

Electrical HV Infrastructure Review & Supply Strategy Caravan Park, Magpie Lane Gulgong



November 2023

DOCUMENT CONTROL

Version	Date	Author	Reviewer	Revision Details
A	30/06/2023	Jamie Antonuccio	Ben Dennis	Initial Issue
B	15/11/2023	Jamie Antonuccio	Evelyn Tram	Plans updated to include finalised client plans and 2 substations
C	16/11/2023	Jamie Antonuccio	Evelyn Tram	Updated terminology

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1. SCOPE

This report has been prepared by Power Solutions NSW Pty Ltd as an input into the planning for the proposed development works at the Caravan Park, Magpie Lane Gulgong development. The review was commissioned by Michael Elliott of ADW Johnson Pty Ltd. The intention of this report is to;

- Review Essential Energy's WebGIS systems, DBYD and street-view records to identify existing electrical infrastructure within vicinity of development.
- Complete preliminary electrical maximum demand calculations for the proposed development
- Provide summary report outlining findings inclusive of; Essential Energy's expected servicing requirements, high-level masterplan drawings and possible lead-in requirements.
- Submit application and summarise Essential Energy's project requirements for the site connection.

2. BACKGROUND

The proposed development of Lot 1 DP174385 is located at 313 Magpie Lane, Galambie. An extensive development is currently proposed on the site, the key construction items including:

- 240 long term sites
- Community Centre 1 and 2
- Office buildings
- Other amenities and storage facilities
- Lawn Bowl Greens
- 147 short term sites

Refer to Appendix A for the development masterplan.

3. EXISTING ELECTRICAL NETWORK

Please see Appendix B for extracts from Essential Energy's GIS networks which provide an indication of the existing electrical infrastructure in and around the site.

230V/415V - Low Voltage Network

There is no existing low voltage network near the development. A 22kV installation in the form of new padmount substation will be required to supply the development. Please refer to section 5 of this report.

An existing overhead 22kV voltage line runs to the East of the development.

22kV – High Voltage Network

There is currently an existing 22kV feeder running near the Eastern side of the development along Magpie Lane.

Essential Energy typically require any proposed padmount substation to be looped into the 22kV line (i.e., two connections for a substation).

In this design, there may only be a possibility that one connection can be made.

4. DEVELOPMENT DEMAND REQUIREMENTS

Maximum demand based on ADMD per dwelling

Please see below for a maximum demand spreadsheet produced by Power Solutions based upon the preliminary information provided in drawing 240401-PSK-002-K (also included in appendix A of this report). As per the requirements of AS/NZS3000:2018 a calculation has been completed for the site.

This calculation yields a proposed development load of **1355A** at Low Voltage for the Southern long term sites.

For the Northern short term sites, loads were calculated as **337A**. This assumes 100% powered short term sites.

This assumes there are no gas services within either site. This equates to a total load for the development of **1692A** at Low Voltage.

Maximum Demand Calculation - Summary				
AS/NZS 3000:2018				
Project	5800 Magpie Lane - Southern long term sites			
Address	313 Magpie Lane, Galambine			
Table	Description	Load Amps Per Phase		
		R	W	B
C1.1	Long term sites 240 lots	670.0	670.0	670.0
C2	Community centre 1 & 2, office & activities	684.1	684.1	684.1
		1354.1	1354.1	1354.1

(i)

Maximum Demand Calculation - Summary				
AS/NZS 3000:2018				
Project	5800 Magpie Lane - Northern short term sites			
Address	313 Magpie Lane, Galambine			
Table	Description	Load Amps Per Phase		
		R	W	B
C1	Short term sites 147 lots	209.0	209.0	209.0
C2	Office & activities building, amenities block, workshops & storage	127.7	127.7	127.7
		336.7	336.7	336.7

(ii)

Table 1 - Electrical Demand Calculations

DEVELOPMENT SERVICING STRATEGY

The standard method of supply that Essential Energy will endorse for a community title development is:

- Essential Energy high voltage assets: Substations and 22kV overhead and underground cabling
- Privately owned low voltage assets: Main Switchboard, LV cabling, Low Voltage Pillars, Streetlights
- Preferred supply arrangement: Maximum of one point of supply and one main switchboard per Torrens lot (unless a compliant supply arrangement cannot be achieved).

Proposed 22kV Network Extension to Development Site

Each substation will require connection via two 22kV cables. Two connections allow the substations to be 'back-fed', minimising the duration of power outages in the event of networks faults. This connection arrangement is referred to as a looped arrangement.

The nearest point of connection for the development is the existing overhead 22kV line (MUD42) at the intersection of Goolma Road and Guntawang Road, approx. 1100m route distance from the site entry. The second point of connection can also be made at this same intersection or alternatively on Magpie Lane approx. 1400m to the East (please refer to external options 1 and 2 in Appendix B for this detail).

The 22kV extension to the development site will involve the installation of 22kV poles and conductor. Key items to note include:

- Poles will likely be required every 70m-100m.
- A tree clearing corridor with a width of 15m will be required, centred over the powerline. This will likely require the removal of most trees in the road reserve on the side of the road to the powerline. This tree clearing zone width can be reduced to approx. 6m if heavier CCT conductor is installed. This will involve additional cost for both conductors and additional poles.
- Essential Energy may not accept the installation of 2 x 22kV circuits (as required for a looped arrangement outline in external option 1) on a single set of poles. In this case, two separate powerlines may

be required installed adjacent on another, or on opposite sides of the road.

Internal Development 22kV Network Installation

Easements and Allocations

Please note that all Essential Energy assets installed in private land (i.e., within the development lot) must be installed within an easement. The minimum easement dimensions are:

- **Substation Easement: 7m x 4.2m**
No other utilities can be installed within a substation easement.
- **22kV Cable Easement: 2m width**
No other utilities can be installed within a cable easement.
Other utilities may cross a cable easement at 90 degrees.

Since the 2m cable easements requires exclusion of all other utilities (please note this includes low voltage and streetlight cables as these are privately owned and operated), the Essential Energy high voltage cables may need to be installed in the development roadway. This option will require approval from Essential Energy which can be requested as a part of the preliminary enquiry discussed in the 'Upstream Augmentation' section below.

Alternatively, the 22kV cables can be located within the footway but will likely occupy a large proportion of the footway on this side of the road.

Substation Arrangement

As the powered short term sites are required in the Northern part of the development site, it is expected that **two padmount substations** will be required. This is due to the distance to the perimeter dwellings for the short term site being too great from the central substation to maintain a compliant electrical supply. It is expected that with one central point of supply, the voltage drop at these dwellings on the extremities of the site will be non-compliant.

Dispensation will need to be sought from Essential Energy to allow for two points of supply and two main switchboards (MSB's). The expected Segregation between the private electrical networks from each MSB has been referenced in Appendix B, sheet 3 of this report.

Upstream Augmentation Works

When an application for connection is made, Essential Energy will review the existing high voltage network to determine if the 22kV feeder MUD42 has capacity for the additional development load. Depending upon their assessment, Essential Energy may require some upgrade works further upstream.

Due to the small sizing of the network feeders, there appears to be a **medium - high** risk that Essential Energy will require network augmentation to increase the capacity on the 22kV feeder.

To minimise the risk and scope of any potential upgrades, we'd recommend:

1. Submitting a preliminary enquiry to Essential Energy to request information as to how much capacity is available in the network.
2. If substantial upgrade works are required, minimisation of the maximum demand where reasonably achievable is recommended. Any reduction in maximum demand may reduce the scope of works required by Essential Energy.

After the preliminary enquiry, there will be a better understanding of what maximum demand figures will be required to avoid upgrade-works, if at all possible.

Communications

Review of DBYD records indicates that there are currently Telstra assets located along Magpie Lane that also extend within the site. For reticulation of a communications network within the site NBN will likely be the service provider. Upon application submission, NBN will review and assess the Telstra network and if suitable, will extend from the Telstra assets in Magpie Lane.

If an NBN connection to the Telstra network is not suitable, a Telstra network extension may be required under the “Infrastructure Provider of Last Resort” Policy or alternatively the use of a wireless technology such as Sky Muster is an option.

Please refer to Appendix C for further information.

Existing Transgrid Transmission Line

An existing 132kV Transgrid line, identified as 94M, currently resides east of the proposed development and is situated within a 45m wide easement. Please note the following key requirements when designing infrastructure within the Transgrid easement:

- Minimum separation of 20m from Transgrid structures/poles to proposed roads.
- Roads may run parallel with the line within the Transgrid easements but should not be within 10m of the powerline centreline.
- Any increase in ground level within Transgrid easements will require Transgrid review and approval against their overhead network models.
- Any structures proposed within the Transgrid easement will need to be reviewed and approved by Transgrid and as a minimum, should comply with the requirements ISSC20.

INDICATIVE COSTS FOR 22kV NETWORK & MSB'S

Note that the costs below are based on market data and are only estimates. Please consult an ASP1 for accurate construction prices.

Essential Energy Assets: Appendix B - \$800,000 +/- 20%

- 1400m of overhead 22kV powerline
- 800m of trenching to install 2 x 22kV Cable.
- 2 x Padmount Substation

Private Electrical Assets - \$350,000+/- 20%

- 2 x Main Switchboards
- Low Voltage cable reticulation
- Long term site Streetlighting

5. Conclusion

The development sites will require the installation of two padmount substations to service the sites development load.

The developer will need to determine their preference regarding the high voltage network connection. 1 x padmount substation will be installed in the Northern side of the development and 1 x padmount substation will be installed on the Southern side of the development. One main switchboard will be installed adjacent each substation.

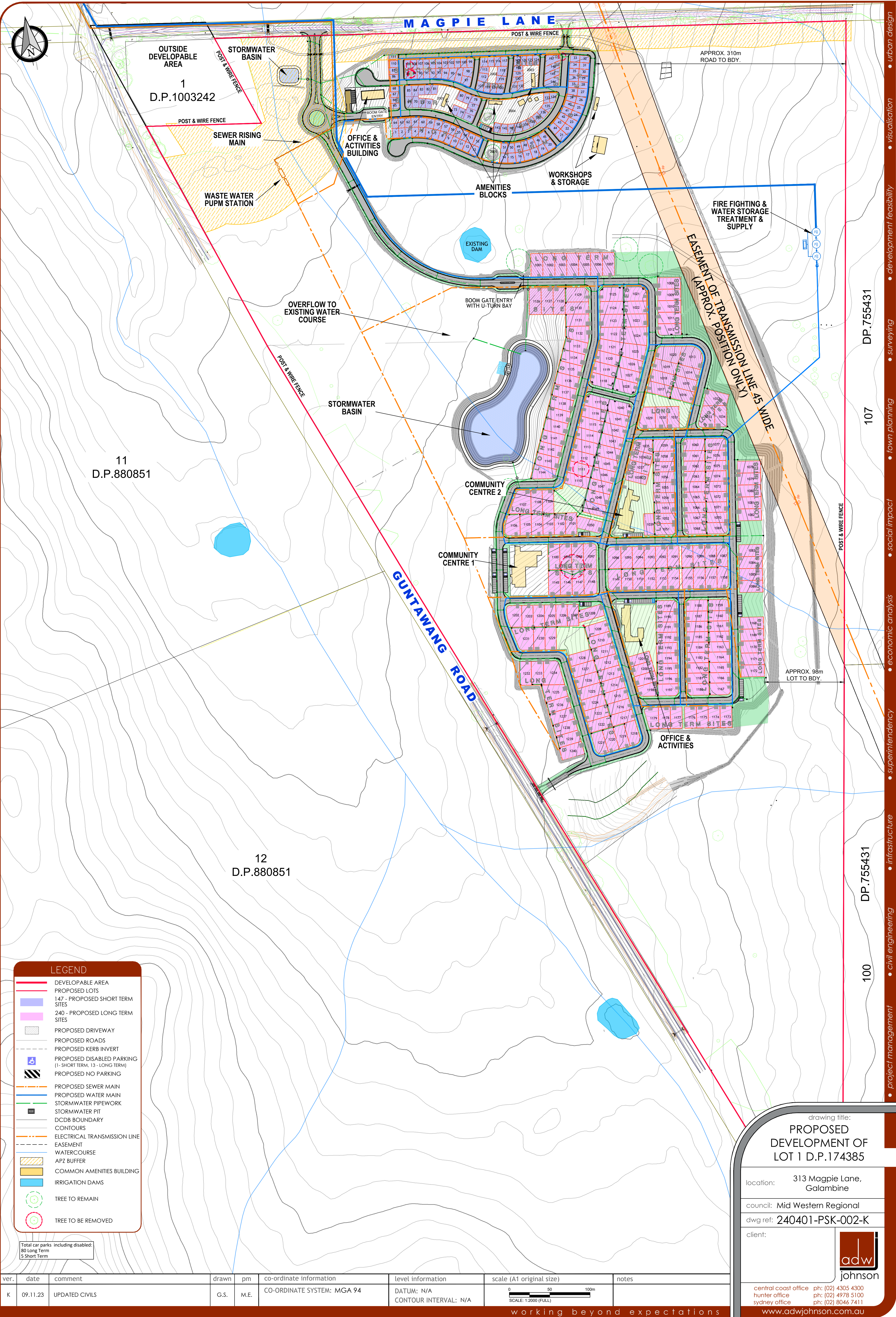
The high voltage network connections can either be installed as:

- 2 x HV connections at Goolma Rd/Guntawang Road (External Option 1)
- 1 x HV connection at Goolma Rd/Guntawang Road & 1 x HV connection on Magpie Ln (External Option 2)

Refer to Appendix B for further detail on the internal and external options for the site.

It is recommended that a preliminary enquiry be submitted to Essential Energy to determine if there is any upstream augmentation that is required to facilitate the developments connection to the grid. It is expected that the risk of some level of augmentation being required for this site is medium-high.

APPENDIX A – DEVELOPMENT MASTERPLAN



drawing title:
**PROPOSED
DEVELOPMENT OF
LOT 1 D.P.174385**

location: 313 Magpie Lane,
Galambine

council: Mid Western Regional

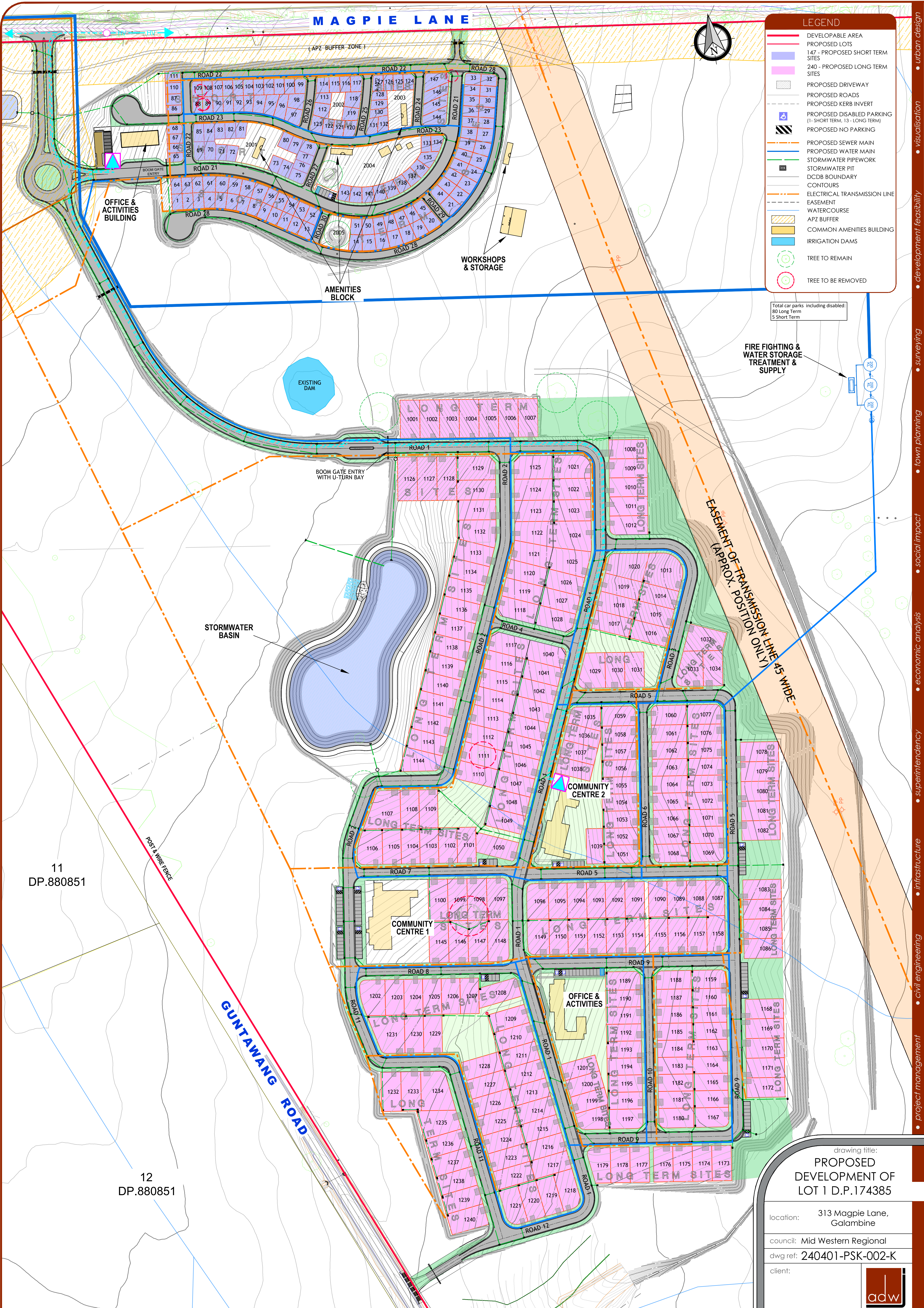
dwg ref: 240401-PSK-002-K

client:



central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411

www.adwjohnson.com.au



- LEGEND**
- DEVELOPABLE AREA
 - PROPOSED LOTS
 - 147 - PROPOSED SHORT TERM SITES
 - 240 - PROPOSED LONG TERM SITES
 - PROPOSED DRIVEWAY
 - PROPOSED ROADS
 - PROPOSED KERB INVERT
 - PROPOSED DISABLED PARKING (1- SHORT TERM, 13 - LONG TERM)
 - PROPOSED NO PARKING
 - PROPOSED SEWER MAIN
 - PROPOSED WATER MAIN
 - STORMWATER PIPEWORK
 - STORMWATER PIT
 - DCDB BOUNDARY
 - CONTOURS
 - ELECTRICAL TRANSMISSION LINE
 - EASEMENT
 - WATERCOURSE
 - COMMON AMENITIES BUILDING
 - IRRIGATION DAMS
 - TREE TO REMAIN
 - TREE TO BE REMOVED

Total car parks including disabled:
80 Long Term
5 Short Term

FIRE FIGHTING & WATER STORAGE TREATMENT & SUPPLY

EASEMENT OF TRANSMISSION LINE 45 WIDE (APPROX. POSITION ONLY)

11
DP.880851

12
DP.880851

drawing title:
PROPOSED DEVELOPMENT OF LOT 1 D.P.174385

location: 313 Magpie Lane, Galambine

council: Mid Western Regional

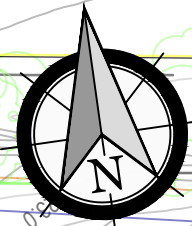
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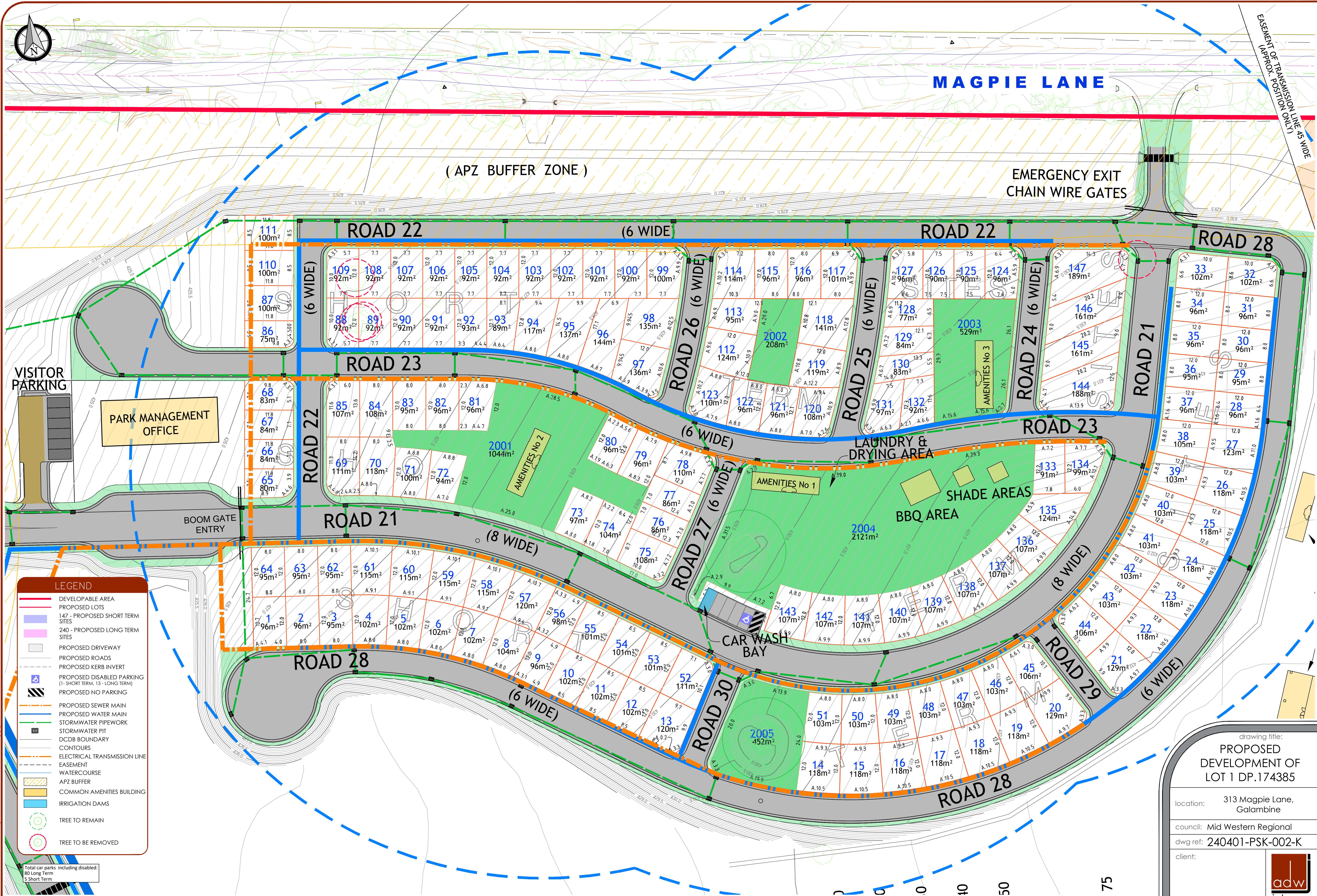
ver.	date	comment	drawn	pm	co-ordinate information	level information	scale (A1 original size)	notes
K	09.11.23	UPDATED CIVILS	G.S.	M.E.	CO-ORDINATE SYSTEM: MGA 94	DATUM: N/A CONTOUR INTERVAL: N/A	0 50 100m SCALE: 1:2000 (FULL)	



LEGEND

- DEVELOPABLE AREA
- PROPOSED LOTS
- 147 - PROPOSED SHORT TERM SITES
- 240 - PROPOSED LONG TERM SITES
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- EASEMENT
- WATERCOURSE
- APZ BUFFER
- COMMON AMENITIES BUILDING
- IRRIGATION DAMS
- TREE TO REMAIN
- TREE TO BE REMOVED

Total car parks including disabled:
80 Long Term
5 Short Term



ver.	date	comment	drawn	pm	co-ordinate information	level information	scale (A1 original size)	notes
K	09.11.23	UPDATED CIVILS	G.S.	M.E.	CO-ORDINATE SYSTEM: MGA 94	DATUM: N/A CONTOUR INTERVAL: N/A	0 10.0 20.0m SCALE: 1:400 (FULL)	
• project management • civil engineering • infrastructure • superintendency • economic analysis • social impact • town planning • surveying • development feasibility • visualisation • urban design								

drawing title:
PROPOSED DEVELOPMENT OF LOT 1 DP.174385

location: 313 Magpie Lane, Galambine

council: Mid Western Regional

dwg ref: 240401-PSK-002-K

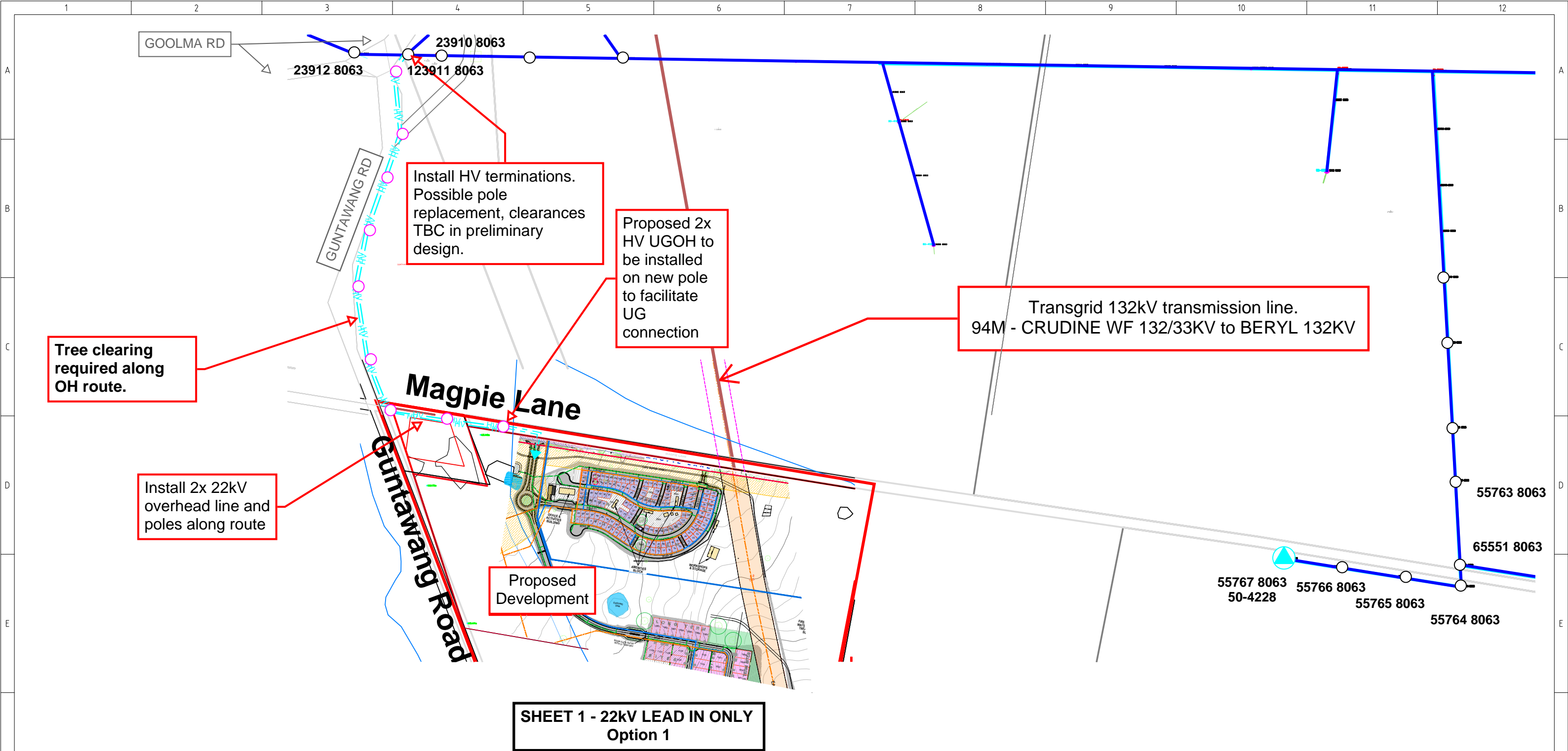
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APPENDIX B – PROPOSED NETWORK INFRASTRUCTURE



NOTE: Pole quantity and locations are indicative only.

Legend

22kV OH Conductor

132kV Transmission Line

22kV UG Cable

Pole

Pole Mounted Substation

EXISTING

PROPOSED

CONCEPT ONLY					
B	15/11/2023	Updated client plans with 2 substations	JA	ET	JA
A	27/06/2023	Original Issue	JA	BD	JA
REV	DATE	REVISION DESCRIPTION	BY	CHECK	APPR'D

Sydney | Newcastle

1300 732 293 | projects@powersol.com.au

PO Box 278,

CHARLESTOWN NSW 2290

TITLE					
CARAVAN PARK MAGPIE LANE GULGONG LOT 1 DP 174385 EXTERNAL OPTION 1					
CAD FILE NAME	JOB No.	SIZE	SCALE	DESIGNER	SHEET
-	5800	A3	NTS	J.ANTONUCCIO	1
				REV NO.	B



22kV HV lead in indicative only - refer to sheet 1 and 2

Proposed 315kVA Padmount Substation to be installed on community lands. Easement 4.2m x 7m.

HV UG cable to be installed in conduit for entire route.

Proposed 1000kVA Padmount Substation to be installed on community lands. Easement 4.2m x 7m.

Essential Energy Substation Requirements:

- 3m minimum separation to all non-fire rated structures. Any structures with 3m of padmount housing must have 120/120/120 fire rating
- 6m minimum separation to building ventilation openings
- 10m minimum separation to fire hydrant booster assemblies.
- Padmount level to be min. 600mm above 1:100 yr flood level.
- Extent of the easement to be even levelled and to be consistent with surroundings to allow for safe work arrangements for the supply authority vehicle/truck.

Proposed 2x HV UGOH to be installed on new poles to facilitate UG connection into proposed development

HV UG cable to be installed in road with 2m cable easement along **entire** route. Easement to be free of all utilities.

NOTE: Only HV plans shown.

NOTE: Pole and Substation locations are indicative only.

Legend

22kV UG Cable

22kV OH Conductor (Hydrogen 7/4.5)

Padmount Substation

Pole

PROPOSED

— HV — HV —

▲

○

CONCEPT ONLY

APPENDIX C – TELSTRA NETWORK INFORMATION (DBYD)

