	709718	6383540
Batch Plant	718197	6381861
Temporary Met Mast 1 (near T35)	705733	6384799
Temporary Met Mast 2 (near T11)	711209	6378561

Co-ordinate reference system: GDA94 MGA Zone 55

TEMPORARY WORKERS ACCOMMODATION FACILITY

A Temporary Workers Accommodation Facility (TWAF) will be constructed together with the construction site office and construction compound near the site access point at the northern end of the Project Site. The TWAF has been designed to accommodate 90% of the peak construction workforce as well as the staff that would manage and operate the facility. An example TWAF is shown in Figure 2-15.



Figure 2-15: Example TWAF

SITE OFFICE AND CONSTRUCTION COMPOUNDS

The TWAF will incorporate a construction site office and associated facilities, including amenities, light vehicle parking, heavy vehicle parking, equipment laydown/storage areas, power supply, water, wastewater treatment and communication services.

Two additional construction compounds will be established on the Project Site to provide suitable areas for the temporary storage of wind turbine components, cabling, construction plant and construction materials.

MOBILE ROCK CRUSHING

Mobile rock crushing plant and equipment will be used at across the Project Site – typically as part of the foundation excavation work at suitable wind turbine locations. The use of suitable crushed and screened materials will reduce the need to transport materials for track construction from off-site. Any rock crushing plant and equipment will be located within the Development Footprint. Example rock crushing plant is shown in Figure 2-16.



Figure 2-16: Mobile Rock Crushing Plant

CONCRETE BATCHING PLANTS

Two concrete batching plants will be established to produce the concrete required for the WTG foundations. The batch plants will include stockpile areas for sand and aggregate materials, storage tanks for cement and water, mixing and dispatch hoppers and chutes.

Each batch plant area is sized to accommodate entry and exit for the bulk delivery vehicles, front-end loaders and concrete trucks. The batching plant would include an in-ground water recycling / first flush pit to prevent dirty water escaping onto the surrounding area and would be fully remediated after the construction phase.



Figure 2-17: Concrete Batching Plant

TEMPORARY METEOROLOGICAL MASTS

There are currently two temporary 110 m tall meteorological mast installed on the Project Site which are used to measure wind speed, wind direction, temperature and humidity at different heights above ground level.



Figure 2-18: Temporary Met Masts

2.5. Flexibility

As with most wind farm developments, the location and dimensions of the Project components are likely to change slightly during the detailed design process. The other key reason for having flexibility for the location of the Project components is to enable further reduction of the associated environmental impacts during the detailed design and construction phases.

To accommodate this approach:

- The Development Footprint has been defined to incorporate all temporary and permanent ground disturbance associated with the construction and operation of the wind farm. There is likely to be some change in the design and layout of components within the defined Development Footprint.;
- A Development Corridor larger than the Development Footprint was defined and the ground disturbance based environmental assessments (biodiversity & heritage) were carried out over this larger area. The extent of the Development Corridor varies, but is typically 20 m wider on each side of the Development Footprint.
- During detailed design and construction the dimensions and area of the Development Footprint will not be increased, but flexibility is sought to micro-site Project element and the associated Development Footprint within the defined and assessed Development Corridor.
- WTG locations will not be micro-sited by more than 100 m from the locations listed in Table 2-2, and will remain within the Development Corridor
- Micro-siting of any WTG shall be limited to ensure that the blade tip is at least 50 m from the canopy of existing hollow-bearing trees or where the proposed WTG location is such that the blade tip is already

within 50 m of the canopy of existing hollow-bearing trees that the revised location is not any closer to the existing hollow-bearing trees

- Following detailed design and confirmation of the final turbine number and layout, the permanent meteorological masts may need to be relocated, but will remain within the Development Corridor

2.6. Mitigation Measures in Physical Layout

As part of the development of the physical layout and design of the Project, mitigation measures were designed to be integrated into the Project (Appendix C of the Amendment Report). These measures are designed to stop, limit, or mitigate some of the risks associated with the development of the Project and include, but are not limited to:

- Prevention measures associated with fire hazard risk for the proposed transformers and equipment, and WTGs.
- Prevention measures associated with public health and magnetic fields, including increasing the distance from the source, rearranging equipment layout and equipment orientation and substation siting.
- Prevention measures associated with bushfire and electrical fire, including the construction and maintenance of APZs, lightning protection, heat barriers, heat and/or smoke detection systems, and suppression systems.
- Prevention measures associated with blade throw, including ensuring the WTG components are manufactured and certified to current best practice Australian and international (IEC 61400-23) safety standards.
- Prevention measures associated with visual amenity, including ensuring uniformity in the colour, design, rotational speed, height and rotor diameter of the WTGs, the use of simple muted colours and non-reflective materials to reduce distant visibility and vegetation screening.

2.7. Site Access

The Project Site will be accessed from the public road network via two proposed site access location that will service the site during construction, operation, maintenance and decommissioning the access points will have gates and be secured, and appropriate warning signs erected.

The north eastern access is via Burrendong Dam Road, Yarrabin is the main site access that will service most of the wind farm with the exception of the a section of the HV wind farm powerline and connection switchyard. As the section of HV powerline and connection switchyard is located on the western side of the Lake Burrendong a second access point is proposed off Tara Road, Mumbil on the south-western side of the site. (see Figure 1-2)

During the windfarm construction, all over-size, over-mass (OSOM) vehicles will use the main site entry via Burrendong Dam Road, while heavy and light vehicles transporting materials resources and people will used both site access points.

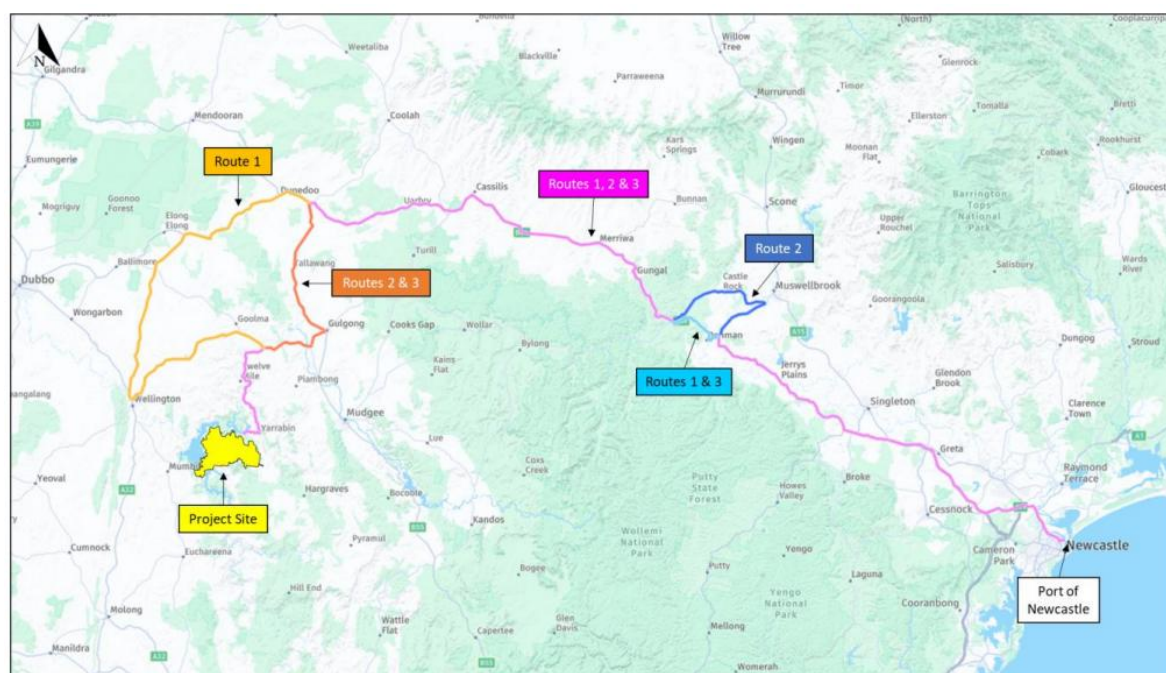
2.7.1. Port to Site OSOM Transport route

As the nearest seaport to the Project Site is the Port of Newcastle, an OSOM route was assessed and a proposed route defined. Dependent on load specificity the OSOM Vehicle will follow one of the three routes as outlined in Table 2-5 and Figure 2-19

OSOM, Heavy and Light Vehicle routes will be further defined during the post-Development Consent period in the preparation of the Traffic Management Plan (TMP) and in consultation with TfNSW, DRC and MWRC.

Table 2-5: Transport Route for Project Elements

Blades (Max loaded height 5.6m)	Towers (Max loaded height 6.1m)	Remaining Components (Max loaded height 5.6m)
Route 1 Selwyn Street, George Street, Industrial Drive, Maitland Road, New England Highway, John Renshaw Drive, Hunter Expressway, New England Highway, Golden Highway, Saxa Rd, Mitchell Highway, Goolma Road, Twelve Mile Road, Yarrabin Road, Burrendong Dam Road.	Route 2 Selwyn Street, George Street, Industrial Drive, Maitland Road, New England Highway, John Renshaw Drive, Hunter Expressway, New England Highway, Golden Highway, Denman Road, Bengalla Road, Wybong Road, Golden Highway, Castlereagh Highway, Goolma Road, Twelve Mile Road, Yarrabin Road, Burrendong Dam Road.	Route 3 Selwyn Street, George Street, Industrial Drive, Maitland Road, New England Highway, John Renshaw Drive, Hunter Expressway, New England Highway, Golden Highway, Castlereagh Highway, Goolma Road, Twelve Mile Road, Yarrabin Road, Burrendong Dam Road.



Base image source: Nearmap

Figure 2-19: Port to Site Assessed OSOM Routes

The Port to REZ project being undertaken by EnergyCo and TfNSW includes a number of OSOM upgrades between the Port of Newcastle and the intersection of Golden Highway, Saxa Rd - Elong Elong and are expected to be completed by 2026, before the planned use by this Project.

2.7.2. Project Site Access

The Proponent proposes to undertake the road upgrades shown in Table 2-6 as part of the Project. Portions of Twelve Mile Road, Yarrabin Road and Burrendong Dam Road are currently on privately owned land, outside the boundaries of the gazetted road reserve and to regularise this situation MWRC has requested that the Proponent coordinate the opening and closing of the affected sections of the road reserve prior to carrying out the road upgrades. Refer to Table 2-7 for areas of privately owned land affected and figures in Appendix A for the realigned road reserves. This process will ensure that the road upgrade works and any future maintenance can occur within a designated road reserve. A typical road cross section is presented in Figure 2-20. Figure 2-21 shows the strategic design of the Goolma Road (classified road) and Twelve-mile Road (council road) intersection, which incorporates extended hardstand areas

Table 2-6: Road Upgrade Works

Local public roads	Location	Proposed works
Goolma Road/Twelve Mile Road	Intersection	Intersection upgrade to accommodate BAH treatment for the largest vehicle (26m B-double) and OSOM turn radius to TfNSW, MWRC and relevant Austroads standards
Twelve Mile Road	From Goolma Road to Yarrabin Road (~ 13 km)	Realignment of the horizontal and vertical road geometry, resurfacing, sealing of 6.2m wide carriageway as well as improving drainage and upgrading a number of creek crossings and cattle grids to relevant Austroads standards.
Twelve Mile Road/Yarrabin Road	Intersection	Intersection upgrade to accommodate OSOM turn radius to MWRC standards
Yarrabin Road	From Twelve Mile Road to Burrendong Dam Road (~ 22 km)	Realignment of the horizontal and vertical road geometry, resurfacing, sealing of 6.2m wide carriageway as well as improving drainage and upgrading a number of creek crossings and cattle grids to relevant Austroads standards.
Yarrabin Road/Burrendong Dam Road Intersection	Intersection	Intersection upgrade to accommodate OSOM turn radius to MWRC standards
Burrendong Dam Road	From Yarrabin Road to Site entrance (~ 7 km)	Realignment of the horizontal and vertical road geometry, resurfacing, sealing of 6.2m wide carriageway as well as improving drainage and upgrading a number of creek crossings and cattle grids to relevant Austroads standards.

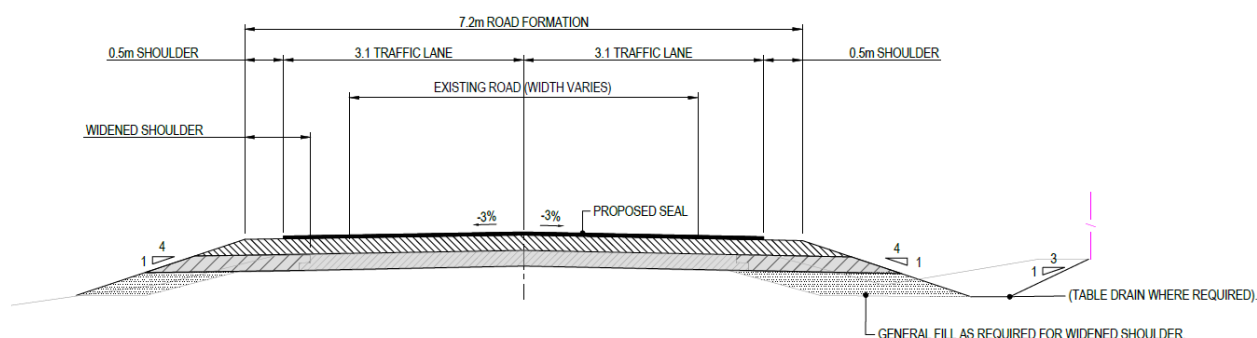
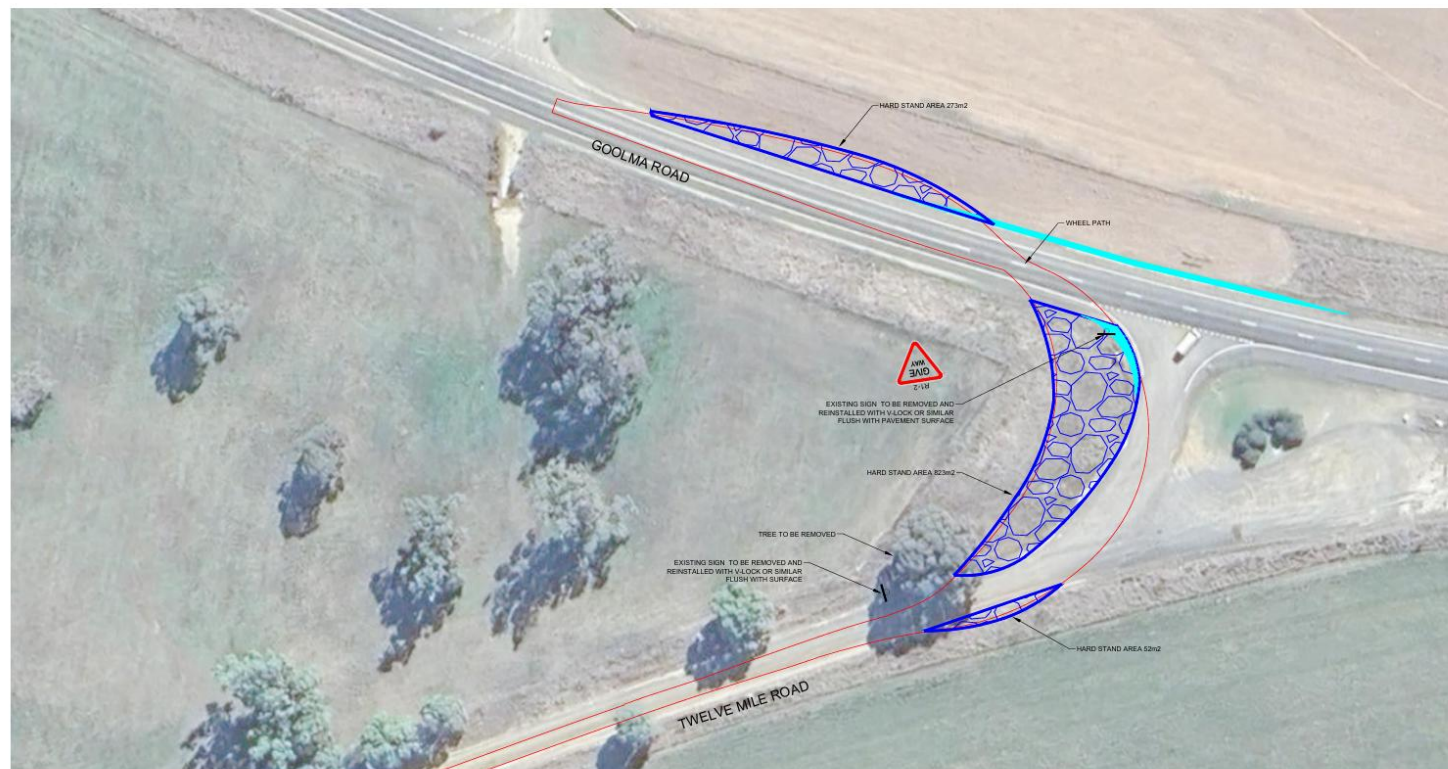


Figure 2-20: Road Upgrade typical cross section



CONSTRUCTION PLAN
SCALE 1:400

NOTE: The requirement for treatments to infrastructure is to be discussed in detail with TNSW and Council at a later stage. The extent of upgrade works will be subject to the discretion of the relevant authorities, particularly where it may be acceptable to retain existing infrastructure—such as kerbs, pavements, and roundabouts—where ARES have identified the OSOM trailer can safely track over them without permanent structural modifications i.e. through the use of road plates or as is.

LEGEND

- TOTAL HARD STAND PAVEMENT WORKS 1143m2 TO TNSW SPECIFICATIONS
- NEW PAVEMENT WORKS 99m2 TO TNSW SPECIFICATIONS
- EXISTING SIGN
- WHEEL PATH

NOT FOR CONSTRUCTION

 SYDNEY Suite 01 Ground Floor 26 Chandos Street, St Leonards NSW 2065 Phone # 02 9493 9500 www.emmconsulting.com.au	REV DATE COMMENT DRAWN REVIEWED		REV DATE COMMENT DRAWN REVIEWED			PROJECT: BURRENDONG WIND FARM 2D STRATEGIC DESIGN - GOOLMA ROAD AND TWELVE MILE ROAD, GOOLMA.	DRAWING TITLE: STRATEGIC DESIGN CONSTRUCTION PLAN OSOM	CLIENT: ARK ENERGY		REV: -
								DRG. #: EMM - C06		
								PROJECT #: E251001		
								SCALE: AS SHOWN		

Figure 2-21: Goolma Road to Twelve Mile Road Intersection Upgrade strategic design showing pavement to accommodate BAR treatment (in aqua) and pavement extent to accommodate OSOM blade transport (in Blue)

Table 2-7: Realignment of Road Reserve on Twelve Mile Road, Yarrabin Road and Burrendong Dam Road – Areas of Encroachment on Private Land and Crown Land

Landholder	Lot/DP	Proposed Dedication Land area (ha)	Rd area	Proposed Rd Reserve Closure Land area (ha)
1	1/1087887	1.019		0
	1/869050	0.977		0
	11/1098620	0.064		0
	15/756922	0.481		0
	16/756922	0.672		0
	2/130808	0.013		0
	2/843109	0.336		0
	2/869050	0.143		0
	20/756902	1.158		0
	3/1199081	0.221		0
	3/843109	0.230		0
	4/1199081	0.672		0
	45/40656	1.553		0
	5/843109	0.169		0
	7/1199081	0.192		0
	7/843109	0.163		0
	Total	8.063		0
2	112/1166561	0.047		0
	Total	0.047		0
3	1/756902	0.827		0
	Total	0.827		0
4	1/255732	0.004		0
	2/255732	0.186		0
	Total	0.190		0

Landholder	Lot/DP	Proposed Dedication (ha)	Rd Land area	Proposed Rd Reserve Closure Land area (ha)
5	3/255732	0.177	0	
	Total	0.177	0	
6	4/255732	0.287	0	
	TOTAL	0.287	0	
7	6/843109	0.987	0	
	Total	0.987	0	
8	35/756902	0.980	0	
	Total	0.980	0	
9	31/756902	0.597	0.02	
	Total	0.597	0.02	
10	40/756902	0.248	0.148	
	Total	0.248	0.148	
11	1/446123	0.924	0	
	10/756902	3.296	2.606	
	Total	4.220	2.606	
12	1/221173	3.469	0	
	160/756891	0.361	0.264	
	2/221173	0.058	0	
	2/231505	1.598	0.175	
	Total	5.486	0.439	
13	1/1146129	0.734	0.034	
	Total	0.734	0.034	
14	96/756891	0.172	1.501	
	Total	0.172	1.501	
15	2/1146129	4.418	0	
	Total	4.418	0	

Landholder	Lot/DP	Proposed Dedication (ha)	Rd Land area	Proposed Rd Reserve Closure Land area (ha)
16	3/1130715	3.163		0.828
	Total	3.163		0.828
17	79/756891	0.302		0
	Total	0.302		0
18	1/788518	0.079		0
	3/788518	0.854		0
	Total	0.933		0
19	1/601087	0.191		0
	Total	0.191		0
20	2/601087	0.058		0
	Total	0.058		0
21	1/780706	1.612		0
	2/229937	0.692		0
	67/756891	0.193		0
	Total	2.497		0
	Grand Total Private Land	34.577		5.576
The State Of New South Wales	44/40633	1.062		0
	46/40656	0.041		0
	7300/1149023	0.277		0
	7301/1148954	0.978		0.451
	7305/1148490	0.135		0
	Total	2.493		0.451
The State Of New South Wales (perpetual lease)	34/756872	1.685		0
	Total	1.685		0

Landholder	Lot/DP	Proposed Dedication (ha)	Rd Land area	Proposed Rd Reserve Closure Land area (ha)
Grand Total Crown Land		4.178		0.451

3. Uses and Activities

3.1. Land Uses

The Project site is zoned as RU1 (Primary Production) and E3 (Environmental Management), with a minor SP2 (Infrastructure) zoning to the north which corresponds with a tourist park. The Project is located within both the Dubbo Regional Council (the result of a merger between Wellington and Dubbo Shire Councils) and Mid-Western Regional Council (Figure 3-1).

The Project Site borders Lake Burrendong to the West of the site. The majority of the Project Site has been previously degraded or modified for agricultural development and consists of a mix of cleared lands and remnant woodlands and forests. Some sections of the Project Site however do contain areas of intact native vegetation. The Project design process has avoided areas of native vegetation where possible.

The Project Site is located within the Far West and Orana region of NSW, which has an area of approximately 33,936,588 ha. Of the total area of the Far West and Orana region, agricultural practices such as grazing native vegetation, modified pastures, cropping, and horticulture utilise approximately 29,620,376 ha, or 87.28%, (ABARES, 2023). The Project will involve the temporary diversification in land use of up to 1,322 ha (Development Corridor), accounting for 0.01% of all land used for agriculture in the Far West and Orana region, for the duration of the Project life. While this temporary change in land use may reduce agricultural production, the reduction will primarily be a result of the construction period. Following the completion of construction works, grazing will continue within the Project Site, allowing for the continuation of agricultural activities and helping to control vegetation. Therefore, at a regional level, impacts to agricultural production will be minimal. At the conclusion of the life of the Project, the Project Site would be decommissioned and rehabilitated to permit the resumption of grazing activities across nearly all the previously utilised area.

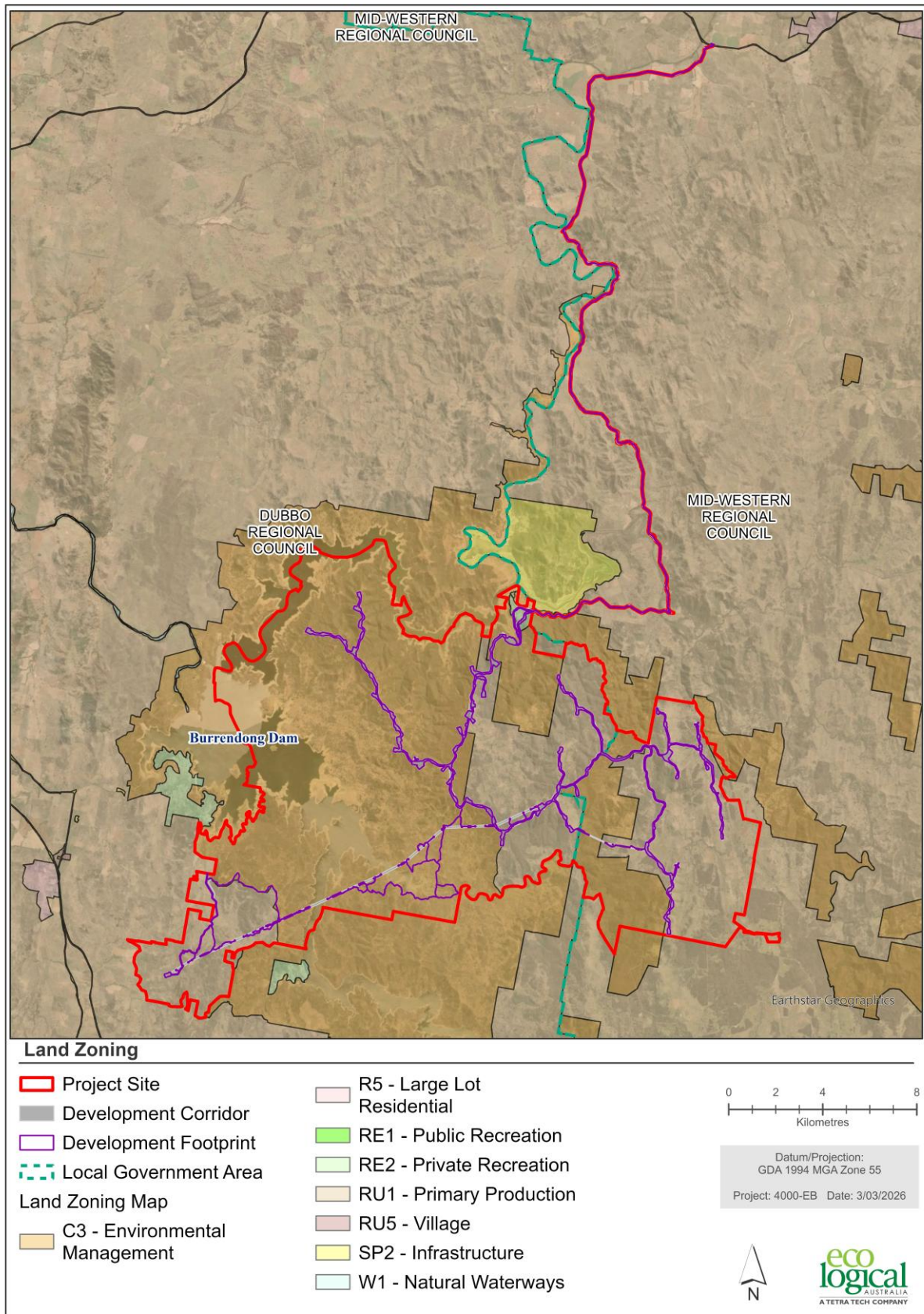


Figure 3-1 Project Site and Land Use Zoning

3.2. Proposed Activities within the project site

The proposed activities for each Project phase are outlined in Table 3-1.

Table 3-1: Proposed Activities during Project Stages

Project Phase	Proposed Activities
Pre-construction	• Preliminary geotechnical investigations • Detailed design • Procurement • Preparation and approval of environmental management strategy & plans
Early Works	• Surveys including road dilapidation surveys • Flora and fauna investigations and pre-clearing surveys and inspections. • Minor clearing of vegetation • Civil works for temporary site offices and Temporary Workers Accommodation Facility • Installation of temporary site offices and compounds • Installation of environmental impact mitigation measures, fencing and enabling works • Intersection and road upgrades on the public road network • Establishment of Project Site access points, minor access roads and minor adjustments, etc. including associated vegetation removal and heritage artefact salvage.
Construction Works	Includes all physical works to enable the operation of the Project, including but not limited to, • the construction and installation of TWAF, WTGs, compounds, transmission lines • construction of ancillary infrastructure • the establishment or construction of any temporary facilities which were not already established during the Early Works phase.
Operation and Maintenance	• Ongoing operation, monitoring (both on-site and remote monitoring) and maintenance of all Project infrastructure and land within the development corridor during the operational lifespan of the Project (approximately 30 years). • Maintenance of land within Development Corridor. • Replacement of major components as required, such as WTG blades. This may require the use of cranes and ancillary equipment.
Decommissioning	• Includes all physical works required for the dismantling and transportation of Project infrastructure and restoration of the Project Site to near prior condition.

3.3 Resource Requirements

CEMENT, AGGREGATE, SAND AND ASPHALT

Due to the presence of vast mining interests in the region, the sourcing of gravel and other raw material is found to be widely and readily available. Cement for the foundations will be sourced following the civil construction company selection and may occur locally or from an alternative supplier. Additionally, aggregate and sand will be sourced as close to the Project Site as possible. The use of rock crushers on site will help facilitate recycled materials to be used on site.

WATER

The water requirements for the Project will be met in accordance with the provisions of the *Water Management Act 2000* (WM Act) by sourcing water from within the locality where practicable and from a licensed supplier. For the fixed water requirements for the Project, a total of 997 ML is estimated to be required for the earthworks (956 ML), the WTG footings (10.5 ML) and transmission line footings (6 ML) up to operation of the TWAF (24ML). In addition to this is the amount of water required for dust suppression, the amount of which varies based on the length of road being actively used and the climate at the time (further discussed in Appendix M of the Amendment Report).

The amount of water required for this Project will need to be sourced from an appropriate location with the relevant licences. Sources of water nearby are the Macquarie River (Wambuul), Cudgegong River, Burrendong Dam, and catchment farm dams (used for stock).

ROAD BASE

Road base material will be required for the construction of internal roads to access the WTGs, substations, compounds, and other ancillary infrastructure within the Project Site. Where practicable, part of the road base requirement will be sourced from material extracted from WTG foundations and any cut and fill from road construction, utilising rock crushing plant. Where the remainder of material is required, it will be sourced and imported to site via a suitably approved quarry.

4. Timing and Phasing

Following receipt of the anticipated planning approvals there are several planned pre-construction activities including:

- Detailed design
- Tendering and cost estimates
- Finalisation of grid connection agreement
- Development and approval of environmental management plans
- Financial investment decision
- Procurement

The project is not expected to be carried out in stages. A typical sequence of construction activities is as follows:

- Land surveying and setout
- Upgrade of local roads
- Site establishment including construction site office, TWAF and temporary facilities
- 330 kV switchyard construction
- Site clearing
- Access track construction
- WTG installation
- Substations and electrical reticulation
- Commissioning
- Rehabilitation

An anticipated timeline is outlined in Table 4-1

Table 4-1: Anticipated Project Timeline

Phase					Approximate Duration
Pre-Construction development)	(tender,	detailed	design,	contract	12-18 months
Early Works and Construction					24-30 months
Operation					30 years
Maintenance					Continuous and Ongoing
Decommissioning					At completion of Project Life

4.1. Description of Project Phasing

This section provides a description of the various phases of the Project lifecycle which would commence pending Development Consent.

The Project as described in this EIS is indicative and subject to changes following the detailed design process. The proposed layout of the Project has been prepared based on a range of factors and the best knowledge available at the time. The development of wind energy technology is progressing at a rapid rate. Therefore, while the Project proposes to develop 70 WTGs, commercial considerations, and technological advancements at the time of development may lead to fewer WTGs being selected for construction and operation.

Further design variations relate to specific requirements of the preferred suppliers selected following the granting of development consent. If granted, the preferred suppliers will have unique operating requirements and specifications, such as transport vehicle turning radii or crane requirements that would need to be considered as part of the final design process.

4.1.1. Pre-Construction

POST APPROVAL

Once all required approvals have been obtained, secondary approvals will be acted upon including approval of the Environmental Management System (EMS) and associated management plans, and application for an Environment Protection Licence (EPL) (if required) and other relevant authorisations.

MINOR WORKS

Prior to the commencement of construction, minor works will take place to further inform the detailed design and prepare the Project Site for construction. This may include:

- Surveys
- Geotech investigations
- implementation of environmental safeguards such as sediment fencing
- minor clearing of native vegetation
- establishment of temporary facilities.

4.1.2. Early Works and Construction

Construction works will commence following provision of detailed design inputs, which may be staged. Construction includes all physical works to enable the operation, including, but not limited to, the construction and installation of WTGs, construction of ancillary infrastructure and establishment or construction of any Temporary Facilities which were not already established as part of the minor works.

CONSTRUCTION HOURS

In general, project-related construction or decommissioning will occur during the following times:

- **Monday to Friday:** 7:00 am to 6:00 pm
- **Saturday:** 8:00 am to 1:00 pm
- No works on Sunday or public holidays.
- Work may also take place outside these designated hours under certain conditions, including:
 - When the activities cannot be heard (<35 dB) at nearby residences not associated with the project
 - When material deliveries or dispatches are required by NSW Police or other relevant authorities for safety purposes (OSOM delivery of turbine blades and tower sections)
 - When the work is needed to protect life, property, or the environment from significant harm
 - When approved by the Planning Secretary of the Department of Planning, Housing and Infrastructure (DPHI)

ROAD UPGRADES

The local public road upgrades will be undertaken during early works and prior to the commencement of construction of the wind farm to the satisfaction of the relevant road authorities.

TEMPORARY FACILITIES

Construction of temporary facilities such as offices, parking bays and toilet facilities will be undertaken. Temporary concrete or asphalt batching plant and rock crusher facilities will also be established.

ANCILLARY INFRASTRUCTURE

INTERNAL ACCESS TRACKS

Internal access tracks, turning heads and hardstands will be established using heavy earthworks machinery. Material excavated on-site for WTG and compound foundations and internal road alignments will be crushed on-site and used for road base or aggregate subject to meeting the relevant functional specification.

OVERHEAD TRANSMISSION LINES

Construction of the proposed overhead transmission lines requires the following works to be undertaken:

- Site establishment including the provision of access.
- Centreline surveying and service location.
- Easement preparation, including the lopping and / or removal of trees.
- Excavation and transmission pole erection.
- Conductor and earth wire installation (including pilot wire).

UNDERGROUND TRANSMISSION LINES

During WTG and electrical compound base construction, the underground transmission lines would be installed. This would involve the cutting or excavation of trenches for the laying of the underground transmission lines that link the Project components. The general procedure for the laying of underground transmission lines will be as follows:

- Establishment of trenches.
- Laying of banded cables.
- Backfilling and compaction of excavated area.

All trenches would be marked with warning tape and backfilled once the cables were in-situ. On completion the underground transmission lines may be marked with small marker posts, and the surrounding vegetation will be allowed to regrow.

OTHER ELECTRICAL INFRASTRUCTURE

Clearing and excavations will be undertaken, and reinforced concrete foundations will be constructed to support electrical infrastructure and buildings. Infrastructure required within the yard will include transformers, switchgear, power conditioning equipment, energy storage technology, switch room, cabling, and backup generators. The Substations will be designed and constructed in line with TransGrid requirements and any other relevant technical, electrical, and planning standards.

WIND TURBINE GENERATORS

Excavation of the WTG foundations will be undertaken to prepare the area for concrete pouring and WTG installation. Each foundation would be excavated, blinding layer of concrete placed, shuttering and steel reinforcement would be put in place and concrete poured to form the base in-situ.

If rock anchor foundations are required, the rock anchor cores would be drilled into the bedrock prior to concrete pour. The rock anchor tendons are grouted into place, stressed, and secured once the concrete has cured sufficiently. Steel form shuttering and steel reinforcement would then be put in place and concrete poured to

form the base in-situ. The upper surface of each base would finish at ground level with either a central reinforced concrete plinth to support the tower, or a base steel tower section set into the concrete.

Erection of WTGs is generally a two-stage process with the base and first two tower sections lifted into place. This generally takes one day to complete. Once this has been completed various minor works are undertaken before the remaining tower sections, nacelle, generator, hub, and blades are lifted into place. This can take three days to complete depending on the prevailing weather conditions.

Both mobile cranes and tower crane methods are considered appropriate for this Project.

COMMISSIONING

Pre-commissioning checks will be carried out on the high voltage electrical equipment prior to connection to the TransGrid transmission network. When the Project's electrical system has been energised, the WTGs and Substation will be commissioned and put into service. WTGs are commissioned sequentially enabling some WTGs to commence operation prior to the completion of wind farm construction.

4.1.3. Operations and Maintenance

Once operational, the Project would be monitored both by on-site staff and through remote monitoring. Aspects of the Project operation to be dealt with by on-site staff would include safety management, environmental condition monitoring, landowner management, routine servicing, malfunction rectification and site visits. Those functions to be overseen by remote monitoring include WTG and Substation performance assessment, Project reporting, remote resetting, and maintenance co-ordination.

On-site maintenance will require permanent access to the WTGs and Substation to address technical and mechanical servicing requirements. Replacement of major components, such as WTG blades, may require the use of cranes and ancillary equipment.

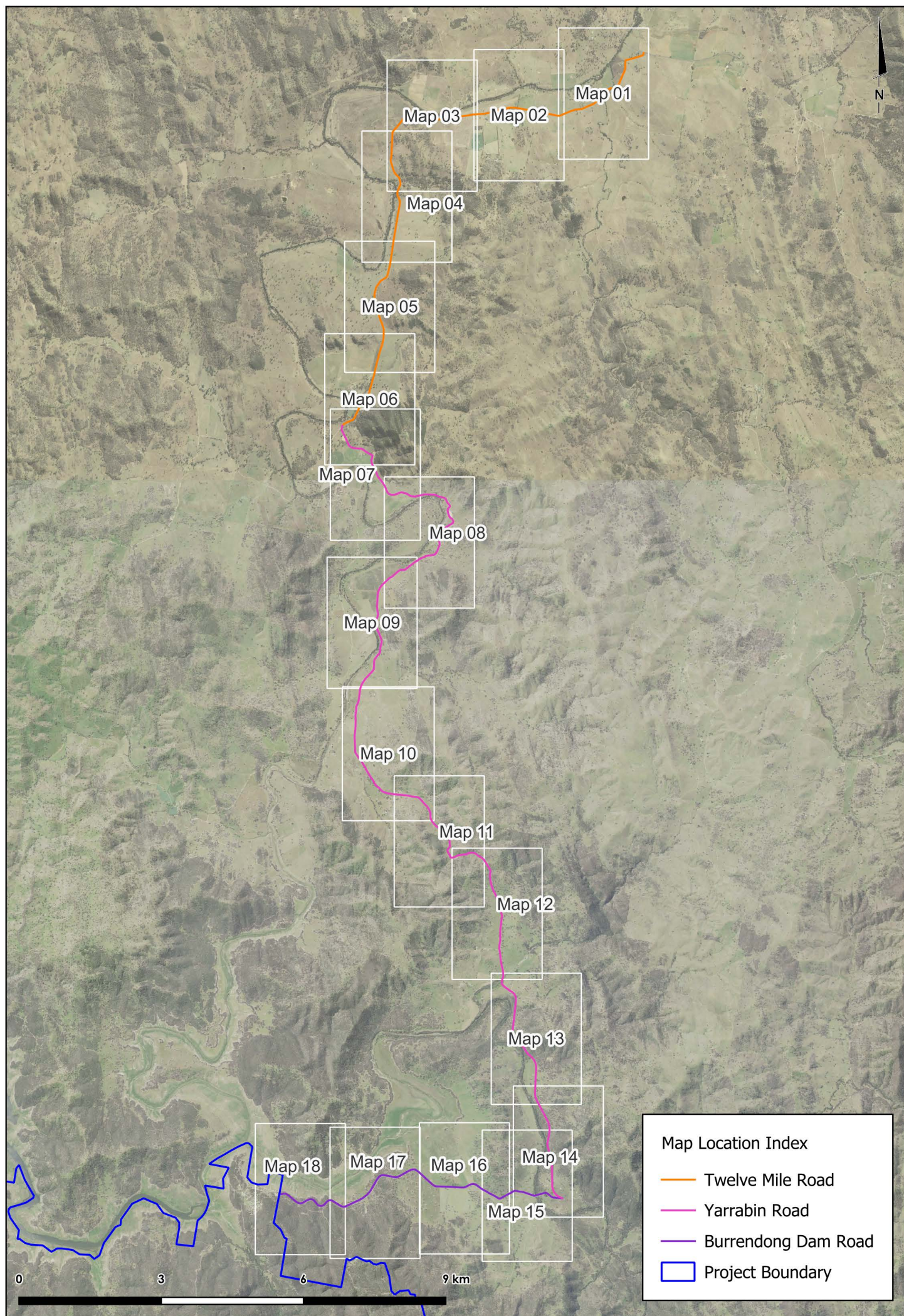
Management of regrowth and existing vegetation will be necessary within the overhead transmission line corridors to reduce the threat of fire and physical damage to the transmission line, and to allow access for maintenance vehicles. This will be carried out using mechanical, manual, and chemical clearing methods prior to construction activities commencing and as part of ongoing maintenance activities for the duration of the Project.

4.1.4. Decommissioning

At the end of the operational life of the Project, all above ground infrastructure will be dismantled and removed from the Project Site. This may not include the connection infrastructure which may be essential to be retained. WTG tower bases would be cut back to below ploughing level or topsoil built up over the foundation to achieve a similar result. The land will be returned to near prior condition and use.

Internal roads, if not required for ongoing farming purposes or fire access, would be removed and the Project Site reinstated as close as possible to its original condition and use. Access gates, if not required for farming purposes, would also be removed. Individual landowners will be involved in any discussion regarding the removal or hand-over of infrastructure on their property.

Appendix 1 – Figures showing road reserve realignment on private land













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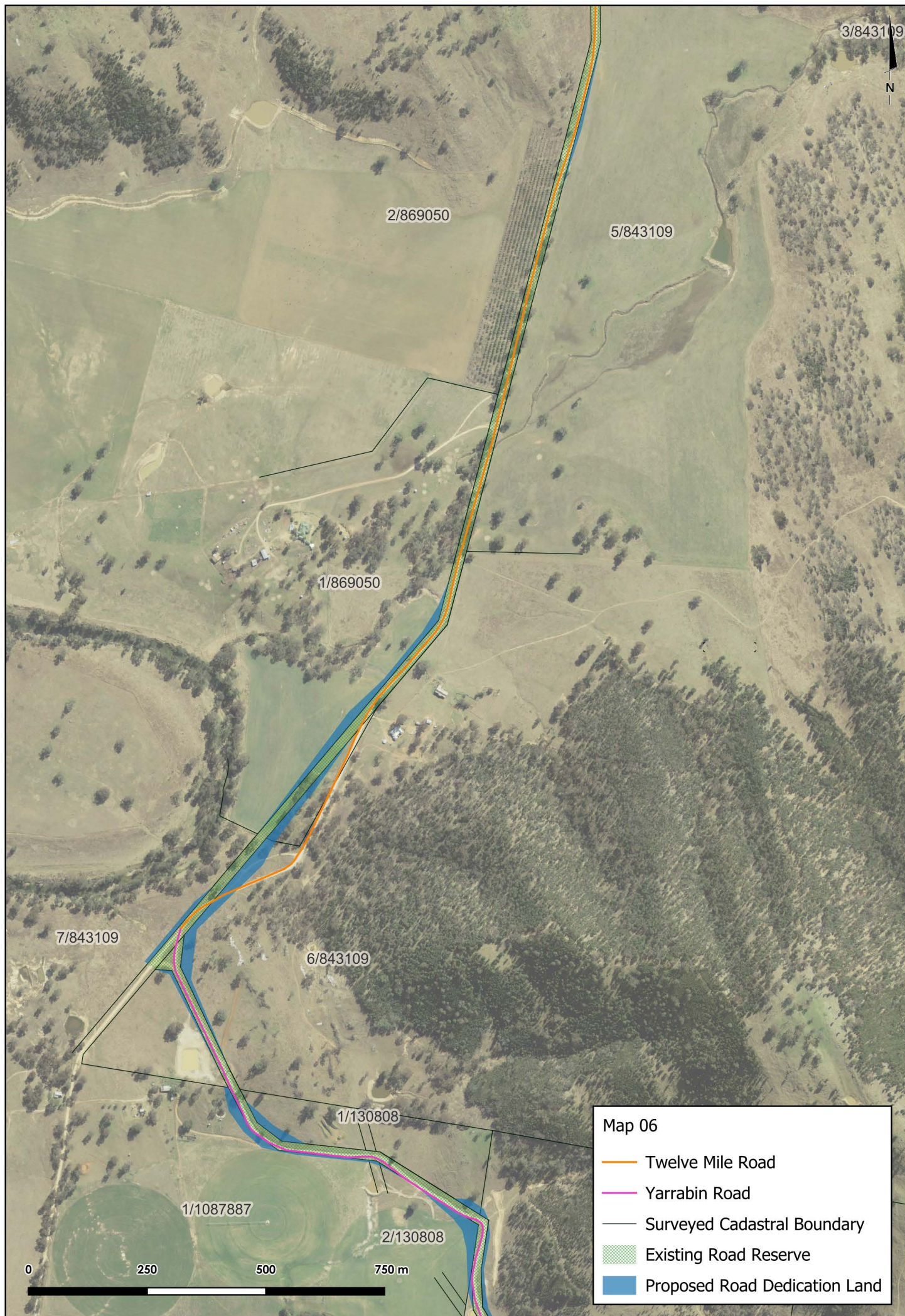
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Map 05

- Twelve Mile Road
- Surveyed Cadastral Boundary
- Existing Road Reserve
- Proposed Road Dedication Land





Map 07

- Twelve Mile Road
- Yarrabin Road
- Surveyed Cadastral Boundary
- Existing Road Reserve
- Proposed Road Dedication Land



















Map 16

- Burrendong Dam Road
- Surveyed Cadastral Boundary
- Existing Road Reserve
- Proposed Road Dedication Land





Map 18

- Burrendong Dam Road
- Surveyed Cadastral Boundary
- Existing Road Reserve
- Proposed Road Dedication Land
- Project Boundary