Transgrid

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HumeLink

Appendix A Updated project description

Appendix A Updated project description

Guide to Appendix A: Updated project description

Appendix D of the *NSW State significant infrastructure guidelines* (DPHI, 2024b) provides information on the form and content requirements for amendment reports. These guidelines require that a consolidated, detailed description of the amended project is included in the appendices of the amendment report.

Chapters 3 (Project description – infrastructure and operation) and 4 (Project description – construction) of the EIS provide a detailed description of the proposed construction and operation of the project. Chapter 3 (Description of the amended project) of the Amendment Report contains both a simple overview of the amendments in table form and a detailed description of each of the amendments, as required by *State significant infrastructure guidelines – preparing an amendment report* (DPE, 2022a). This appendix provides an updated and consolidated detailed description of the amended project as required by *State significant infrastructure guidelines – preparing an amendment report* (DPE, 2022a). It updates and supersedes the project description provided in Chapters 3 and 4 of the EIS to reflect the amendments and refinements to the project, referred to in this Amendment Report as the amended project. To illustrate the changes to the project description between the EIS and the amended project, project elements that have been removed are shown in **~~strike through~~** and new elements and/or details are added in **bold green coloured** text. For references in this appendix, refer to Chapter 28 (References) of the EIS.

This updated project description can be read as the amended project and project footprint as amended project footprint.

Contents

3. Project description – infrastructure and operation

This chapter provides a consolidated description of the infrastructure and operation of the project, including the proposed transmission lines, associated substation work and ancillary development. This chapter also describes how the project would operate and be maintained. The description of the project components is based on the **preliminary detailed design, which is an update to the EIS concept design** ~~**current concept design**~~.

Assessments of the potential environmental impacts from the project's proposed amendments and refinements are provided in Chapter 6 (Assessment of impacts) of the Amendment Report and in the supporting technical reports. Some elements of the project may continue to be refined as part of further detailed design of the project. If approval is granted, any changes to the project would be reviewed for consistency with the approved project in accordance with the process described in Chapter 26 (Environmental management) **of the EIS**. A description of how the project would be constructed is provided in Chapter 4 (Project description - construction) **of the EIS**.

3.1. Project overview

The project includes the construction and operation of around ~~**360**~~ **365** kilometres of new 500 kilovolt (kV) electricity transmission lines, substations, permanent and temporary access tracks and roads, and ancillary facilities.

The key components of the project include:

- construction and operation of around ~~**360**~~ **365** kilometres of new double circuit 500 kV transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle
- construction of a new 500/330 kV substation at Gregadoo (Gugaa 500 kV substation) approximately 11 kilometres south-east of the existing Wagga 330/132 kV substation (Wagga 330 kV substation)
- demolition and rebuild of a section of Line 51 (around two kilometres in length) as a double circuit 330 kV transmission line connecting into the Wagga 330 kV substation
- modification of the existing Wagga 330 kV substation and Bannaby 500/330 kV substation (Bannaby 500 kV substation) to accommodate the new transmission line connections
- connection of transmission lines to the future Maragle 500/330 kV substation (Maragle 500 kV substation), approved under the Snowy 2.0 Transmission Connection Project (SSI-9717)
- ~~**provision of one optical repeater telecommunications hut and associated connections to existing local electrical infrastructure**~~
- **telecommunications connections to existing substations**
- establishment of new and/or upgraded temporary and permanent access tracks
- ancillary work required for construction of the project such as construction compounds, worker accommodation facilities, utility connections and/or relocations, brake and winch sites and helipad/helicopter support facilities.

Table 3-1 provides a summary of the infrastructure and operations proposed as part of the project.

Table 3-1 HumeLink project summary - infrastructure and operation

Project element	Summary of project	Reference
Project footprint and location	The project footprint extends from the existing Wagga 330 kV substation in the west to the existing Bannaby 500 kV substation in the east and the future Maragle 500 kV substation in the south. The project footprint includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation. As such, the project footprint comprises all proposed infrastructure elements including the proposed transmission line structures, transmission line easements, new substation infrastructure~~, telecommunications hut~~ and permanent access tracks. The final location of all proposed infrastructure would be confirmed during **further** detailed design.	Figure 3-1
Transmission line sections	The project includes the construction of new 500 kV transmission lines between: • Wagga 330 kV substation and proposed Gugaa 500 kV substation (approximately 11 km) • proposed Gugaa 500 kV substation and Wondalga (approximately ~~65~~ **61** km) • Wondalga and future Maragle 500 kV substation (approximately ~~46~~ **54** km) • Wondalga and Bannaby 500 kV substation (approximately ~~234~~ **239** km). Note that the transmission line section between Wagga 330 kV substation and the proposed Gugaa 500 kV substation would **initially** operate at 330 kV under HumeLink**, however has capability to be operated at 500 kV in the future with the commissioning of the Victoria to NSW Interconnector West (VNI West) project**. The project also includes the rebuild of approximately 2 km of Line 51 as a new double circuit 330 kV transmission line between the Wagga 330 kV substation and near Ivydale Road, Gregadoo. This would be adjacent to the new transmission line between the existing Wagga 330 kV and proposed Gugaa 500 kV substations.	Figure 3-1 Section 3.3
Substation locations and work	The project includes the following substation work: • construction of a new 500/330 kV substation in Gregadoo, NSW, referred to as the proposed Gugaa 500 kV substation • modification of the existing 330/132 kV substation at Gregadoo, NSW, referred to as the Wagga 330 kV substation • modification of the existing 500/330 kV substation at Bannaby, NSW • connection of the new transmission lines to the future 500/330 kV substation at Maragle, NSW. Note that construction and operation of the future Maragle 500 kV substation will be carried out under the approved Snowy 2.0 Transmission Connection Project (SSI-9717).	Figure 3-5 to Figure 3-9, Section 3.4
Operational ancillary development	The project includes the following operational ancillary development: • ~~one optical repeater telecommunications hut located at Killimicat (about 10 km north-east of Tumut)~~ • **four telecommunications connections between the transmission line corridor and Transgrid substations** • new and upgraded operational access tracks and roads (including waterway crossings where required).	~~Figure 3-10,~~ Sections 3.3 to 3.5

Project element	Summary of project	Reference
Operational maintenance and resource use	Regular maintenance activities would be required for the transmission lines and substations during operation. Likely maintenance activities would include: • regular inspection and maintenance of transmission lines and structures • ad hoc fault and emergency fly over(s) to assess infrastructure condition should an unplanned outage occur • vegetation management within the transmission line easement to maintain appropriate clearances between ground vegetation and transmission lines and management of trees outside of the easement which could pose a bushfire risk and/or risk to the transmission lines • ad hoc attendance (typically one to two times per month) at substations of one or two switching operators to undertake planned and unplanned switching of equipment • routine inspection and maintenance of substation infrastructure, property and switchyard areas. The operational water requirement for the project is anticipated to be approximately 116 kL/year.	Section 3.6
Property requirements	The project would acquire ~~**80.74**~~ **103.49** ha of freehold land for the proposed Gugaa 500 kV substation ~~**and telecommunications hut located at Killimicat**~~. A new transmission line easement would also be required for the project in addition to potential access easements to provide Transgrid operational staff with access from the nearest public road to the transmission line easement.	Section 3.7
Commencement of operations	The project is expected to be operational by the end of 2026.	Chapter 4 (Project description - construction)
Operational workers	The project would require five full-time maintenance workers during operation (in addition to Transgrid's existing workers in the region).	Section 3.6
Operational life	The design life of the project is 50 years, which can be extended to more than 70 years for some infrastructure components and plant items. Components would be replaced or refurbished towards the end of their serviceable life, allowing the service life to be maximised as far as possible.	Section 3.6

3.2. Location and setting

The project extends across the lands of the Wiradjuri, Ngunnawal, Ngarigo and Gundungurra people. ~~It is~~ **Project infrastructure and ancillary facilities are** located within the ~~**five**~~ **six** Local Government Areas (LGAs) of Wagga Wagga City, Snowy Valleys, Cootamundra-Gundagai Regional, Yass Valley**, Goulburn Mulwaree** and Upper Lachlan Shire.

The project traverses primarily rural areas with a range of land uses that include cropping, grazing, horticulture, forestry, and renewable power generation (solar and wind). Other land uses in proximity to the project include residences, farm buildings and infrastructure, broad-acre rural residential development, recreation and existing transmission line easements. The project footprint also extends across State forests including Bago State Forest, Green Hills State Forest and Red Hill State Forest and privately owned plantations.

No national parks or reserves are traversed by the project footprint. Several national parks and reserves are located within the vicinity of the project footprint with the closest being Tarlo River National Park, south of Bannaby, and Minjary National Park, north-west of Tumut. The boundaries of both national parks are located less than 10 metres from the project footprint.

A number of waterways cross the project footprint. These include the following key waterways, which consist of named rivers and/or Strahler ~~level~~ 6th stream order waterways (ie large rivers or creeks with steady flow and volume, and average depths of between one and three metres):

- O'Briens Creek
- Kyeamba Creek
- Keajura Creek
- Umbango Creek
- Tarcutta Creek
- ~~Gilmore Creek~~
- Tumut River
- Adjungbilly Creek
- Murrumbidgee River
- Lachlan River
- ~~Wollondilly River~~
- ~~Tarlo River~~
- Tooles Creek.

The nearest major town is Wagga Wagga located about 9.2 kilometres north-west of the project at its closest point (western end of the project footprint). Smaller towns near the project footprint include Adelong, Tumut, Yass, Bowning, Dalton, Crookwell, Taralga, Batlow and Tarcutta ~~Tumbarumba~~.

3.3. Transmission lines

3.3.1. Transmission line sections

The proposed transmission line sections are shown on Figure 3-1 and described below. The final transmission line route within the project footprint would be confirmed during further detailed design.

3.3.1.1. Wagga 330 kV substation to proposed Gugaa 500 kV substation

The proposed new double circuit transmission line between the existing Wagga 330 kV substation and the proposed Gugaa 500 kV substation would be approximately 11 kilometres long (refer to Figure 3-1a). This section would include the construction of 500 kV transmission structures and lines that would be initially energised at 330 kV. This section would have the capability to be operated at 500 kV ~~if required~~ in the future**, during the commissioning and operation of VNI West**. ~~Any future energisation at 500 kV would be subject to further assessment and approval.~~

From the Wagga 330 kV substation, the transmission line route would run in a south-east direction generally parallel with the existing 330 kV single-circuit transmission line (Line 51) before connecting with the proposed Gugaa 500 kV substation. Line 51 is generally located on the northern boundary of the project footprint. This section of the route would also be parallel with Gregadoo East Road, which is located around 350 metres to the north of the project footprint.

The transmission line route in this section would cross five ~~four~~ local roads: Boiling Down Road, Ashfords Road, Ivydale Road, Angels Lane and Big Springs Road.

3.3.1.2. Proposed Gugaa 500 kV substation to Wondalga

The section of the new double circuit 500 kV transmission line between the proposed Gugaa 500 kV substation and Wondalga would be approximately ~~65~~ 61 kilometres long (refer to Figure 3-1a and Figure 3-1e).

From the proposed Gugaa 500 kV substation, the transmission line route would run in an east-south-east direction generally continuing to parallel Line 51 for about 53 kilometres, with Line 51 mostly remaining on the northern boundary of the project footprint. In two locations, around 2.5 kilometres east of the

proposed Gugaa 500 kV substation and 12 kilometres **west of** ~~**before**~~ Wondalga, the new transmission line route would split from Line 51 to the south by up to 1.5 kilometres, but generally continues to run parallel with Line 51.

The transmission line route in this section would cross **two** ~~**several**~~ classified roads including Tumbarumba Road **and**~~**,**~~ Hume Highway (about nine kilometres south-west of Tarcutta) ~~**and Batlow Road**~~ as well as numerous local roads such as Humula Road and Westbrook Road. The route would cross several waterways including but not limited to O'Briens Creek, Kyeamba Creek, Keajura Creek, Umbango Creek, and Tarcutta Creek. Towards Wondalga, the route would also traverse Green Hills State Forest.

3.3.1.3. Wondalga to future Maragle 500 kV substation

The section of the new double circuit 500 kV transmission line between Wondalga and the future Maragle 500 kV substation would be approximately ~~**46**~~ **54** kilometres long (refer to Figure 3-1e to Figure 3-1f). The transmission line route in this section **just west of Wondalga Road** would generally run in a ~~**south-south-east**~~ **southern** direction ~~**from**~~ ~~**Wondalga**~~ **along the eastern side of Green Hills State Forest for about 21 kilometres then south-east for around 17.5 kilometres through Bago State Forest** before meeting two existing 330 kV transmission lines (Line 64 and Line 66). ~~**connecting with the future Maragle 500 kV substation. From Wondalga, for around 10 kilometres, the route would be generally parallel with Line 51 until Snubba Road. After splitting with Line 51, the route would head south and run on the western side of Snubba Road for about 10 kilometres. From Snubba Road, the route would traverse Bago State Forest for about 11 kilometres before**~~ The transmission line route then would run generally parallel with Line 64 and Line 66 along East Bago Powerline Road in a southerly direction for about five kilometres. Immediately south of the intersection of East Bago Powerline Road and Powerline Road, the transmission line route would turn in a south-west direction parallel with Line 64 and generally follow East Bago Powerline Road for around 10 kilometres until the future Maragle 500 kV substation on the southern side of Elliot Way.

The transmission line route in this section would mainly cross local roads, **tracks** and trails within **Green Hills State Forest and** Bago State Forest **as well as Lower Bago Road and Batlow Road**. **Adelong Creek, Bago Creek,** ~~**Gilmore Creek**~~ and Honeysuckle Creek would be the main waterways crossed for this section of route.

East of Wondalga Road, the transmission line route would run south-east for around four kilometres before turning north.

3.3.1.4. Wondalga to Bannaby 500 kV substation

The section of the new double circuit 500 kV transmission line between Wondalga and the existing Bannaby 500 kV substation would be approximately ~~**234**~~ **239** kilometres long (refer to Figure 3-1b to Figure 3-1e). The transmission line route in this section would generally run in a north-east direction from Wondalga before connecting with the existing Bannaby 500 kV substation.

From Wondalga, the route would run in northerly direction for 23 kilometres crossing Batlow Road near Windowie and Snowy Mountains Highway around three kilometres west of Gilmore before reaching Gocup Road. From Gocup Road, the route would cross the Tumut River and run in a north-east direction for about 15 kilometres before meeting an existing 330 kV transmission line (Line 3) about 500 metres east of Brungle Creek Road. The route would then run parallel to Line 3 for about nine kilometres through Red Hill State Forest. The transmission line route would then continue north for about 20 kilometres crossing Adjungbilly Creek and Adjungbilly Road and traversing another portion of Red Hill State Forest.

From this point, the route would turn north-east and continue for about 11 kilometres before crossing the Murrumbidgee River, several local roads, and Jugiong Creek and meeting again with Line 3 near Burrinjuck Road, a further 15 kilometres north-east. The route would parallel Line 3 for about four kilometres before continuing towards the Hume Highway, a further 15 kilometres north-east. Prior to reaching the Hume Highway, the transmission line route would cross Black Range Road and several waterways including but not limited to Washpen Creek, Bowning Creek and Derringullen Creek near where it flows into the Yass River.

The transmission line route would cross the Hume Highway and Main Southern Railway line about seven kilometres north-west of Yass and continue for five kilometres north-east before meeting an existing 330 kV transmission line (Line 3J) about three kilometres west of Cooks Hill Road. The route would then generally parallel Line 3J running for around 51 kilometres in a north-east direction until the Gullen Range 330 kV substation near Bannister. Classified roads that would be crossed in this area include Rye Park Road about four kilometres west of Dalton, and Grabben Gullen Road about 15 kilometres north-east of Dalton. The Lachlan River and Humes Creek are the main waterways that would be crossed by the route in this area.

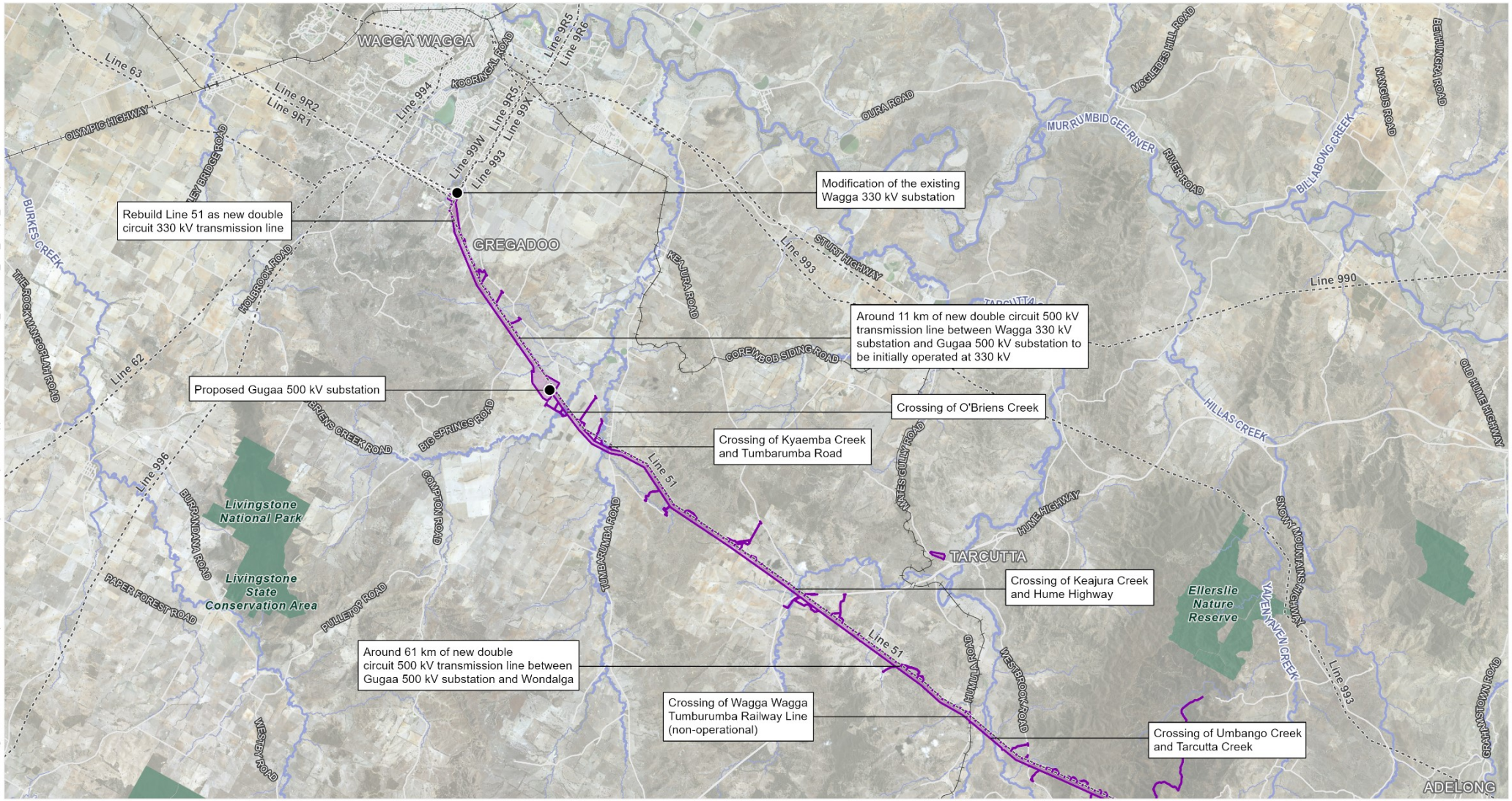
From the Gullen Range 330 kV substation, the transmission line route would continue for around 12 kilometres in a north-east direction and generally parallel an existing 330 kV transmission line (Line 3H) before crossing Crookwell Road/Goulburn Road and the Wollondilly River and Pejar Dam, which is the major waterway crossing in this area. After crossing the Wollondilly River and Pejar Dam, the transmission line route would deviate to avoid the Crookwell 2 Wind Farm.

From here, the transmission line route would continue for around 27 kilometres in a north-east direction and run parallel to an existing 330 kV transmission line (Line 61). In this area the route would cross Woodhouselee Road and Taralga Road, which are the main north-south local roads. Tarlo River would be the main waterway crossed about 11 kilometres north-east of the Crookwell 2 330 kV substation.

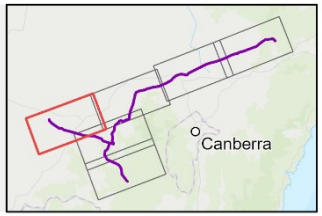
From this point, the transmission line route would continue to run for six kilometres in a north-east direction to avoid Tarlo River National Park before crossing Bannaby Road and turning in an easterly direction for around eight kilometres. At this location, the transmission line route would turn south-east and run generally parallel with two existing 500 kV transmission lines (5A6 and 5A7) for about three kilometres, crossing Hanworth Road before connecting to the existing Bannaby 500 kV substation.

3.3.1.5. Replacement of the existing section of Line 51

In addition to the proposed 500 kV transmission line, the project would include construction of a double circuit 330 kV transmission line south of Wagga 330 kV substation (refer to Figure 3-1a). This new double circuit 330 kV transmission line would replace about two kilometres of existing 330 kV single circuit transmission line infrastructure associated with the existing Line 51. Structures associated with the rebuilt Line 51 would range between 24 metres and 50 metres high and have a typical height of 40 metres.



Project footprint
National park and reserve
Existing Transgrid transmission line
Railway
Substation



Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

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Projection: GDA 1994 MGA Zone 55

HumeLink

Figure 3-1a: Proposed project footprint

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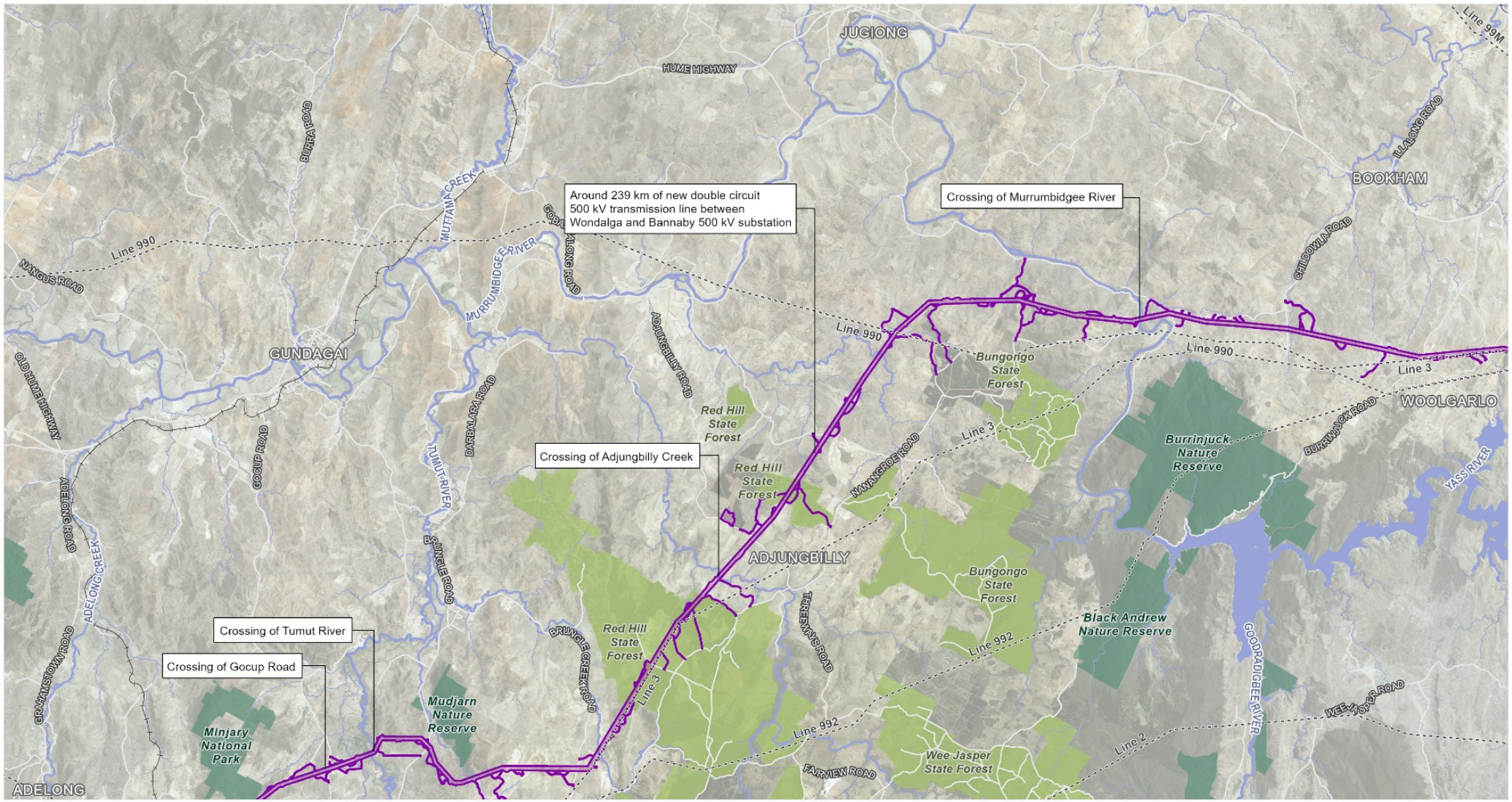

Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

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Projection: GDA 1994 MGA Zone 55

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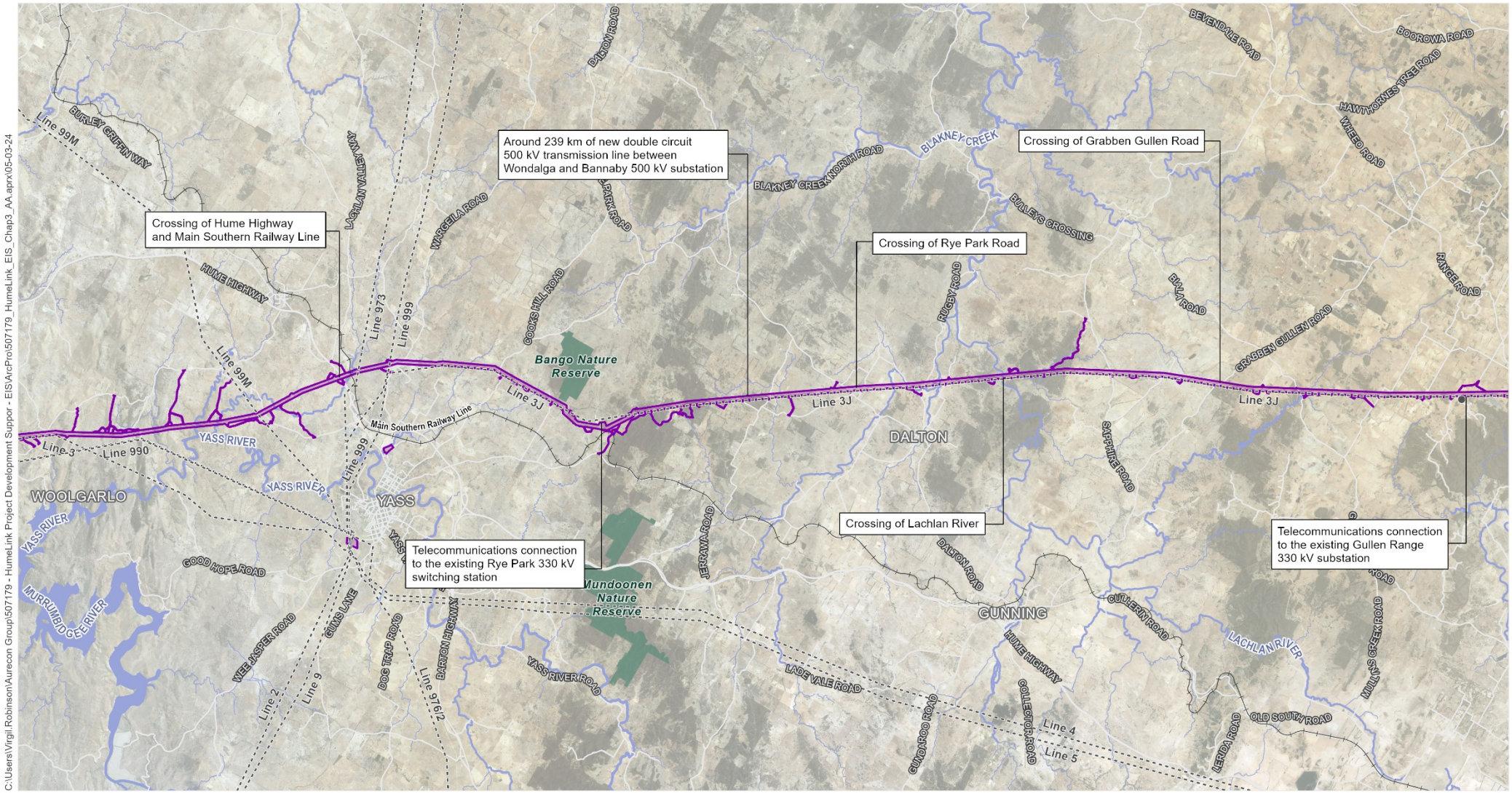
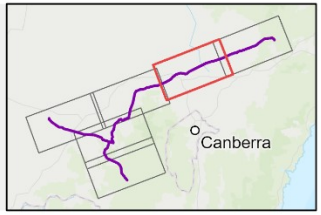
Figure 3-1b: Proposed project footprint



Project footprint
National park and reserve
Waterbody
Existing Transgrid transmission line
Railway



Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

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Projection: GDA 1994 MGA Zone 55

HumeLink

Figure 3-1c: Proposed project footprint

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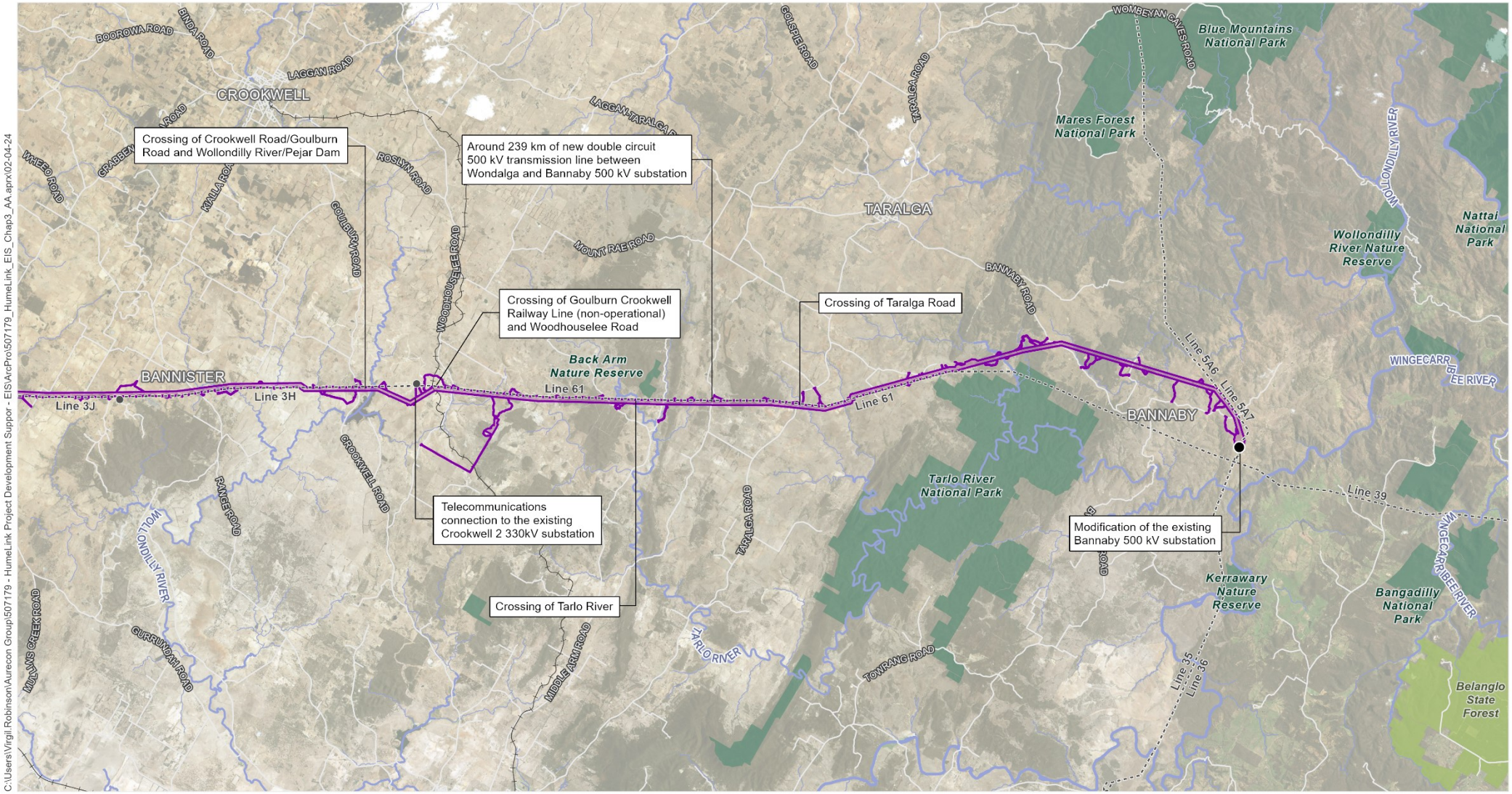

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Projection: GDA 1994 MGA Zone 55

HumeLink

Figure 3-1d: Proposed project footprint

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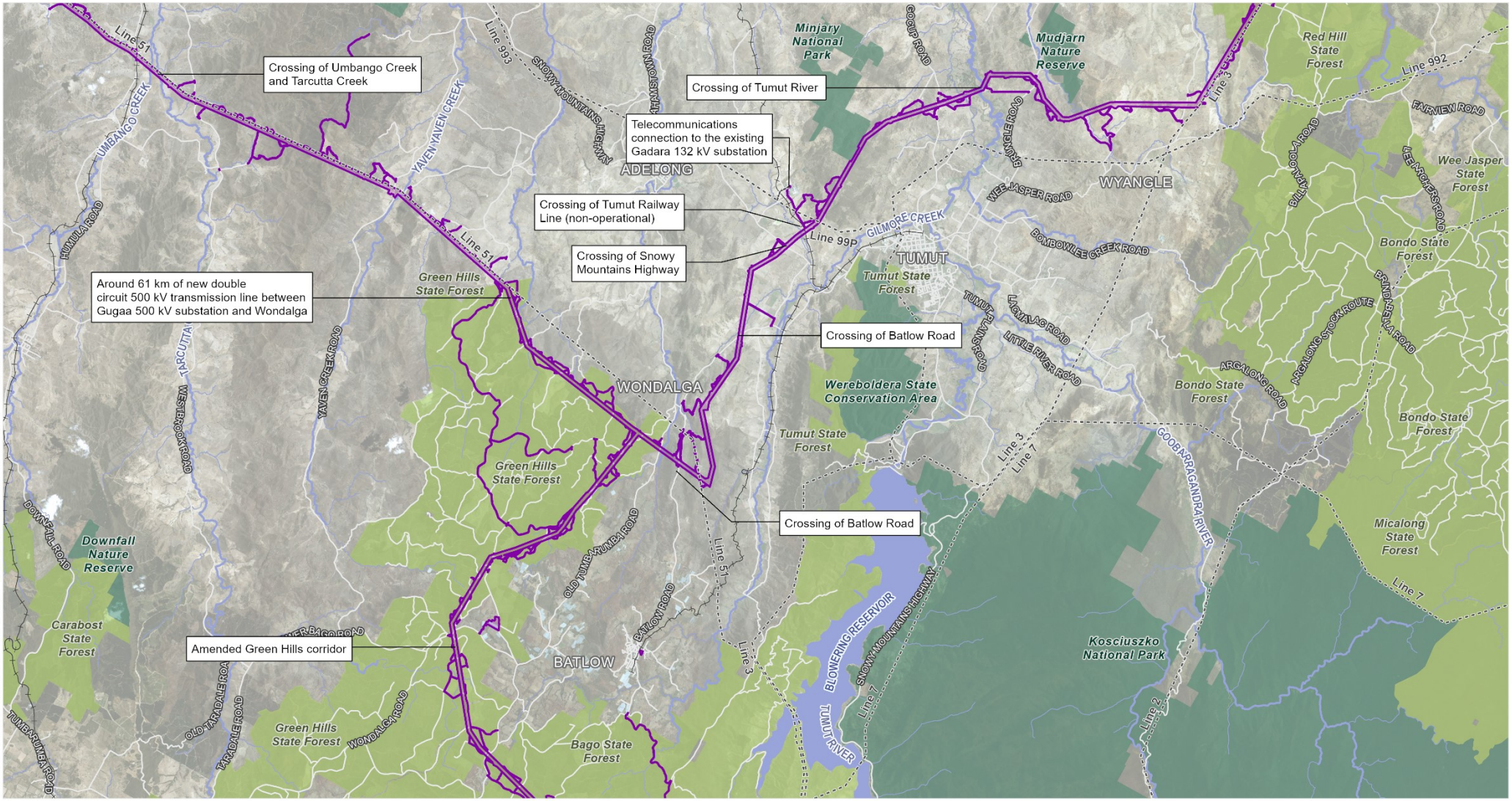

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Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

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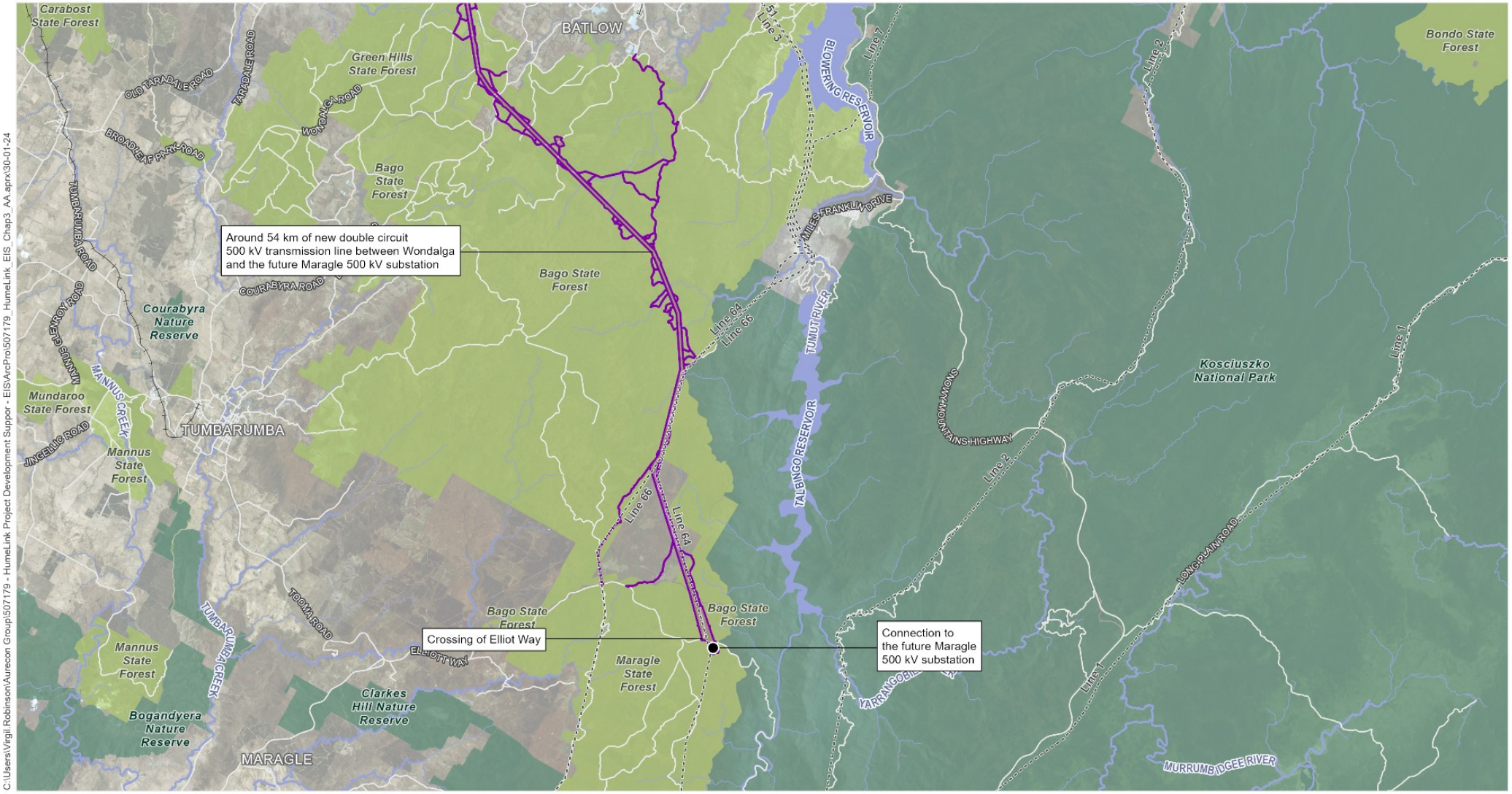
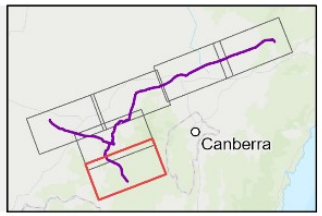
Projection: GDA 1994 MGA Zone 55

HumeLink

Figure 3-1e: Proposed project footprint



Project footprint
National park and reserve
State forest
Waterbody
Existing Transgrid transmission line
Railway
Substation



Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

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Projection: GDA 1994 MGA Zone 55

HumeLink

Figure 3-1f: Proposed project footprint

3.3.2. Transmission line structures

The 500 kV transmission lines would be supported on a series of free-standing steel lattice structures ranging in height between ~~**around**~~ 50 metres ~~**up to a maximum of**~~ **and** 76 metres **with an average height of 60 metres.** ~~**but typically around 60 metres high**~~.

In some locations, the height of the transmission line structures may increase above 76 metres to minimise biodiversity, heritage or property impacts, or improve overall safety outcomes by providing the opportunity to increase the spanning distance between transmission line structures. These locations will be reviewed during further detailed design. Any structures that exceed 76 metres in height would be managed in accordance with the change management process described in Section 26.4 (Managing project changes) of the EIS in consultation with affected landowners.

The structures would be generally spaced between 300 to 600 metres apart. **Ongoing design development and changes to the transmission line corridor have refined transposition[1] locations, which would result in up to six transmission line structures at these locations.**

The footings of each structure would require an area of **approximately** ~~**up to**~~ 300 **to 450** square metres, depending on ground conditions and the proposed transmission line structure type. Additional disturbance at each structure site may be required to facilitate structure assembly and stringing. Earth wire and communication cables would be co-located on the transmission line structures.

The 500 kV transmission line would be supported by two types of tower:

- Suspension towers would hold up the conductors. These would be steel lattice, free-standing towers.
- Strain towers would be used for the first and last structure of the transmission line, at road or waterway crossings, and where there is a change in direction. They would have a wider base than suspension towers. Strain towers would also be used for structural reasons to break up long runs of suspension towers.

Indicative configurations of the 500 kV and 330 kV transmission line structures that may be used as part of the project are shown in Figure 3-2. In addition, examples of existing transmission line structures similar to those proposed for the project are provided in Figure 3-3 and Figure 3-4.

[1] **Transposition is the periodic swapping of positions of the conductors of a transmission line in order to improve transmission reliability.**

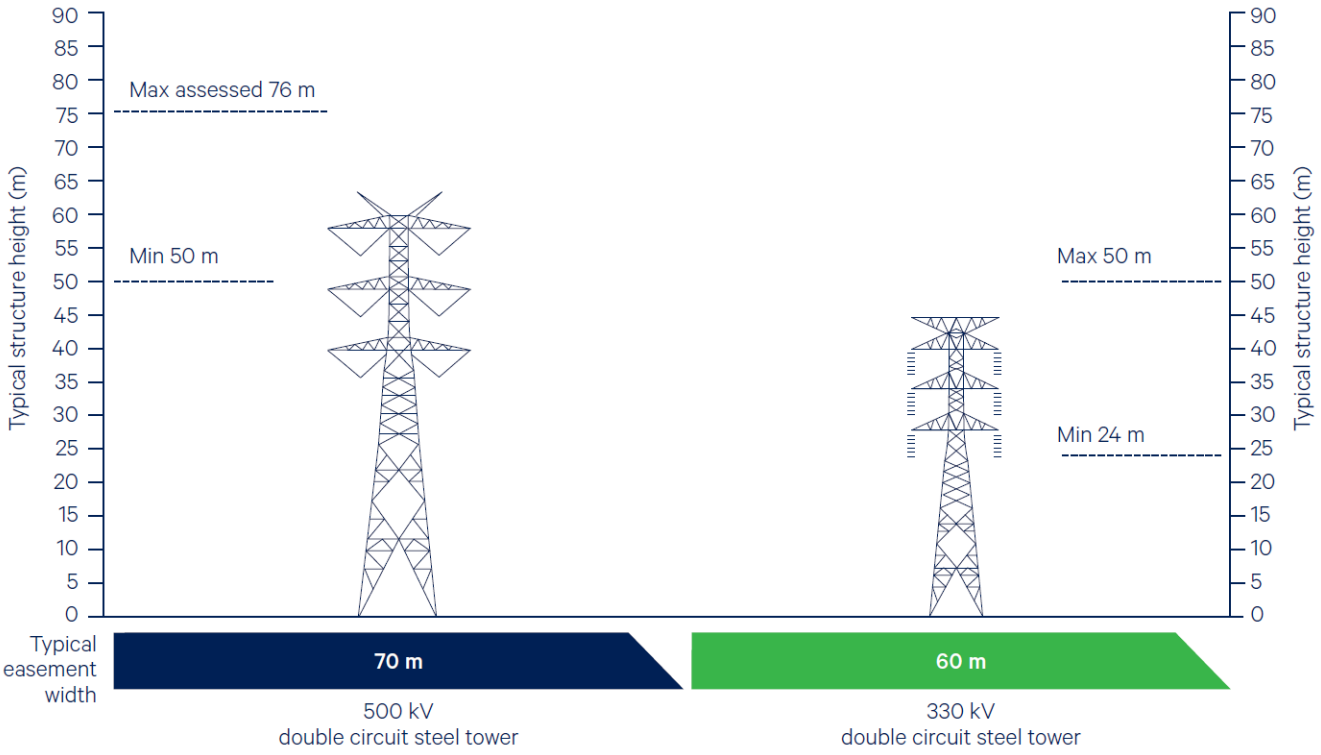


Figure not to scale.

Transmission line structures have been assessed to a height of 76 metres. Any structures that exceed 76 metres, would be managed in accordance with the change management process described in section 26.4 (Managing project changes) of the EIS, in consultation with affected landowners.

Figure 3-2 Indicative design for the transmission line structures

Figure 3-3 Example of 500 kV transmission line structures

Figure 3-4 Example of 330 kV transmission line structures

The final location and specification of each transmission line structure within the project footprint would depend on a range of factors such as the distance between each transmission line structure, local geotechnical conditions, and local environmental (for example the need to avoid specific areas of biodiversity and/or heritage) or property constraints. The type and arrangement of the transmission line structures would continue to be refined during **further** detailed design with a view to further minimise environmental impacts within the identified transmission line easement, wherever practicable.

A range of considerations must be taken into account during the detailed design process to ensure that the transmission line can be constructed, operated, and maintained safely and efficiently. These considerations may affect the feasibility of micro-siting transmission line structures or adjusting their height to avoid or minimise environmental and social impacts.

The key engineering constraints to transmission line design are outlined in Table 3-2 below.

Table 3-2 Key engineering constraints for transmission line design

Engineering constraint	Description
Terrain	**Siting transmission line structures in steep terrain is avoided to the extent possible as:** • **the location must ensure the transmission line structure footings can be safely excavated and provide sufficient operating space for heavy vehicles during assembly** • **steep terrain can require longer, more expansive tracks to maintain a gradient of less than 18 per cent.**
Elevation	**At high altitudes, where snow and ice are common, alpine transmission line structures are required. To allow these structures and the associated conductors to withstand the weight of snow and ice, the acceptable span length is shorter than in non-alpine areas.**
Operational clearance requirements	**While transmission line structure heights may be increased to meet operational clearance requirements, this may introduce new issues including:** • **increased loading on the structures, which may require stronger/heavier structures affecting steelwork and foundation designs** • **increased disturbance areas to accommodate stronger/heavier structures and associated foundation designs and construction benches** • **increased conductor blowout, which may require wider easements and additional clearing** • **increased transmission line structure height and visibility.** **There are also design limits on the maximum height of the transmission line structures.**
Tension structures	**Tension structures are required where there is a change in the angle of the alignment. Relocating a transmission line structure where there is a change of angle would require adjusting the position of all suspension structures between the tension structures, so that all fall in a straight line.**

3.3.3. Transmission line access requirements

Access to the transmission line easement for operational purposes would preferentially use existing public and private roads and tracks. **A proportion of the** access tracks created for construction would be retained during operation of the project to provide ongoing access.

The access tracks created for construction would include a trafficable surface between three to six metres wide with a one or two metre shoulder. The access tracks would be designed and formed so they are suitable for operation and maintenance vehicles (namely, long wheel-base four-wheel-drive vehicles).

The access tracks (and any required waterway crossing) would be designed in accordance with:

- *Guidelines for the planning, construction and maintenance of tracks* (Department of Land and Water Conservation (DLWC), 1994)
- *Managing Urban Stormwater: Soils and Construction – Volume 2C Unsealed Roads* (Department of Environment and Climate Change (DECC), 2008a)
- *Policy and Guidelines for Fish Friendly Waterway Crossings* (Department of Primary Industries (DPI), 2003)
- *Why do fish need to cross the road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge, 2003)
- *Controlled activities – Guidelines for watercourse crossings on waterfront land* (DPE, 2022b)
- *Controlled activities – Guidelines for riparian corridors on waterfront land* (DPE, 2022c).

Further detail on access tracks is included in Chapter 4 (Project description - construction).

Operational parking requirements for the transmission line easement are not anticipated at this stage.

3.4. Substations

3.4.1. Proposed Gugaa 500 kV substation

A new substation is needed as the Wagga 330 kV substation does not have sufficient space for new infrastructure to connect to the 500 kV transmission lines provided as part of the project.

The proposed Gugaa 500 kV substation would be constructed at Gregadoo, about 11 kilometres south-east of the existing Wagga 330 kV substation. The substation would be located approximately 500 metres west of Livingstone Gully Road and 1.1 kilometres south of Gregadoo East Road.

A summary of the features of the proposed Gugaa 500 kV substation is provided in the following sections.

3.4.1.1. Built form and layout

The substation would occupy an area of approximately ~~**22**~~ **34** hectares, which would include a **split** substation bench with a**n overall** maximum width of about ~~**250**~~ **285** metres, a maximum length of about 490 metres and a 20 metre buffer area around **each substation bench** ~~**the substation**~~. The configuration of the proposed Gugaa 500 kV substation would include two line bays at the western end to connect with Wagga 330 kV substation and two line bays at the eastern end to provide a connection to Bannaby 500 kV substation and the future Maragle 500 kV substation. The buffer area would include (but would be limited to) the asset protection zone (APZ), stormwater, drainage, and oil containment infrastructure, wastewater infrastructure and access and parking (refer to sections below for further details).

Two new auxiliary services buildings would be included for the proposed Gugaa 500 kV substation as follows:

- 500 kV auxiliary services building – approximately 17 metres long, five metres wide and six metres high (excluding the lightning protection rods)
- 330 kV auxiliary services building – approximately 22 metres long, five metres wide and six metres high (excluding the lightning protection rods).

The auxiliary services buildings would include secondary systems such as control, automation, protection and communications systems, ancillary services such as fire detection, security system and air conditioning and 125 volt direct current (DC) and 50 volt DC battery systems.

The typical infrastructure and equipment in the new substation would include:

- ~~**seven**~~ **ten** new single-phase 500/330 kV transformers (including one spare transformer)
- ~~**three**~~ **four** new three-phase 500 kV reactors (including one spare reactor)
- a range of supporting 500 kV and 330 kV electrical components including overhead conductors, busbars and gantries
- 500 kV and 330 kV circuit breakers, current transformers, voltage transformers, disconnectors, earth switches and other high voltage equipment
- 125 volt DC and 400 volt alternating current electrical distribution systems
- drainage infrastructure and oil containment system.

The maximum height of new equipment proposed at the new substation is estimated to be around 33 metres.

Figure 3-5 provides an indicative layout of the proposed Gugaa 500 kV substation and Figure 3-6 provides a photomontage of the proposed substation.

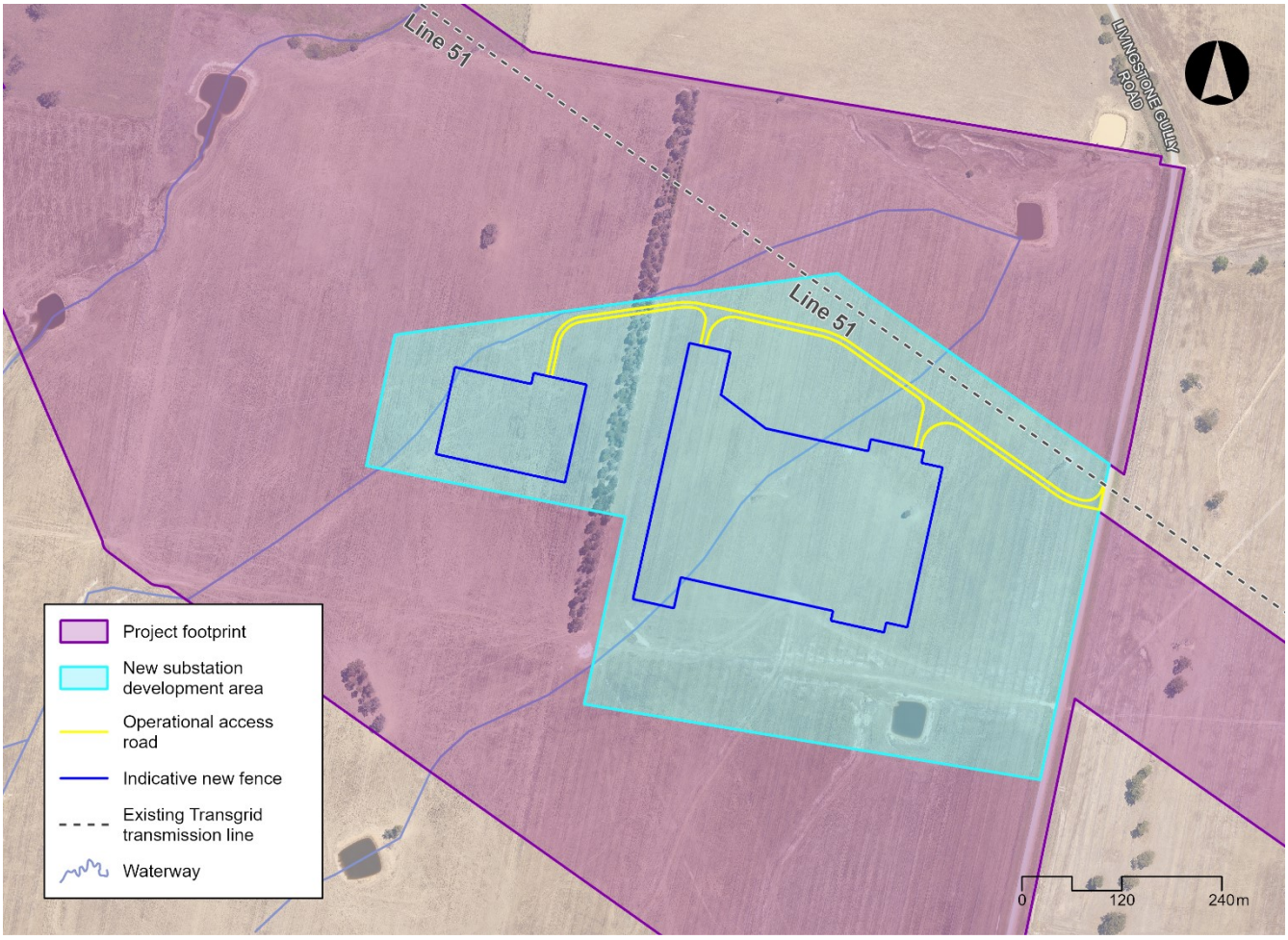


Figure 3-5 Indicative layout of the proposed Gugaa 500 kV substation

Figure 3-6 Photomontage of the proposed Gugaa 500 kV substation looking south from Livingstone Gully Road

3.4.1.2. Access and parking

An operational access road around 900 metres long would be provided from Livingstone Gully Road to the new substation as shown in Figure 3-5. The access road would allow access for maintenance and operational workers and would also be suitable to allow heavy vehicles as required (such as vehicles bringing replacement equipment). The access road would be designed in accordance with *Managing Urban Stormwater: Soils and Construction – Volume 2C Unsealed Roads* (DECC, 2008a).

It is anticipated that road improvement work would be required for Livingstone Gully Road to facilitate connection with the operational access road. The extent of work would likely extend for about 50 metres along the Livingstone Gully Road. The design of the road improvement work would be confirmed during **further** detailed design and would be carried out in accordance with the relevant Austroads Guides **or the relevant asset owners' standards where required,** any road occupancy licence(s), and in consultation with the relevant road authority. Further detail on the types of road improvement work is provided in Chapter 4 (Project description - construction).

Parking for a small number of maintenance and operational worker vehicles and heavy vehicles would be provided within the substation boundary.

3.4.1.3. Safety and security

The proposed Gugaa 500 kV substation would have security fencing approximately three metres high around all sides of the switchyard. The security fencing would comprise galvanised steel (or similar material). Gates would also be installed to provide an overall opening of around seven metres at the main entrance point to the substation, which would be on the northern side.

To comply with Transgrid's safety requirements, the following additional security measures would be required:

- security cameras within the substation
- operational lighting
- safety and public information signage at the substation
- an APZ, which would be an area kept clear of all trees and vegetation that may affect the substation during a bushfire; the APZ would comply with Transgrid's design and safety standards.

Based on the bushfire hazard analysis carried out in *Technical Report 13 – Bushfire Risk Assessment*, an APZ of nine metres is proposed for all boundaries of the proposed Gugaa 500 kV substation.

3.4.1.4. Lighting

Operational lighting would be required at the proposed Gugaa 500 kV substation for site security and for the safety of workers operating and maintaining the substation equipment. Substation lighting would operate from dusk until dawn, seven days a week and would aim to maintain 2.5 lux as a minimum level. There may be areas that exceed 2.5 lux (in some cases up to 30 lux).

Lighting would typically be located on substation steelwork (ie gantries). The final lighting design would focus illumination to within the substation boundary in accordance with the requirements of Australian Standard *AS 4282-2019 Control of the obtrusive effects of outdoor lighting* (Standards Australia, 2019).

3.4.1.5. Water supply

The proposed Gugaa 500 kV substation would require about 62 kilolitres of water annually for operation and maintenance purposes. Operational water requirements would be sourced from a rainwater tank fed from the secondary systems building that would also allow for water truck deliveries if required. Connection to water mains is not anticipated at this stage.

3.4.1.6. Stormwater and drainage

The proposed Gugaa 500 kV substation would include suitable drainage infrastructure to capture and discharge stormwater collected from within the substation site during operation. The stormwater drainage system **within the substation** would be designed for a rainfall corresponding to a 10 per cent annual exceedance probability (10% annual exceedance probability (AEP)) event and include series of surface drains which would interconnect with a grid of stormwater pits. The system would predominantly discharge along the northern boundary of the substation site.

~~**Grassed swales between two and 12 metres wide**~~ **Catch or table drains (such as swale drains)** would be installed around the **benches** ~~**western, southern, and eastern boundaries of the site**~~ to divert runoff ~~**around**~~ **from** the site. The**se drains** ~~**swales**~~ would be designed for rainfall corresponding to a two per cent annual exceedance probability (2% AEP) event. The runoff would be diverted to natural waterways using appropriate dispersion/dissipation structures.

Appropriately sized and designed cross-drainage would be installed under the operational access road to the substation to direct flows.

3.4.1.7. Wastewater

A freestanding building containing toilet facilities is proposed for the proposed Gugaa 500 kV substation with connection to a town sewerage system (or a suitable disposal system such as a septic tank or a treatment plant with the treated water pumped to a suitable landscaped area).

3.4.1.8. Oil containment

The proposed Gugaa 500 kV substation would include an oil containment system designed in accordance with Transgrid's standards and procedures and the requirements of the *Protection of the Environment Operations Act 1997* (POEO Act). This would include consideration of appropriate bunding, dedicated drainage points and spill oil containment tanks to manage any potential spills or leaks from the new transformers and reactors, as required.

3.4.2. Wagga 330 kV substation

The existing Wagga 330 kV substation at the corner of Ashfords Road and Boiling Down Road, Gregadoo would be modified to accommodate new bays for two new 500 kV transmission line circuits (operated at 330 kV) within the existing substation property.

A summary of the features of the modified substation is provided in the following sections.

3.4.2.1. Modified form and layout

The general layout and built form of the existing Wagga 330 kV substation would not be significantly altered by the project with modifications mainly proposed for the south-eastern part of the substation. The typical infrastructure and equipment that would be installed and work associated modifying the existing substation would include:

- modifications to the busbars, line bays, existing line connections, bench and associated earthwork
- additional drainage infrastructure
- modification to internal substation roads
- installation of new concrete cable trenches and cable pits
- steelwork, cabling and installation of secondary communication systems.

The new equipment to be installed at the existing Wagga 330 kV substation would have an estimated maximum height of around 28.5 metres. The height of existing equipment at the substation is around 27 metres. An existing vacant bay at the substation would be used for new equipment for the new 330 kV double-circuit infrastructure associated with Line 51.

It is anticipated that existing parking arrangements would be used at the Wagga 330 kV substation with no new parking for maintenance and operational workers being required as part of the project.

Given the limited scale of modifications and that the work would be within the existing Wagga 330 kV substation property boundary, there would be no proposed changes to existing wastewater infrastructure or existing safety and security measures. Additionally, no new spill containment measures are proposed for the modified substation as no new transformers or reactors are proposed.

Figure 3-7 shows the indicative layout of the proposed modifications to the of Wagga 330 kV substation. These changes would be subject to **further** detailed design.

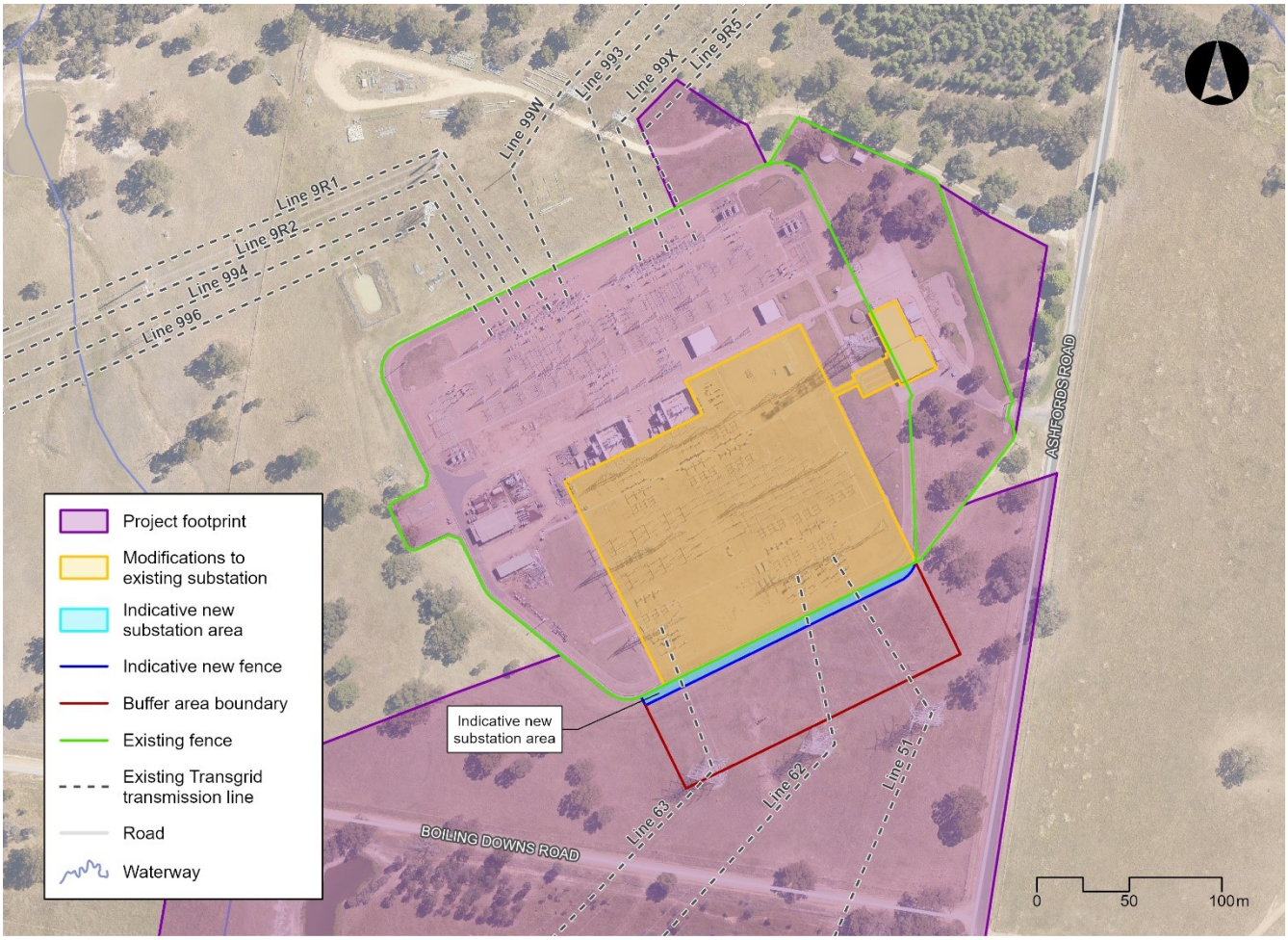


Figure 3-7 Indicative layout of the modified Wagga 330 kV substation

3.4.2.2. Lighting

Additional operational lighting would be required at Wagga 330 kV substation for site security and for the safety of workers operating and maintaining the substation equipment. Substation lighting would operate from dusk until dawn, seven days a week and would aim to maintain 2.5 lux as minimum level. There would be areas that exceeds 2.5 lux (in some cases up to 30 lux).

Lights would typically be located on substation steelwork (ie poles). The final lighting design would focus illumination to within the substation boundary in accordance with the requirements of Australian Standard *AS 4282-2019 Control of the obtrusive effects of outdoor lighting* (Standards Australia, 2019).

3.4.2.3. Water supply

The existing Wagga 330 kV substation sources water for maintenance and operational activities via connection to water mains. The modified Wagga 330 kV substation would require an additional 27 kilolitres of water per year for maintenance and operational activities. This would be sourced from the existing water supply arrangements.

3.4.2.4. Stormwater and drainage

An on-site stormwater drainage system currently exists within the Wagga 330 kV substation to capture and discharge stormwater collected within the site. Additional stormwater drainage would be required to support the modifications including drainage connections to the new concrete cable trenches and pits. All drainage work would be undertaken within the existing substation boundary.

3.4.3. Bannaby 500 kV substation

The existing Bannaby 500 kV substation on Hanworth Road, Bannaby would be expanded to accommodate connections for new 500 kV transmission line circuits. All modification work at the existing Bannaby 500 kV substation would occur within the existing substation property.

A summary of the features of the modified substation is provided in the following sections.

3.4.3.1. Modified form and layout

As part of the proposed modification, the existing Bannaby 500 kV substation would mainly be expanded on the northern and western sides with the total area of new development being approximately 10 hectares. Modifications within the existing substation bench are also proposed.

No modifications are required for the existing Bannaby 330 kV substation, which is located about 300 metres to the south of the existing 500 kV substation.

The typical infrastructure and equipment that would be installed, and work associated with modifying the existing substation, include:

- extension of the existing substation bench by up to about 80 metres on the northern side and up to about 41 metres on the western side including bulk earthwork and external palisade fencing
- construction of a new unsealed reactor access road adjacent to substation
- additional drainage and spill oil containment system
- installation of concrete footings, compounds, tanks, cable trenches, kerbs, fire walls, drains and pits
- installation of steel support structures
- installation of new electrical equipment including up to two 500 kV reactors, extension of 500 kV busbars, high-voltage switchyard equipment, insulators, conductors, earthing, lighting and cabling
- installation of secondary systems in the existing control building.

The new equipment would have an estimated maximum height of around 33 metres. The height of existing equipment at the substation is around 35 metres.

Given the scale of modifications, no additional wastewater infrastructure is proposed as part of modified Bannaby 500 kV substation.

Figure 3-8 shows the indicative layout of the proposed modifications to the of Bannaby 500 kV substation. These changes would be subject to **further** detailed design.

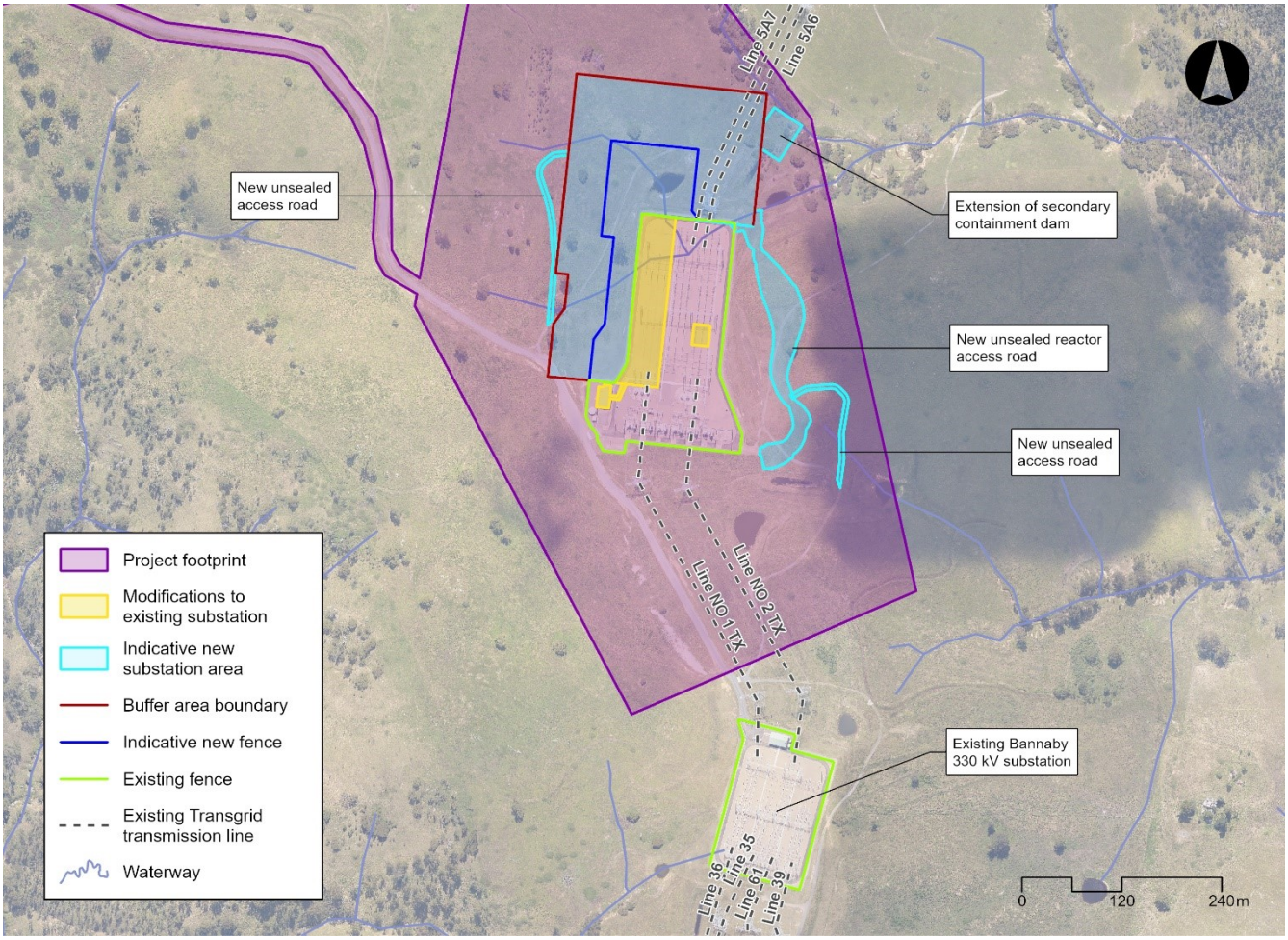


Figure 3-8 Indicative layout of the Bannaby 500 kV substation following modification

3.4.3.2. Access and parking

The existing unsealed access road from Hanworth Road to the Bannaby 500 kV substation would be upgraded as part of the modification work. The upgrade work would mainly be limited to the existing access road formation and involve work to ensure the access road is suitable for heavy vehicles used in the modification of the Bannaby 500 kV substation (eg grading and resurfacing vehicles). The extent of the upgrade work would be confirmed during **further** detailed design and would be designed in accordance with *Managing Urban Stormwater: Soils and Construction – Volume 2C Unsealed Roads* (DECC, 2008a).

It is anticipated that existing parking arrangements for maintenance and operational workers would be used at the Bannaby 500 kV substation with no new parking required as part of the project.

3.4.3.3. Safety and security

The project would include security fencing approximately three metres high at the modified Bannaby 500 kV substation. The fencing would be installed around all sides of the modification work and integrate with the existing security fencing. The security fencing would comprise a galvanised steel (or similar) material. If required, motorised sliding gates or manual swing gates would also be installed to provide an overall opening of around seven metres at the main entrance point to the site.

To comply with Transgrid's safety requirements, additional security measures may be incorporated, which would include (but not be limited to):

- security cameras within the substation
- safety and public information signage at the substation to ensure public safety
- an APZ, which would be an area kept clear of all trees and vegetation that may affect the substation during a bushfire; the APZ would comply with Transgrid's design and safety standards.

Based on the bushfire hazard analysis is carried out in *Technical Report 13 – Bushfire Risk Assessment*, an APZ of up 35 metres (eastern boundary) is proposed with other boundaries requiring an APZ of between eight and 21 metres.

Additional operational lighting would be required at Bannaby 500 kV substation for site security and for the safety of workers operating and maintaining the substation equipment. Substation lighting would operate from dusk until dawn, seven days a week and would aim to maintain 2.5 lux as a minimum level. There would be areas that exceeds 2.5 lux (in some cases up to 30 lux).

Lights would typically be located on poles. The final lighting design would focus illumination to within the substation boundary in accordance with the requirements of Australian Standard *AS 4282-2019 Control of the obtrusive effects of outdoor lighting* (Standards Australia, 2019).

3.4.3.4. Water supply

The existing Bannaby 500 kV substation sources water for maintenance and operational activities from onsite water tanks. The modified Bannaby 500 kV substation would require an additional 27 kilolitres of water per year for maintenance and operational activities. This would be sourced from the existing water tanks.

3.4.3.5. Stormwater and drainage

An on-site stormwater drainage system exists within the Bannaby 500 kV substation to capture and discharge stormwater collected from within the site. Some additional stormwater drainage would be required as part of the modified Bannaby 500 kV substation, including:

- a new pit and pipe or concrete 'V' drain drainage system to manage runoff within the site
- grassed swales about five to six metres wide around the western and northern boundaries of the site to divert off site runoff from entering the site.

New drainage to manage runoff within site would be designed for rainfall corresponding to a 10% AEP event. New drainage to divert offsite runoff would be designed for rainfall corresponding to a 2% AEP event. The new drainage would connect with the existing system and off-site runoff would be diverted to natural waterways using appropriate dispersion and dissipation structures.

3.4.3.6. Oil containment

The proposed work at Bannaby 500 kV substation would upgrade the existing oil containment system infrastructure. This would include installation of a new primary oil containment tank and extension of the secondary containment dam by about seven metres. The upgrade would be designed in accordance with Transgrid's standards and procedures and the requirements of the POEO Act. This would include consideration of appropriate bunding, dedicated drainage points and spill oil containment tanks to manage any potential spills or leaks from the new transformers and reactors, as required.

3.4.4. Future Maragle 500 kV substation

The project would connect to the future Maragle 500 kV substation approved under the Snowy 2.0 Transmission Connection Project (SSI-9717). Construction of the future Maragle 500 kV substation is proposed to be undertaken between 2023 and 2026. Further detail on the Snowy 2.0 Transmission Connection Project is available at the Department of Planning and Environment's Major Project website: www.planningportal.nsw.gov.au/major-projects/project/10591.

The connection work required for the project would include:

- stringing conductors between transmission line structures and the future Maragle 500 kV substation gantry (including overhead earth wire and optical ground wire (OPGW))
- installing droppers from the future substation gantry to the switchgear.

All other work associated with the future Maragle 500 kV substation, including operational access and parking, safety and security, lighting drainage and spill containment, would be constructed as part of the Snowy 2.0 Transmission Connection Project. It is not envisaged that any refinement or adjustment would be required as a result of the HumeLink project.

An indicative layout of future Maragle 500 kV substation showing the connection location is provided in Figure 3-9.

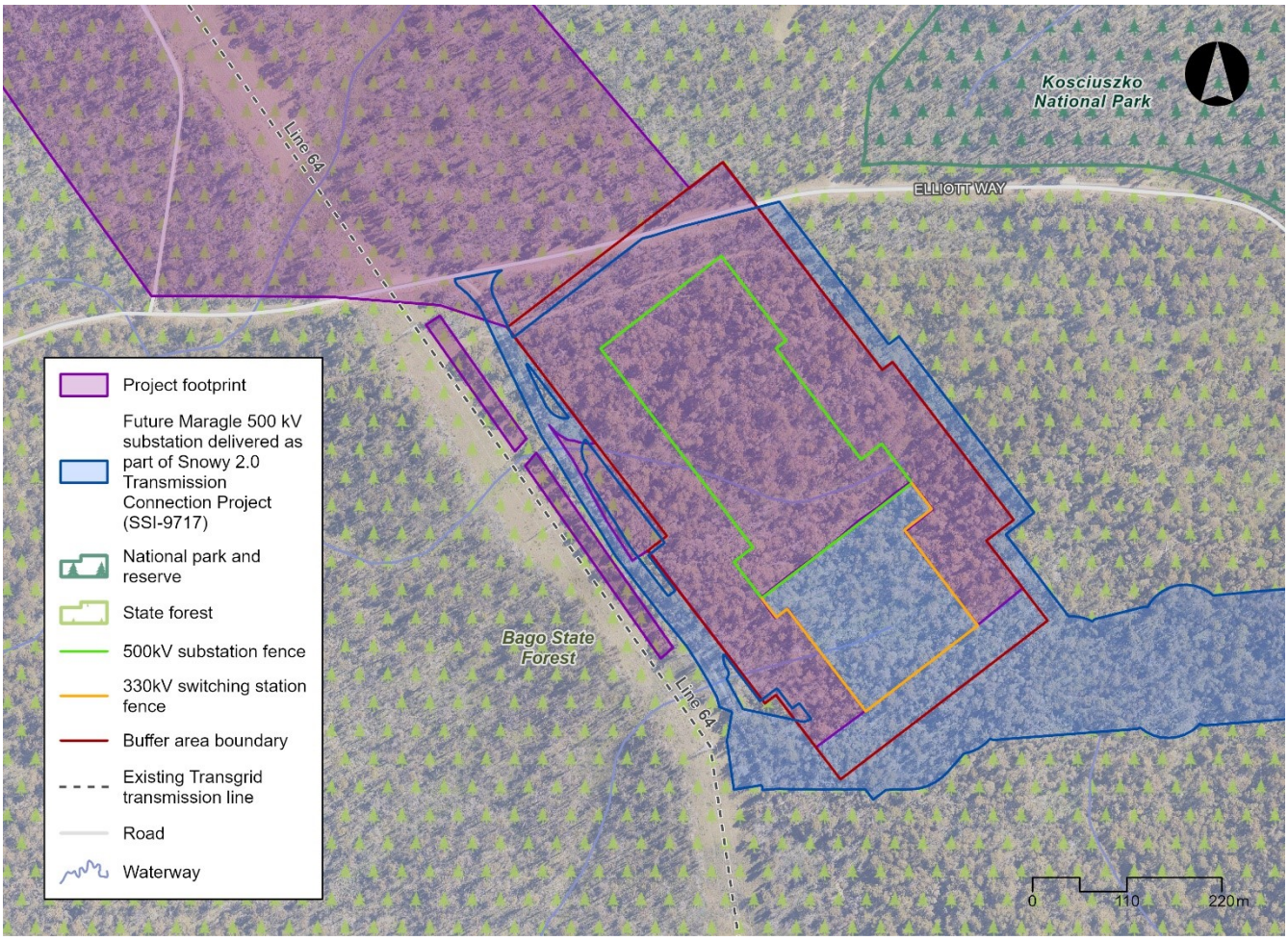


Figure 3-9 Indicative layout of the future Maragle 500 kV substation

3.5. ~~Telecommunications hut~~ Telecommunications connections

~~Telecommunications huts are generally required to be located along transmission lines greater than 135 kilometres long. Telecommunications huts contain optical repeaters, which boost the signal in the OPGW, and back-up power supplies to ensure the stability of the communications system over long distances. Telecommunications huts facilitate the communication of protection and control systems between substations.~~

~~3.5.1. New telecommunications hut at Killimicat~~

~~One telecommunications hut is required for the project. The hut would be located adjacent to existing transmission line structures at Killimicat (about 10 kilometres north-east of Tumut). Its dimensions would be six metres by three metres. The hut's main features would include:~~

- ~~a metal cladding exterior~~
- ~~a security fence around the perimeter of the optical repeater site, enclosing an area of approximately 400 square metres~~
- ~~connection to the local power supply via a new power line about 980 metres long.~~

~~The requirements for an APZ for the telecommunications hut would be investigated and confirmed during detailed design (refer to *Technical Report 13 – Bushfire Risk Assessment*). Access to the telecommunications hut during operation would be via the transmission line easement and nearby access track retained for operation.~~

~~Figure 3-10 shows the location of the proposed telecommunications hut and Figure 3-11 provides photo of a typical an of a telecommunications hut.~~

Telecommunications connections, constructed using underground fibre optic cable (UGFC), are proposed to be installed between the transmission line corridor and the following existing Transgrid substations:

- Rye Park 330 kV switching station. This would involve approximately 300 metres of trenching and cable installation.
- Gadara 132 kV substation. This would involve approximately 2.6 kilometres of trenching and cable installation.
- Gullen Range 330 kV substation. This would involve approximately 1.1 kilometres of trenching and cable installation.
- Crookwell 2 330 kV substation. This would involve approximately 1.7 kilometres of trenching and cable installation.

The telecommunications connections would boost the transmission line signal and ensure the stability of the communications system over long distances. They remove the need for a telecommunications hut at Killimicat. The final alignment of the telecommunications connections would be determined in consultation with landowners during further detailed design.

The locations of the proposed telecommunications connections are shown in Figure 3-1.

~~Rye Park Wind Farm substation connection~~

~~A telecommunications connection with the future Rye Park Wind Farm substation is proposed as part of the project (refer to Figure 3-1). This connection removes the need for a telecommunications~~

~~hut in the eastern end of the project and would involve connection of OPGW & between two proposed transmission line structures and the Rye Park Wind Farm substation through~~

~~bling. The length of the connections between the transmission line structures and the Rye Park Wind Farm substation would be between 200 to 350 metres.~~

~~The Rye Park Wind Farm substation will be constructed separately to this project in accordance with the approved Rye Park Wind Farm Project (SSD-6693).~~

3.6. Operation and maintenance

The proposed infrastructure would be safely operated and maintained in compliance with the Transgrid's safety rules, operation and maintenance procedures.

Maintenance activities of the transmission lines and substations would be undertaken by Transgrid operational and maintenance workers. Further details of these activities are provided in Sections 3.6.1 and 3.6.2. The project would require about five workers during operation for ongoing maintenance. The five workers would be in addition to Transgrid's existing 58 maintenance workers working in the Transgrid regions in which the project is located.

The maintenance activities would be guided by a number of Transgrid operational procedures and guidelines including:

- *Maintenance Plan – Transmission Line Assets* (Transgrid, 2021c)
- *Maintenance Plan – Easement and Access Tracks* (Transgrid, 2022a)
- *Environmental Handbook* (Transgrid, 2021d)
- *Electricity Network Safety Management System* (Transgrid, 2020b)
- *Bushfire Risk Management Plan* (Transgrid, 2021e)
- *Waste Management Procedure* (Transgrid, 2022b)
- *Preparing and Approving Environmental Checklists Procedure* (Transgrid, 2020c)
- *Environmental Assessment Framework* (Transgrid, 2020d).

The design life of the project is 50 years, which can be extended to more than 70 years for some infrastructure components and plant items. Maintenance activities would be regularly undertaken for all project infrastructure components and plant items. These components would be replaced or refurbished towards the end of their serviceable life, allowing the service life to be maximised. At the point in the future where project infrastructure is required to be decommissioned, it would be recycled, reused or disposed of appropriately. **Restoration/**rehabilitation and revegetation of decommissioned operational areas would be consistent with the existing land use or as otherwise agreed with the relevant landowners, where possible.

Chapter 26 (Environmental management) **of the EIS** provides details on the approach to environmental management during operation and decommissioning.

3.6.1. Transmission lines operation and maintenance

The transmission lines would require regular maintenance. Likely maintenance activities for transmission lines and structures would include:

- regular inspection and maintenance, including:
  - an annual fly over (aerial inspection) as part of seasonal bushfire prevention surveys
  - routine infrastructure inspections. This would typically involve two to three maintenance workers driving a light vehicle from public roads to the easement utilising access tracks, then along the easement inspecting each transmission line structure in turn. Structures would be inspected both from the ground and by maintenance workers climbing the structure on a six-yearly cycle
  - reactive transmission line maintenance in response to unexpected issues identified during routine inspections. This would typically involve maintenance workers using light vehicles, an elevated work platform and a medium sized truck to rectify any defects found during routine inspections. Generally, this would occur within the same maintenance cycles as the routine infrastructure inspection.
- ad-hoc fault and emergency fly-over(s), as required, to assess infrastructure condition should an unplanned outage occur (eg through a weather event or other failure of infrastructure). The amount of maintenance and/or crew required for repair of any damaged infrastructure would depend on the extent of repairs required.
- vegetation management within the transmission line easement and hazard tree zone (refer to Section 3.6.3).

3.6.2. Substation operation and maintenance

3.6.2.1. Proposed Gugaa 500 kV substation

During operation, the proposed Gugaa 500 kV substation would not accommodate full-time staff or contractors. Maintenance at the new substation would typically include routine and ad hoc attendance (typically one to two times a month) of one to five workers to undertake planned and unplanned maintenance. It is expected that this work would only require light vehicles and/or small to medium plant (depending on the work required). Any waste generated during operation would be minimal and disposed of in accordance with Transgrid's *Waste Management Procedure* (Transgrid, 2022b) by the maintenance workers.

Maintenance activities at the proposed Gugaa 500 kV substation would typically include (but not be limited to):

- routine inspection of substation infrastructure (such as transformers and other electrical plant and equipment) throughout the year by around two to three workers
- routine maintenance of substation equipment, property, and switchyard areas on a scheduled basis. This would typically be monthly and undertaken by between one and five maintenance workers
- ad-hoc fault and emergency work to repair any damaged infrastructure (eg through a weather event or other failure of infrastructure), as required. The amount of maintenance and number of crew would depend on the extent of repairs required.
- vegetation management along the operational access road and within the substation's APZ (refer to Section 3.6.3 for further detail).

Maintenance activities would be regularly undertaken for the different infrastructure components and plant items. These components would be replaced or refurbished towards the end of their serviceable life, allowing the service life of the substation to be maximised.

3.6.2.2. Wagga 330 kV substation and Bannaby 500 kV substation

The modification of the Wagga 330 kV substation and Bannaby 500 kV substation would not change the existing operational or maintenance requirements that currently occur for this infrastructure.

3.6.3. Vegetation management during operation

Vegetation would be required to be managed during operation of the project to ensure vegetation clearance requirements and APZs are maintained. A summary of the anticipated vegetation management requirements is provided in the sections below.

3.6.3.1. Transmission line structures and easements

Vegetation within the transmission line easement would be managed in accordance with Transgrid's *Maintenance Plan – Easement and Access Tracks*, which specifies a vegetation clearance requirement at maximum line operating conditions of 3.9 metres for 500 kV transmission lines plus a regrowth allowance of 1.5 metres. The regrowth allowance is based on the annual regrowth rate for the area.

Vegetation within the easement with a mature height, which does not exceed the clearance requirement of 5.4 metres can be retained.

In addition, the area within a 20 metre radius around each transmission line structure footing would be kept free of shrub and tree regrowth.

The management of vegetation at transmission line structures and within the easement would occur on a cyclic basis, determined by vegetation response and growth rate. Based on Transgrid's existing transmission assets in the local region, the easement management cycle is expected to be between four and six years.

Annual light detection and ranging (LiDAR) surveys would be carried out to identify any hazard trees. A hazard tree is defined as a tree or part of tree that if it were to fall would infringe on the vegetation clearance requirements at maximum conductor sag of the transmission lines. Potential hazard trees would be inspected by a suitably qualified arborist to determine the appropriate management response, which could include felling, pruning, or no action (if the inspection confirms that a potential hazard tree is of no risk to the transmission line).

3.6.3.2. Permanent access tracks

Maintenance would be carried out as required along access tracks retained for operational use. This would typically involve repair or reinstatement of damaged/eroded track surfaces/drainage (if resulting from Transgrid's operations) and slashing of any vegetation regrowth within the shoulders and/or management of trees which encroach **on** the access track corridor and prevent safe vehicle passage.

3.6.3.3. Substations ~~and telecommunications hut~~

Vegetation management for the substations ~~**and the telecommunications hut**~~ during operation would be generally limited to the operational access roads and maintenance of the APZs.

Vegetation within the APZ (but outside the asset fence line) would be managed by either slashing or mulching. Trees would be removed but root systems and ground cover vegetation would be retained. Other vegetation would be mown or slashed to a height of around 100 millimetres.

Vegetation management for the substations ~~**and the telecommunications hut**~~ would occur on a cyclic basis, which would be determined by vegetation response and growth rate. Based on Transgrid's existing assets in the local region, the cyclic management period is expected to be monthly for substations ~~**and annually for the telecommunications hut**~~.

3.7. Property acquisition and easements

3.7.1. Transmission line easements

An easement provides a right of access for Transgrid staff and contractors to construct, maintain and operate the transmission line and other operational assets. The easement also generally identifies the zone of initial vegetation clearance and ongoing vegetation management to ensure safe electrical clearances during the operation of the transmission lines. Vegetation management beyond the easement may also occur where nearby trees have the potential to fall and breach safety clearances.

To protect landowner and community safety and provide a safe, reliable network, Transgrid restricts the activities that can be carried out within the easements.

The easement for the new 500 kV transmission lines would typically be 70 metres wide. However, a few locations (such as at transposition locations) may require easements up to 110 metres wide and up to 130 metres wide where the new 500 kV transmission line would parallel the relocated section of Line 51.

Transgrid is working with landowners to finalise the location of and acquire the new transmission line easement**s** for the project.

All acquisitions or easements would be by agreement with landowners or in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991* and the *Property Acquisition Standards* (Department of Finance, Services and Innovation, 2019).

Easements through Crown land would be in accordance with the ***Land Acquisition (Just Terms Compensation) Act 1991*** **and** *Crown Land Management Act 2016* (as applicable).

Easements through State forests would be by agreement with FCNSW via a Deed of Easement, and/or in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991* **and** ***Forestry Act 2012*****.**

Some structures within the final easement may also need to be demolished and/or relocated. This would be undertaken in consultation with and subject to negotiations with the landowners and in accordance with Transgrid's *Easement guidelines - Living and working with electricity transmission lines*.

3.7.2. Access easements

As discussed in Section 3.3.3, access to the transmission line easement would be required for operational purposes. Access easements may be required to provide Transgrid operational staff with access from the nearest public road to the transmission line easement. These access easements would be negotiated with landowners as necessary. Transgrid may install locked and signed access gates to enable access to the

access easement should a landowner not have a suitable gate nearby. Access for landowners would be maintained and landowner access requirements would be complied with (such as biosecurity protocols).

Easements would also be required for the telecommunications connections to the existing substations. These easements are anticipated to be around two metres wide and would be acquired in accordance with the requirements detailed in Section 3.7.1.

3.7.3. Substations ~~and telecommunications hut~~

Freehold property acquisition would be required for the proposed Gugaa 500 kV substation ~~**and the telecommunications hut at Killimicat**~~ as detailed in Table 3-3.

Table 3-3 Property acquisition required for the project

Location	Lot and DP	Area
Proposed Gugaa 500 kV substation	Lot A DP 376288 Lot 56 DP 757261	~~**80.70**~~**103.49** ha[1]
~~**Telecommunications hut at Killimicat**~~	~~**Lot 85 DP 750990**~~	~~**0.04 ha**~~

Note:
1. Operational substation infrastructure would only occupy approximately ~~**22**~~ **34** hectares.

All acquisitions for the proposed Gugaa 500 kV substation ~~**and the telecommunications hut**~~ would be carried out in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991* and the *Property Acquisition Standards* (Department of Finance, Services and Innovation, 2019).

~~**In addition to the freehold acquisition for the telecommunications hut, an easement would be required for the connection to the local power supply. The easement is anticipated to be two metres wide. It would be acquired in accordance with the requirements detailed in Section 3.7.1.**~~

No property acquisition or property adjustments are anticipated for the modification of the Wagga 330 kV substation or Bannaby 500 kV substation, as these would occur within the existing substation properties.

Property acquisition for the future Maragle 500 kV substation is being undertaken as part of the Snowy 2.0 Transmission Connection Project. No additional property acquisition or property adjustments are anticipated as a result of the proposed connection work.

4. Project description - construction

This chapter provides a consolidated description of construction for the project. The chapter includes the indicative construction methodology, timing, likely resources and program. The description of the project components presented in this chapter is based on **preliminary detailed design and pre-construction planning** ~~**the current concept design**~~ **by the construction contractors**.

Some elements of the project may continue to be refined as ~~**part of**~~ **further detailed design and construction planning is undertaken for the project**. If approval is granted, any changes to the project would be reviewed for consistency with the approved project in accordance with the process described in Chapter 26 (Environmental management) **of the EIS**. A description of how the project would be operated is provided in Chapter 3 (Project description - infrastructure and operation).

4.1. Construction overview

Construction of the project is planned to commence once all the necessary approvals are obtained. It is anticipated that construction would commence in 2024.

The indicative approach to construction is described in Sections 4.2 to 4.7. Detailed construction planning, including timing, phasing and work sequencing, would be refined and confirmed with the construction contractors. Further information on the construction program and timing is provided in Section 4.8.

Construction of the project would typically include (but not be limited to):

- site establishment (refer to Section 4.2.1)
- main construction work (refer to Section 4.2.2)
- testing and commissioning (refer to Section 4.2.3)
- demobilisation and **restoration/** rehabilitation (refer to Section 4.2.4).

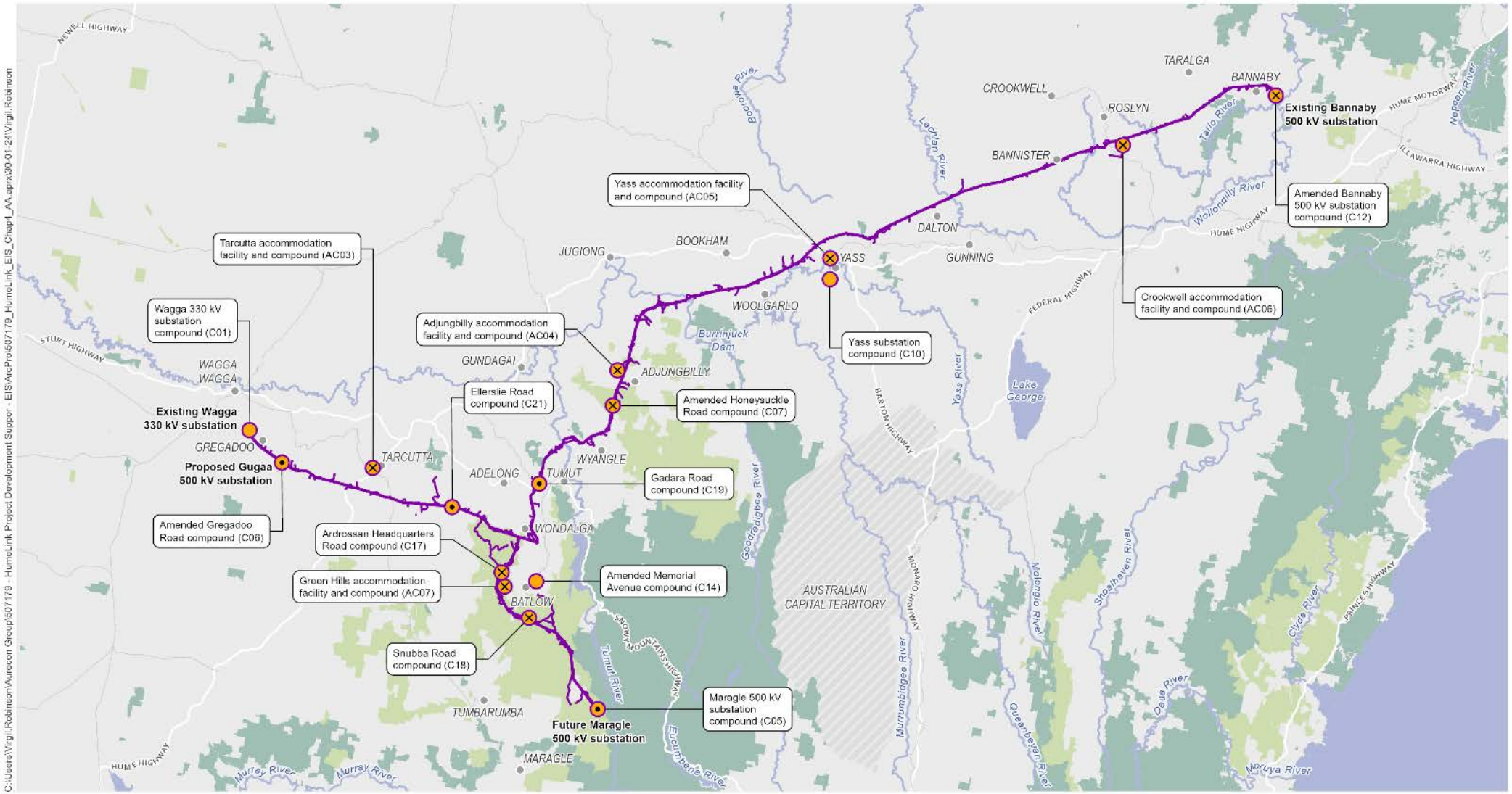
Some activities would be defined as pre-construction work as their purpose is to make the key construction sites ready and to manage specific features or issues of the project. **Pre-construction work includes both pre-construction minor work and pre-construction enabling works.** Pre-construction **minor** work is typically low impact work and proposed to take place prior to the approval of the Construction Environmental Management Plan (CEMP) by the **Department of Planning, Housing and Infrastructure (DPHI) (formerly the** Department of Planning and Environment (DPE)). **Pre-construction enabling work includes site establishment and other activities which would not be categorised as low impact and as such, require management via an Enabling Works Management Plan. All** pre-construction work would be managed in accordance with an Enabling Works Management Plan or Environmental Work Method Statements or similar environmental management documents**, as relevant**. Chapter 26 (Environmental management) **of the EIS** provides further information on the approach to environmental management during construction including details of activities considered as pre-construction work.

A summary of the key construction features of the project is provided in Table 4-1 and shown on Figure 4-1.

Table 4-1 HumeLink project summary - construction

Project element	Summary of the project	Reference
Project footprint	The project footprint extends from the existing Wagga 330 kV substation in the west to the existing Bannaby 500 kV substation in the east and the future Maragle 500 kV substation in the south. The project footprint includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement and permanent access tracks required during operation. As such, the project footprint includes the area of temporary construction disturbance, such as construction compounds, laydown areas, the worker accommodation ~~facility~~ facilities, construction benches for transmission line structures, brake and winch sites, ~~a~~ concrete batching plants, temporary access tracks and waterway crossings. The final locations for these project elements would be confirmed by the construction contractors during further detailed design.	Figure 4-1 Figure 4-8
Construction program	Construction is expected to commence in 2024 and take ~~about~~ an estimated 2.5 years to complete. The project is expected to be fully operational by the end of 2026.	Section 4.8
Construction workers	The number of construction workers would vary depending on the phase of construction and associated activities. During peak construction activities, the project is expected to employ up to ~~1,200~~ 1,600 full-time equivalent workers across multiple work fronts.	Section 4.6.1
Ancillary development	The construction of the project would involve establishment and/ or use of: • existing, new and upgraded access tracks including upgraded connections to the existing road network as required • five combined ~~a~~ temporary worker accommodation ~~facility~~ facilities and construction compounds at Tarcutta, Adjungbilly, Yass, Crookwell and Green Hills ~~at Tumbarumba~~ • ~~14~~ 11 standalone construction compounds nominated to support laydown areas, stockpiling areas, ~~a~~ concrete batching plants, site offices and parking • helipad/helicopter support facilities (within nominated construction compounds) • other minor storage and laydown ancillary areas along the transmission line route.	Section 4.2.1 Section 4.3 Figure 4-8
Construction water management	It is estimated that about ~~564~~ 715 megalitres (ML) of water would be required for construction. This includes ~~498~~ 429 ML of non-potable water and ~~66~~ 286 ML of potable water. Non-potable water sources would include construction sedimentation basins, farm dams, rainwater tanks, groundwater bores and water purchased from existing water user allocations. Potable water sources would include council standpipes, ~~or~~ connection to council water supply systems, commercial suppliers, and on-site water treatment systems in conjunction with non-potable sources. The total ~~annual~~ daily volume of wastewater generated during construction is expected to be about ~~8.81 ML~~ 50-100 kL per worker accommodation facility.	Section 4.5.2
Earthworks estimate[1]	Earthworks for construction of transmission line structures and access tracks would involve an estimated ~~283,590~~ 1,460,000 m^3 of cut and ~~115,690~~ 1,720,000 m^3 of fill. Earthworks for substation construction would involve an estimated ~~382,440~~ 105,000 m^3 of cut and ~~302,580~~ 135,000 m^3 of fill.	Section 4.5.1
Construction access routes	Hume Highway, Sturt Highway, Snowy Mountains Highway, Batlow Road, Crookwell – Goulburn Road and Gocup Road are the main national and state roads proposed to provide access to the project footprint. Access would also be facilitated by the use of regional and local roads throughout the Local Government Areas (LGAs) of Wagga Wagga City, Snowy Valleys, Yass Valley, Cootamundra-Gundagai Regional, Goulburn Mulwaree and Upper Lachlan Shire that connect to the project footprint.	Section 4.7.2 Figure 4-9

Note:
1. Indictive earthwork volumes exclude topsoil strip. Many areas will require localised cut to fill operations which will be developed and optimised during further detailed design and construction planning and are not accounted for in this table. The indicative earthwork volumes are based on the assumption that cut material can be used as fill for the project.



Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

1:925,000

0 20 40km

Projection: GDA 1994 MGA Zone 55

HumeLink

FIGURE 4-1: Overview of key construction features

4.2. Construction methodology

4.2.1. Site establishment

Site establishment involves preparing the site for future activities, such as the building of construction compounds and ~~the~~ **temporary** worker accommodation ~~facility~~ **facilities**. Site establishment activities would commence as pre-construction work as described in Chapter 26 (Environmental management) **of the EIS**.

Site establishment activities include:

- installing site environmental management and traffic controls, including drainage and erosion and sediment management controls, in accordance with a separate activity-specific management plan or work method statement
- installing temporary fencing to ensure construction areas are clearly delineated
- clearing vegetation and topsoil, where required, including stockpiling for reuse during rehabilitation
- establishing construction infrastructure including construction compounds, helipad/helicopter facilities and ~~the~~ temporary worker accommodation ~~facility~~ **facilities** (refer to Section 4.3)
- relocating, adjusting or protecting utilities, where required
- constructing new access tracks and waterway crossings and/or upgrading existing access tracks
- carrying out road improvement work **where required**
- establishing vehicle access and egress points including adjustment of roads to ensure safe vehicle movements as required
- establishing hardstand areas for storage, laydown and car parking
- carrying out geotechnical and contamination investigations
- carrying out property adjustment and demolition work including adjustments to property fencing, barricades, gates and access, and demolition and relocation of existing dwellings and structures as required.

Some of the site establishment activities are discussed in further detail below.

4.2.1.1. Vegetation clearing

Vegetation clearing or pruning would be required to:

- construct transmission line structures
- establish transmission line easements
- **upgrade and/or** construct access tracks
- construct or modify substations
- **establish telecommunications connections**
- ~~**construct the telecommunications hut**~~
- establish construction compounds, the temporary worker accommodation ~~facility~~ **facilities** or other ancillary facilities
- manage hazard trees.

Some vegetation clearing and pruning would be carried out as pre-construction work. Such clearing would exclude threatened flora species, vegetation that is part of a threatened ecological community or is critical habitat for a threatened fauna species (refer to Chapter 26 (Environmental management) **of the EIS**), **unless otherwise approved via the Enabling Works Management Plan**.

Clearing would be undertaken with the use of machinery, or manually where it is unsafe to operate machinery or access is limited. Root balls would be retained where possible and as required due to identified environmental and heritage constraints.

The clearing method would be determined by:

- vegetation type or structure
- slope and terrain
- environmental and ecological constraints.

A summary of the vegetation clearing requirements is provided in Table 4-2 and indicated in Figure 4-2, Figure 4-3, Figure 4-4 and Figure 4-5.These areas have been categorised into different zones of vegetation clearing (total clearing zone (TCZ), easement clearing zone (ECZ) and hazard tree zone (HTZ)) and collectively form the disturbance area for the project. An indicative disturbance area based on ~~**the concept design**~~ **preliminary detailed design** for the project has been developed for the purpose of assessing potential biodiversity impacts as described in ~~**Chapter 8 (Biodiversity)**~~ **Section 6.2 of the Amendment Report**.

Table 4-2 Vegetation clearing requirements

Aspect	Requirements
Transmission line structures (part of the TCZ)	Construction of transmission line structures would require vegetation removal for the following: • establishment of construction benches – which would require a cleared area of around 70 m by ~~**50**~~ **60** m (with the 70 m side placed along the length of the easement and the ~~**50**~~ **60** m section across the width of the easement) for the construction of each structure **in most instances, with larger construction benches of up to 100 m by 70 m in steep terrain** • brake and winch sites – which would require a cleared area of around ~~**50**~~ **60** m by ~~**50**~~ **80** m ~~**where a direction change of the transmission line occurs.**~~ Due to the variable terrain, complete removal of vegetation would typically be required within these areas to facilitate safe access and use of construction vehicles, plant and equipment.
Transmission line easement (part of the ECZ)	Vegetation clearing within the transmission line easement would involve the removal of tall growing vegetation that exceeds the clearance requirements for the transmission line **now or at any time in the future**. Groundcover and understorey vegetation would not be required to be cleared but may be impacted during clearing of the mid-storey and upper storey vegetation. Full vegetation clearing to the width of transmission line easement would be required for sections of the transmission line that traverse plantation forests.
Hazard trees (part of the HTZ)	**The hazard tree zone encompasses land located adjacent to the transmission line easement where selective tree removal, trimming or lopping would be undertaken to manage any risk of damage to transmission lines and structures in the event of tree fall.** For the purpose of the EIS, hazard trees **(trees outside the easement that are of a sufficient height which, if they were to fall, would exceed the clearance requirements for the transmission line)** have been assessed as being removed.
Access tracks (part of the TCZ)	Construction of **new** access tracks would generally require full vegetation clearing **up** to a width of 10 m, **with some limited areas (eg steep terrain) requiring a clearing width of up to 20 m for batters.** **Upgraded tracks may require vegetation clearing, to the same total width as new access tracks, for widening/ formation work or where vegetation may be considered a roadside hazard.** **Existing tracks/ roads would not require vegetation clearing.**

Aspect	Requirements
Substations **and telecommunications connections** ~~**and telecommunications hut**~~ (part of the TCZ)	Areas required for the construction of the proposed Gugaa 500 kV substation and modifications at Wagga 330 kV substation and Bannaby 500 kV substation, ~~**the telecommunications hut**~~ including associated access roads and asset protection zones (APZs) would require full vegetation clearing. **Areas required for the construction of the proposed telecommunications connections, including installing underground fibre optic cables between the transmission line and existing substations would require full vegetation clearing.**
Construction ancillary facilities (part of the TCZ)	The areas required for the construction compounds, ~~**and the**~~ worker accommodation ~~**facility**~~ **facilities and other ancillary facilities (including ancillary telecommunication connections)** would require vegetation clearing.

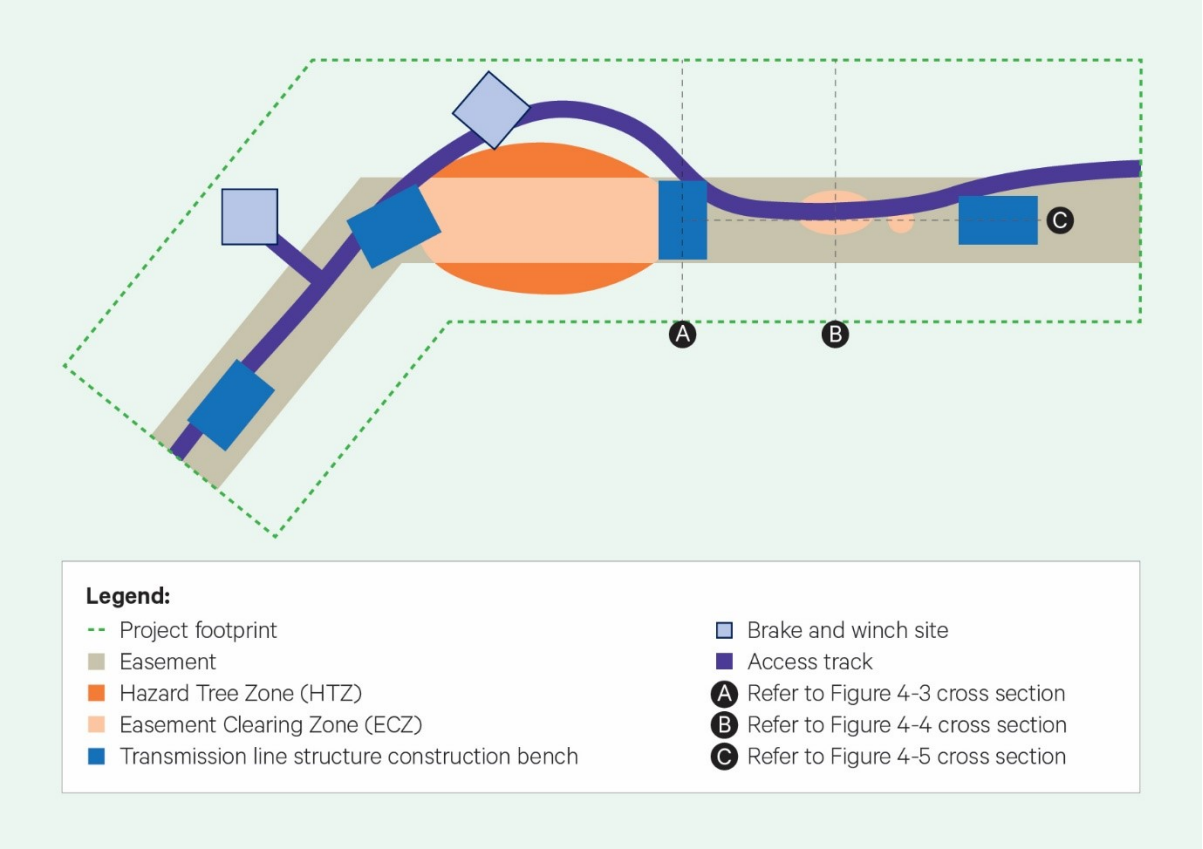


Figure 4-2 Indicative vegetation clearing zones within the project footprint

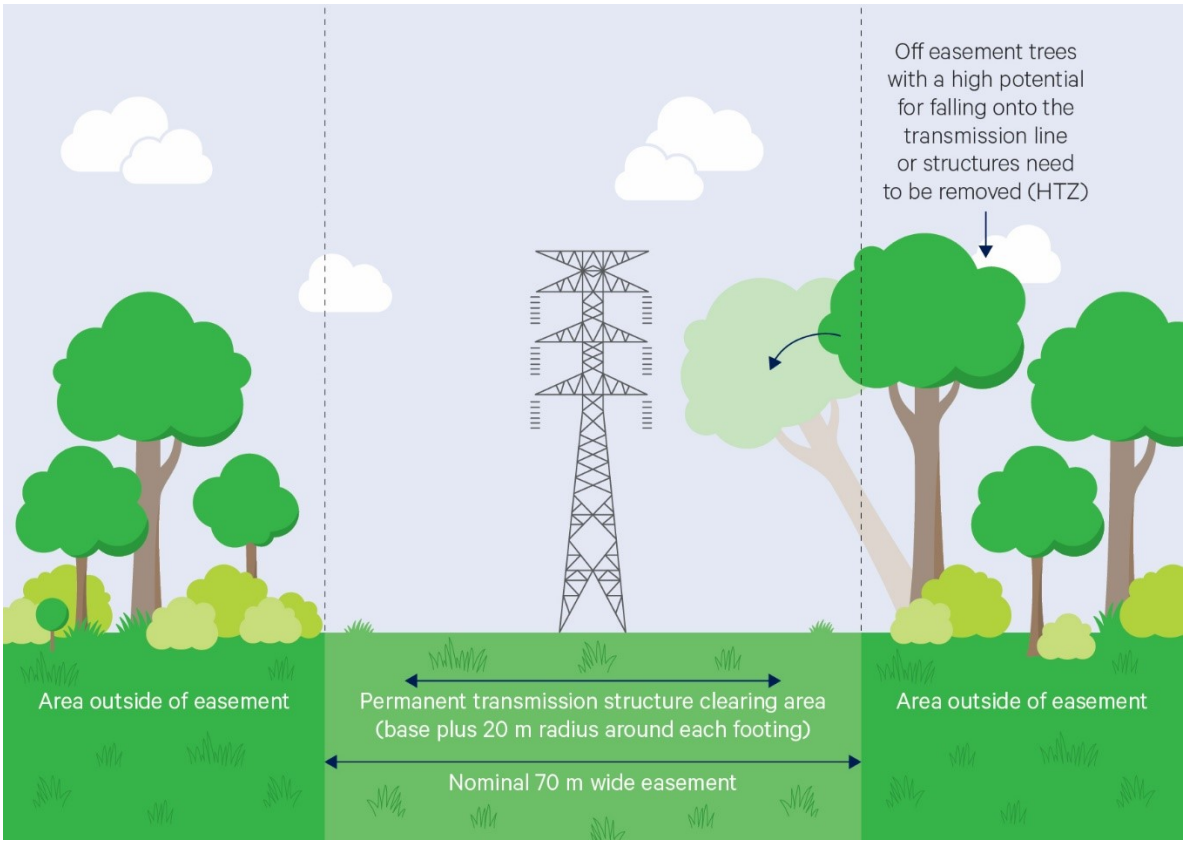


Figure 4-3 Indicative vegetation clearing around a typical transmission line structure

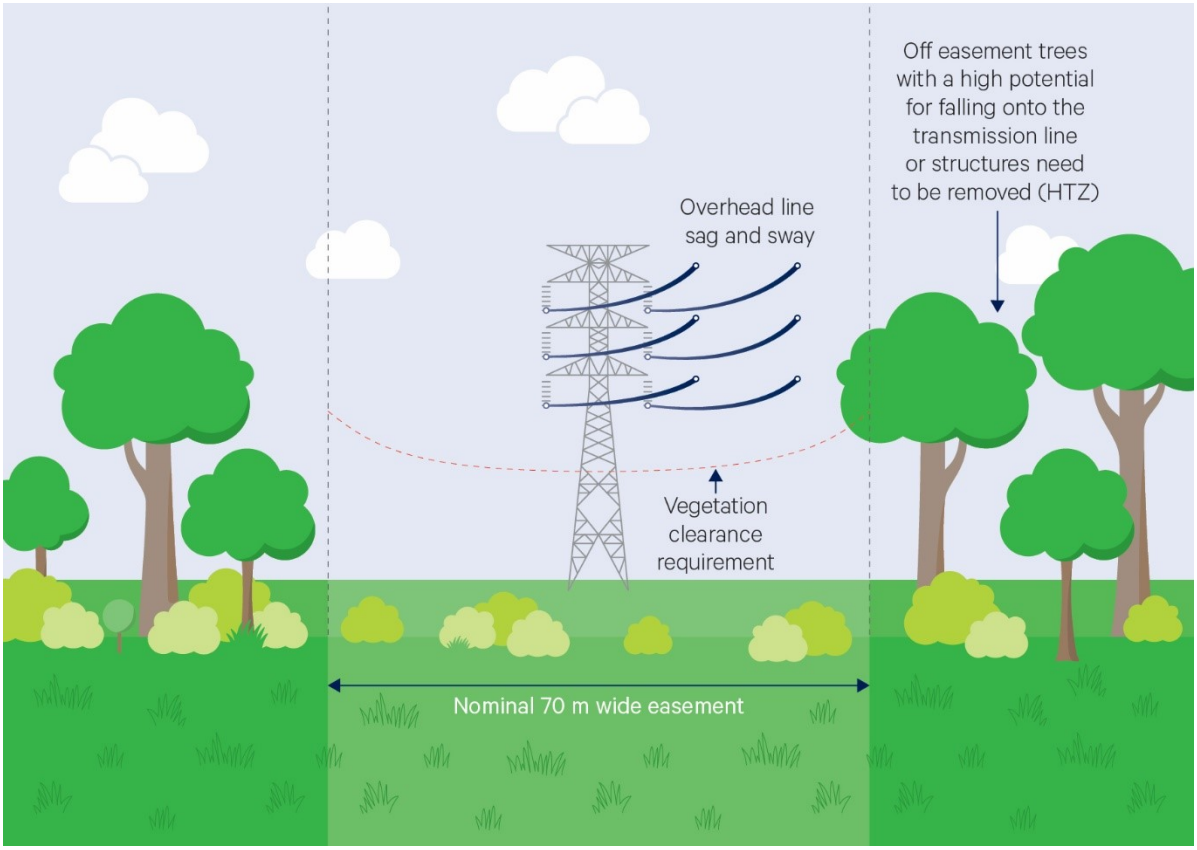


Figure 4-4 Indicative vegetation clearing within the easement

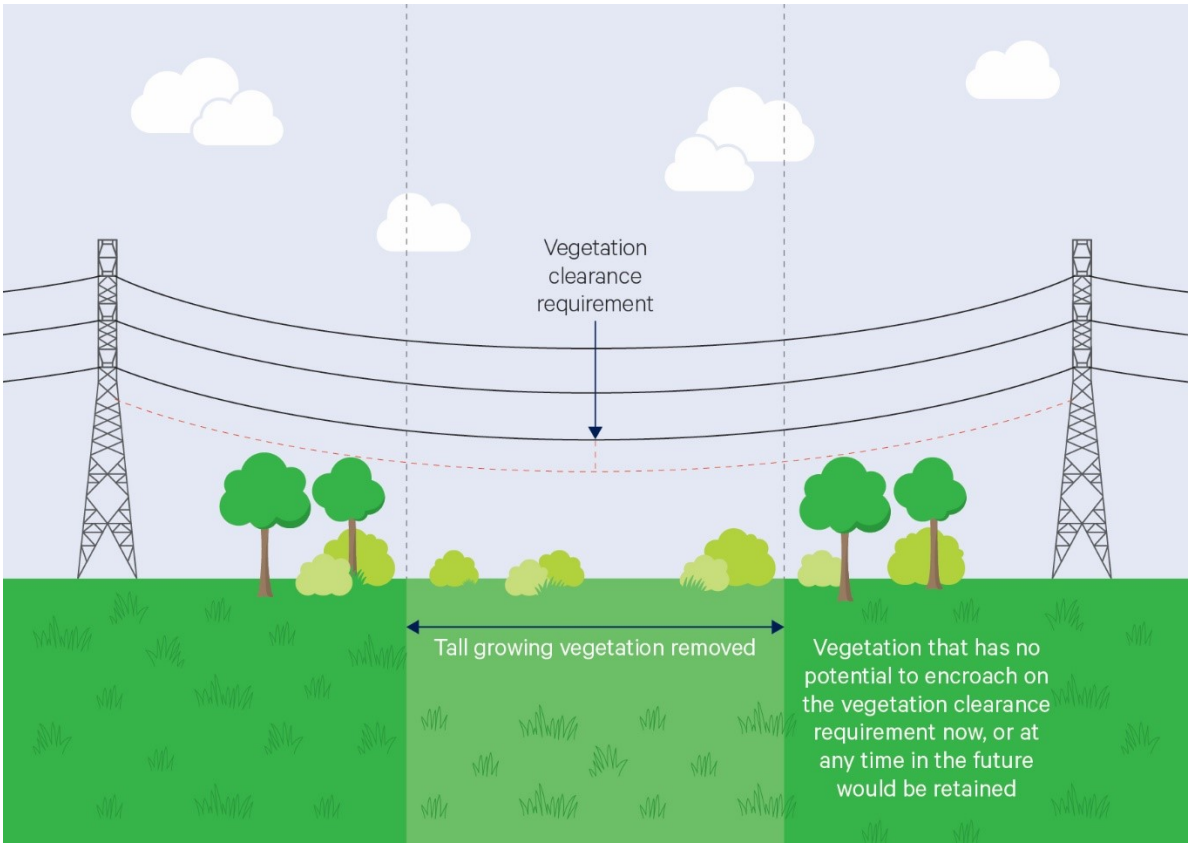


Figure 4-5 Indicative vegetation clearing mid-span

4.2.1.2. Utility connections, adjustments and protection work

It is anticipated that utility service connections would be required for the construction compounds and worker accommodation ~~facility~~ facilities during site establishment. Depending on availability of existing services, this could include power, water and wastewater services. The extent of connection work would be confirmed by the construction contractors during further detailed design and ~~further~~ construction planning.

The project footprint contains a number of existing local utility services including council assets (eg water mains), telecommunication lines, and power distribution lines (eg 11 kV, 33 kV and 66 kV lines) that may require relocation and/or protection work during site establishment. **The project would need to carry out minor adjustments of Essential Energy distribution lines, including near Bannister Lane, Black Range Road and Humula Road.** Potential impacts on additional existing utility services would be confirmed during further detailed design and ~~further~~ construction planning. Any proposed relocation and/or protection work would be determined in consultation with the relevant asset owners.

Where the extent of connection work or any proposed relocation and/or protection work is to be undertaken outside of the project footprint, additional environmental investigation would be carried out and the work reviewed for consistency with the approved project in accordance with the process described in Chapter 26 (Environmental management) of the EIS.

There are no major ~~utilities, such as~~ water ~~or gas~~ pipelines within the project footprint that would require relocation and/or protection work during site establishment.

The project footprint contains three major gas pipelines. Two APA Group gas pipelines associated with the Moomba-Sydney Pipeline System intersect the project footprint at Gadara Road, Gadara and at Dalton near Felled Timber Road, and a Jemena gas pipeline intersects the project footprint at Cooks Hill Road, Bango. Potential impacts on the gas pipelines would be confirmed during further detailed design and construction planning. Where potential impacts are identified, APA Group and/or Jemena requirements for surveying, access and construction would be followed in consultation with the asset owner.

Work associated with rebuilding around two kilometres of an existing 330 kV single-circuit transmission line (Line 51) south of the Wagga 330 kV substation and **telecommunications connections to existing Transgrid substations** ~~**and a connection to the Rye Park Wind Farm**~~ are detailed in Section 4.2.2.

Chapter 11 (Land use and property) **of the EIS** provides further details on existing utility services within and surrounding the project footprint.

4.2.1.3. Property adjustments

Temporary property access arrangements, and installation or adjustment of gates and fences, would be required at some locations along the transmission line route to enable access from the nearest roadway to construction areas. These would be constructed in consultation with the relevant council and/or landowner.

Earthing and isolation panels would be required for any metal property fences that run parallel to the transmission line within the transmission line easement or across the easement within 25 metres of the base of a transmission line structure. Installation of earthing and isolation panels would be in accordance with Transgrid's *Fencing Guidelines* (Transgrid, 2017).

The demolition or relocation of dwellings and other structures (eg sheds and other farm infrastructure) may be required to construct the transmission lines and establish the new transmission line easement. ~~**Nine**~~ **Eleven** dwellings are located within the project footprint, **one of which is not habitable**. Based on ~~**the current concept**~~ **the preliminary detailed design**, ~~**one dwelling is**~~ **two dwellings are** likely to require demolition or relocation. The need for the demolition or relocation of dwellings and other property structures would be confirmed during **further** detailed design and in negotiation with **the affected** landowners.

4.2.1.4. Access tracks

Access tracks would need to be established to accommodate safe access of construction machinery and vehicles to the transmission line structures, substations and other construction work sites.

Access to each transmission line structure would be required during construction and would generally be retained for operational purposes. Access tracks would be required to be traversable by a range of vehicles and would fall into ~~**two**~~ **three** broad groups:

- ~~**unimproved access tracks**~~
- ~~**constructed access tracks.**~~
- **existing tracks/ roads**
- **upgraded tracks**
- **new tracks.**

Access tracks may need to be connected to the existing road network. Where this occurs, road improvement work may be required to facilitate safe vehicle access. The type of work would depend on factors such as the existing environment and road type at the point of connection, existing traffic volumes

and the type of vehicle requiring access. Section 4.2.1.6 provides further detail on the type of work and detailed design requirements for connections to the existing road network.

Table 4-3 provides a description of the types of access tracks that would be used for the project.

Table 4-3 ~~Types of access tracks~~ **Description of proposed work for the nominated access tracks required for the project**

Type	Detail
~~Unimproved access tracks~~	~~Unimproved access tracks would provide access to work sites by using existing roads or tracks or driving on existing soil or ground surface with minimal or no prior preparation. Existing roads, tracks and other existing disturbed areas would be used wherever possible to minimise vegetation clearing requirements.~~ ~~Where access is across open spaces, particularly in cultivated areas, pasture improved grazing land or native grasslands, care would be exercised to ensure that minimum damage is caused to the surface by confining movement, as far as possible, to one route.~~ ~~Stabilisation of unimproved access tracks with a suitable capping material may be required where there are potential erosion and sedimentation risks.~~
~~Constructed access tracks~~	~~Constructed access tracks would be required in areas where there are no existing roads or tracks, or where terrain conditions prevent continuous access along the transmission line easement between road crossings. In those situations, 'off easement' access may be required, and suitable access tracks would be constructed.~~ ~~All new access tracks would include a trafficable surface between 3 and 6 m wide with a 1 or 2 m shoulder and would generally follow the natural contour of the land as far as practicable to minimise the amount of cut and fill and soil disturbance.~~ ~~Access tracks would be stabilised with suitable capping material and include drainage control features such as table drains or cross banks to minimise potential erosion and sedimentation risks.~~ ~~In the case of cultivated land, it may be necessary to locate access tracks along fence lines or otherwise in accordance with landowner requirements. Track construction would be carried out so as to cause minimum disturbance to soil and vegetation both on and adjacent to the track, including restricting the use of bulldozers where practical.~~ ~~Access tracks would be constructed and maintained in accordance with Transgrid's environmental and engineering requirements and the following guidelines:~~ ~~• *Guidelines for the planning, construction and maintenance of tracks* (Department of Land and Water Conservation, 1994)~~ ~~• *Managing Urban Stormwater: Soils and Construction – Volume 2C Unsealed Roads* (DECC, 2008a).~~ ~~Where tracks are, or are required to be, located in areas which are not suitable for use by vehicles and plant following adverse weather conditions, the area would be temporarily bypassed (ie alternative access routes would be identified).~~ ~~Access tracks would be designed and formed such that the track is suitable for use by vehicles during subsequent use as part of future maintenance access (ie suitable for use by long wheel-base 4WD vehicles).~~
Existing tracks/roads	**Existing access tracks include well-established unsealed local roads, forest roads, and tracks maintained by FCNSW or unsealed property access tracks, generally suitable for heavy vehicles.** **Some existing access tracks/roads may be subject to maintenance activities or minor upgrades along the formation, such as resurfacing or grading, or drainage work.** **Minor vegetation pruning/trimming may be required in some locations where vegetation may be considered a roadside hazard. Where pruning/trimming is required, it would be undertaken to avoid impacts on the long-term viability of the vegetation.**
Upgraded tracks	**Upgraded access tracks typically consist of unsealed property access tracks of varying conditions, from well-established sections to rarely used, barely visible sections (ie requiring substantial upgrade). The existing gradient of upgraded access tracks varies and may only be suitable for light vehicles without these upgrades.**

Type	Detail
	Upgraded access tracks are expected to require more substantial work to allow their use during construction compared with existing tracks/ roads. Work may include earthworks to improve gradients, grading or resurfacing, formation widening to 8 m or realignment, drainage work or upgrades to waterway crossings. **Vegetation clearing or pruning/trimming may be required for widening/formation work or where vegetation may be considered a roadside hazard. The total clearing width would generally be up to 10 m, with some areas (eg steep terrain) requiring a clearing width of up to 20 m for batters.**
New tracks	**The locations of new access tracks have generally been selected in consultation with affected landowners to minimise property impacts, including running the track along fence lines, using movement paths preferred by landowners, and going through existing property gates. Establishing the new tracks would typically include earthworks, grading, drainage work and construction of waterway crossings. Fill material may be imported to provide a suitable capping material. To establish the new tracks, vegetation clearing or pruning/trimming may be required. The total clearing width would generally be up to 10 m, with some limited areas (eg steep terrain) requiring a clearing width of up to 20 m.**

4.2.1.5. Waterway crossings

A number of minor waterway crossings may need to be constructed where an access track for vehicles, plant and equipment needs to cross a small creek or drainage line.

Where required, bed-level fords (ie construction of a good footing where a waterway may be crossed) or causeways may be required to be constructed to provide access. Where these crossings are required, they would typically be constructed by:

- removing all loose material from the watercourse at the point to be crossed, forming a depression with firm base and sides
- filling the depression with graded layers of rock, placing the rock layers to produce an interlocked bed of rock, sloped and dished to allow water to drain freely through and flow over the causeway (minimum thickness of around 450 millimetres but not higher than the bed of the waterway).

If required as part of a waterway crossing, culverts may also be installed in accordance with relevant standards (such as *AS/NZS 4058-2007 Precast concrete pipes (pressure and non-pressure)* (Standards Australia/Standards New Zealand, 2007)).

Soil and vegetation disturbance would be kept to a minimum during the construction of all waterway crossings. Additional controls would be installed on the approaches to all waterway crossings as required to minimise potential erosion and sedimentation risks. Areas that are disturbed during the construction of the waterway crossing but are not required for operation would be stabilised and rehabilitated.

All waterway crossings would be designed, installed and maintained in accordance with relevant guidelines for waterway crossings including:

- *Policy and Guidelines for Fish Friendly Waterway Crossings* (DPI, 2003)
- *Why do fish need to cross the road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge, 2003)
- *Controlled activities – Guidelines for watercourse crossings on waterfront land* (DPE, 2022b)
- *Controlled activities – Guidelines for riparian corridors on waterfront land* (DPE, 2022c)
- *Managing Urban Stormwater: Soils and Construction – Volume 1, 4th Edition* (Landcom, 2004).

4.2.1.6. Road improvement work

Road improvement work would be required to facilitate safe vehicular access to the proposed Gugaa 500 kV substation, ancillary facilities described in Section 4.3, and where access tracks require connection to the existing road network. Table 4-4 describes the potential work that could be required **for connections** based on the existing road type.

Table 4-4 Road improvement work based on road type connection

Road type	Potential work required for connection
National and state road	The potential work that could be required for connection includes: • pavement and minor earthwork to facilitate the appropriate turning treatment **if** required, eg basic right turn, basic left turn, channelised right turn and/or auxiliary left turn • drainage work at the point of connection to maintain existing roadside drainage, eg installation of pipe culvert or gutter • minor vegetation clearing to ensure required sight distances are achieved where required • line marking and signage.
Regional and local road – sealed	The potential work that could be required for connection includes: • minor earthwork, eg grading and/or resurfacing, within existing road shoulder based on type of vehicle requiring access • drainage work at the point of connection to maintain existing roadside drainage, eg installation of pipe culvert or table drain • minor vegetation clearing to ensure required sight distances are achieved where required • line marking and signage.
Regional and local road – unsealed	The potential work that could be required for connection includes: • minor earthwork, eg infill, grading and/or resurfacing, of existing road surface and shoulder based on type of vehicle requiring access • minor drainage work at the point of connection to maintain existing roadside drainage, eg installation of table drain • minor vegetation clearing to ensure required sight distances are achieved where required • signage.

The extent and design of the road improvement work would be confirmed during **further** detailed design and would be informed by road dilapidation surveys to be completed for all local roads to be used during construction. Road improvement work would be carried out in accordance with the relevant Austroads Guides, any road occupancy licence(s), and in consultation with the relevant road authority. Relevant Austroads Guides include (but may not be limited to):

- *Guide to Road Design* (Austroads, 2023)
- *Guide to Road Safety* (Austroads, 2021a)
- *Guide to Traffic Management* (Austroads, 2020a)
- *Guide to Temporary Traffic Management* (Austroads, 2021b).

The existing unsealed access road from Hanworth Road to the Bannaby 500 kV substation/**Amended** Bannaby substation 500 kV compound (C12) would be upgraded, **in accordance with the description of proposed work for upgraded tracks in Table 4-3,** as part of the modification work. This would mainly be limited to the existing access road formation to make the access road suitable for heavy vehicles used in construction, eg grading and resurfacing work. The extent of the upgrade work would be confirmed during **further** detailed design and would be designed in accordance with *Managing Urban Stormwater: Soils and Construction – Volume 2C Unsealed Roads* (DECC, 2008a).

It is also anticipated that some widening, and modification of the Gregadoo East Road and Livingstone Gully Road intersection would be required to facilitate delivery of large plant items on oversize delivery vehicles to the proposed Gugaa 500 kV substation and Gregadoo Road compound (C06). The extent of intersection work would be confirmed during **further** detailed design and would be carried out in accordance with the relevant Austroads Guides described above, any road occupancy licence(s) and in consultation with the relevant road authority. The confirmation of the extent of intersection work would also consider the need for any further environmental investigations. Refer to Chapter 20 (Traffic, transport and access) **of the EIS** and **Chapter 6.14 (Traffic, transport and access) of the Amendment Report** for consideration of traffic related impacts associated with the intersection work.

4.2.2. Main construction work

4.2.2.1. Transmission line construction

Overview

The main work associated with the construction of the new 500 kV transmission lines would include (but not be limited to):

- earthwork and footing construction, including:
  - earthwork and establishment of construction benches and brake and winch sites ~~**for each transmission line structure**~~ **as required for the stringing of the transmission line conductors**
  - construction of footings and foundation work for the new transmission line structures including either concrete or steel piles (driven and/or screw), boring and/or excavation, steel fabrication work and concrete pours
- erection of the transmission line structures
- stringing of the conductors and overhead earth wire (OHEW) and optical fibre ground wire (OPGW)
- installation of earthing conductors
- earthing of fences and gates (as required).

As described in Chapter 3 (Project description – infrastructure and operation), construction of the new 500 kV transmission line south of the Wagga 330 kV substation would also require the rebuilding of around two kilometres of an existing 330 kV single-circuit transmission line (referred to as Line 51, refer to Figure 3-1) as a double-circuit 330 kV line.

Further details of the key tasks are provided below.

Earthwork and transmission line structure footing construction

Excavation work at each transmission line structure site would be required for the installation of foundations, levelling around the individual structure foundations, drainage and grading or preparation for construction at the structure site. Excavations would typically be up to five metres deep. Where groundwater is shallow, alternative construction methodologies and designs would be implemented (such as boring) to limit interaction with groundwater.

The typical transmission line structure piling depth would range from four metres up to ~~**27**~~ **28** metres below ground level and would depend on the transmission line structure type and ground conditions (eg greater piling depths would be required where soft soil types are present).

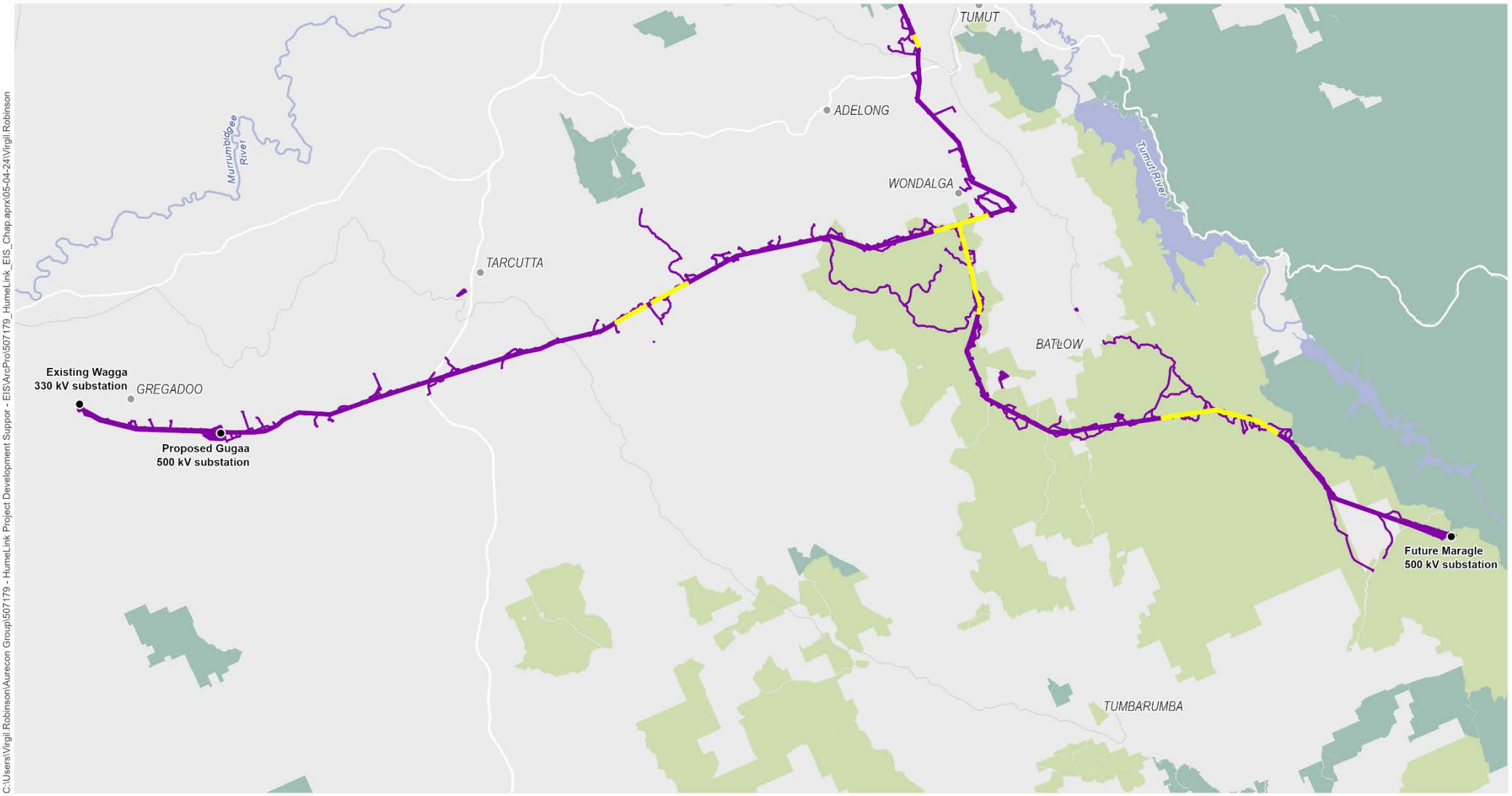
The foundation type would also vary based on ground conditions and would be confirmed during **further** detailed design. Foundation types could consist of bored or cast in-situ reinforced concrete piles, which would both be constructed by drilling holes in the ground, removing the spoil and filling the holes with concrete and steel reinforcement as required. Driven or screw piles could also be used. Driven piles would be constructed by driving or hammering a concrete or steel casing into the ground with the use of vibration; screw piles would be constructed by screwing a pile shaft into the ground. Use of driven and screw piles would minimise the amount spoil produced compared to bored or cast in-situ reinforced concrete piles.

If groundwater is encountered or the excavations are filled by rainwater, the excavation would be dewatered and appropriately managed.

A construction bench may be required to provide a level platform for equipment setup, the erection of the transmission line structure and other construction activities. Benching would be constructed using earthwork plant and equipment such as bulldozers, graders and excavators.

Excavated material would be stockpiled to be used for backfill around the transmission line structure foundations and embankment filling at the tower site from which it was excavated. Topsoil would be kept separate from the excavated material to allow for placement at ground level during backfilling. Any excess excavated material would be spread evenly around the site after completion of the foundation backfilling (if suitable), used elsewhere onsite or removed from the site and disposed of in accordance with the appropriate waste classification.

Based on topography and geotechnical conditions within the project footprint, controlled blasting is potentially required in several locations along the transmission line corridor and/or limited sections of access track within potential controlled blasting areas (refer to Figure 4-6). Controlled blasting would be required during construction for excavation and foundation work with difficult geotechnical conditions. Crushing of rock is expected in areas where blasting is undertaken to break down hard rock for transport. ~~**Blasting may be required depending on geotechnical conditions. This**~~ **The specific blasting locations within the potential blasting areas identified would be confirmed during further detailed design and with further construction planning** ~~**and would be subject to further investigation**~~ (refer to ~~**Chapter 15 (Noise and vibration)**~~ ***Technical Report 9 – Noise and Vibration Impact Assessment Addendum*** for further detail).



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Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

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Projection: GDA 1994 MGA Zone 55

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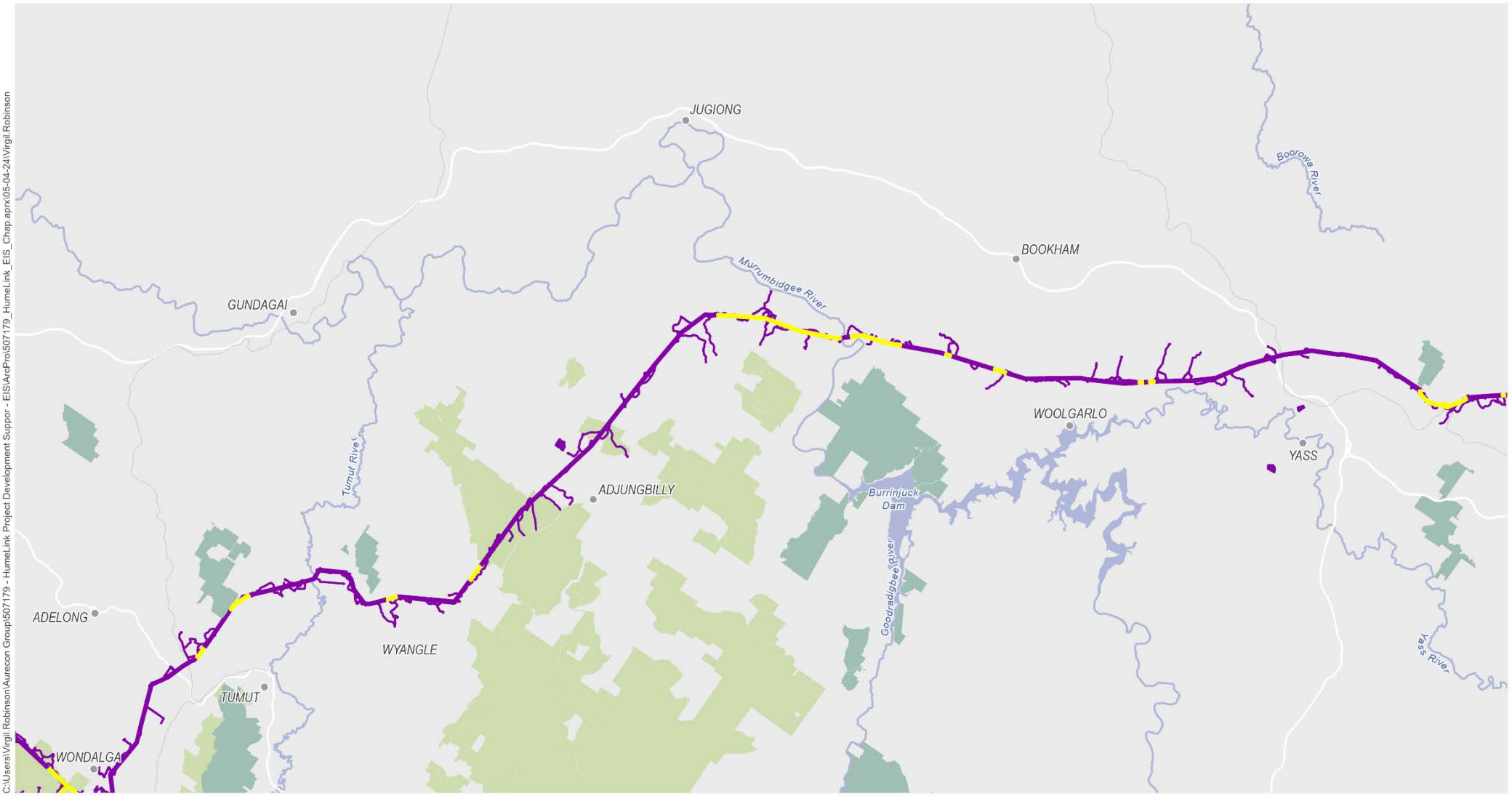
FIGURE 4-6a: Overview of indicative controlled blasting locations



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Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

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Projection: GDA 1994 MGA Zone 55

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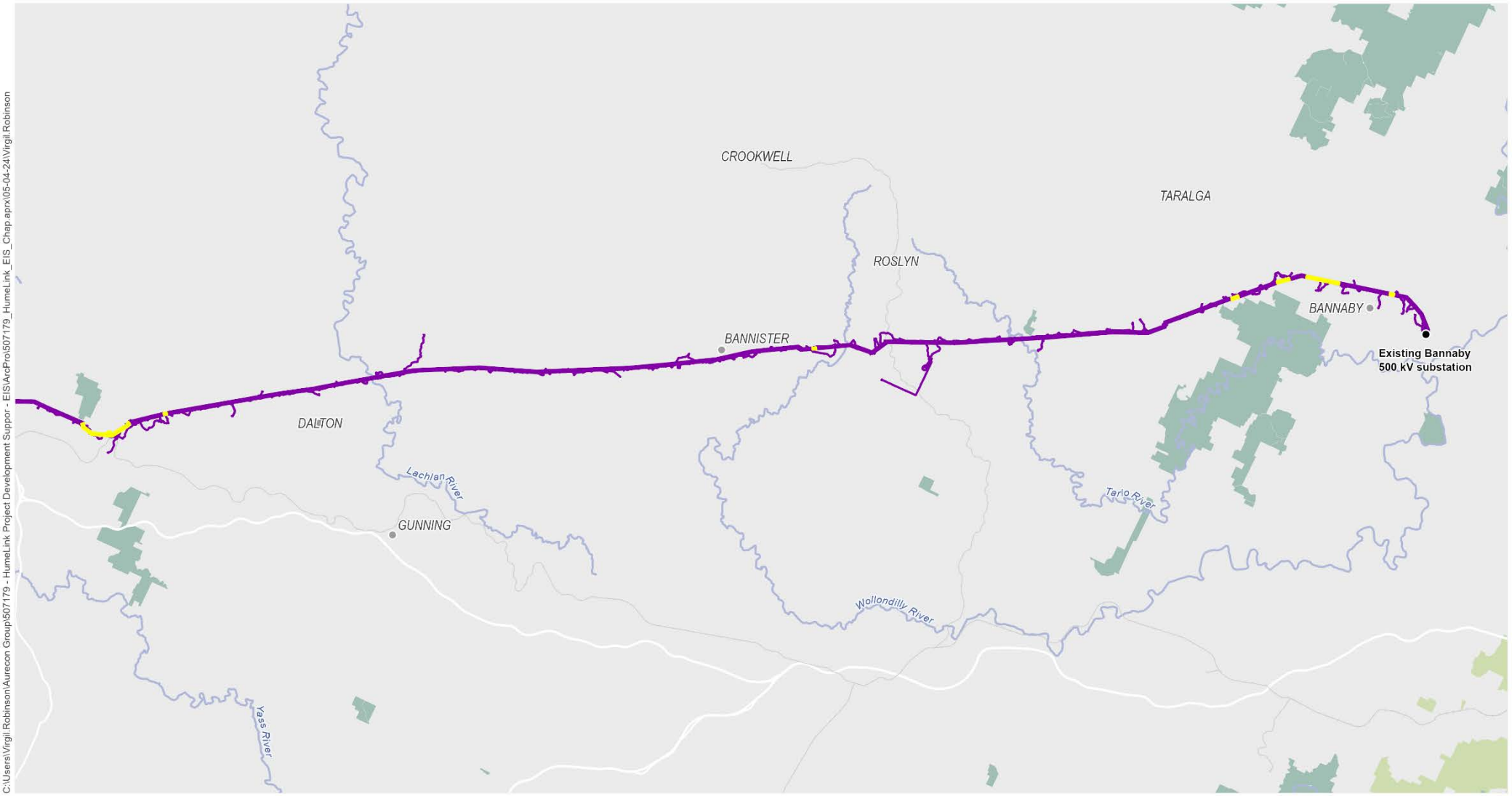
FIGURE 4-6b: Overview of indicative controlled blasting locations



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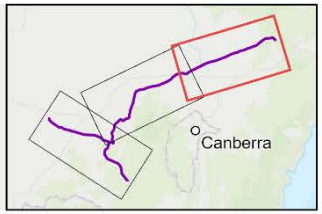
Project footprint
Potential controlled blasting area
National park and reserve
State forest
Waterway
Major road
Railway
Substation



Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

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Projection: GDA 1994 MGA Zone 55

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FIGURE 4-6c: Overview of indicative controlled blasting locations

Rebuild of the existing section of Line 51

The methodology for rebuilding the existing 330 kV single-circuit infrastructure would typically consist of the following key activities:

- disconnection and removal of the existing transmission lines
- dismantling of transmission line structures and removal from site (including removal of foundations to one metre below ground)
- **construction of foundations and** erection of new transmission line structures for the rebuild of Line 51
- stringing of conductors, OHEW and OPGW
- installation of associated transmission line structure fittings, including all earthing below ground level.

Construction of transmission line structures

The transmission line structures would typically be assembled in sections on the ground and then hoisted or lifted into place using cranes **and Elevated Work Platforms (EWPs)**. Alternatively, transmission line structures may be erected in place on the footings by installing individual members.

The transmission line structures would include elements such as step bolts, climbing attachment plates, ladders, platforms, climbing barriers, identification plates, warning plates, and other fixtures and fittings for the attachment of earth wires and insulators.

Stringing of the transmission lines

Once the structure is erected and secured, the transmission line would be strung by either ground pulled draw wire (with brake and winch sites), helicopter **(subject to meeting all Transgrid's health and safety requirements)** or line stringing drone **(with brake and winch sites)**.

The area required for the construction of each transmission line structure would require access for assembly and stringing work. At a typical site, this would include a temporary area of up to ~~**50**~~ **60** metres by 70 metres at each transmission line structure location. **Larger construction benches of up to 70 metres by 100 metres may be required in steep terrain to allow for additional earthworks to make the area safe for working.**

Where a transmission line structure is proposed to allow for a direction change of the transmission line, additional areas of ~~**50**~~ **60** metres by ~~**50**~~ **80** metres would be required to allow for brake and winch sites. Brake and winch sites needed for this activity are typically located about 150 metres away from the structure. Figure 4-7 provides an indicative diagram of how the transmission line would be strung**.**

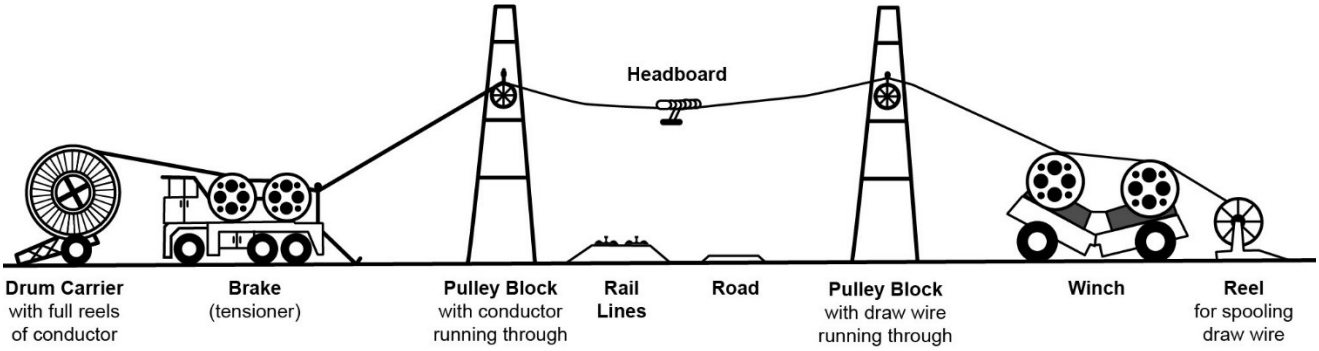


Figure 4-7a Diagram of how the transmission line would typically be strung over roads or railway lines

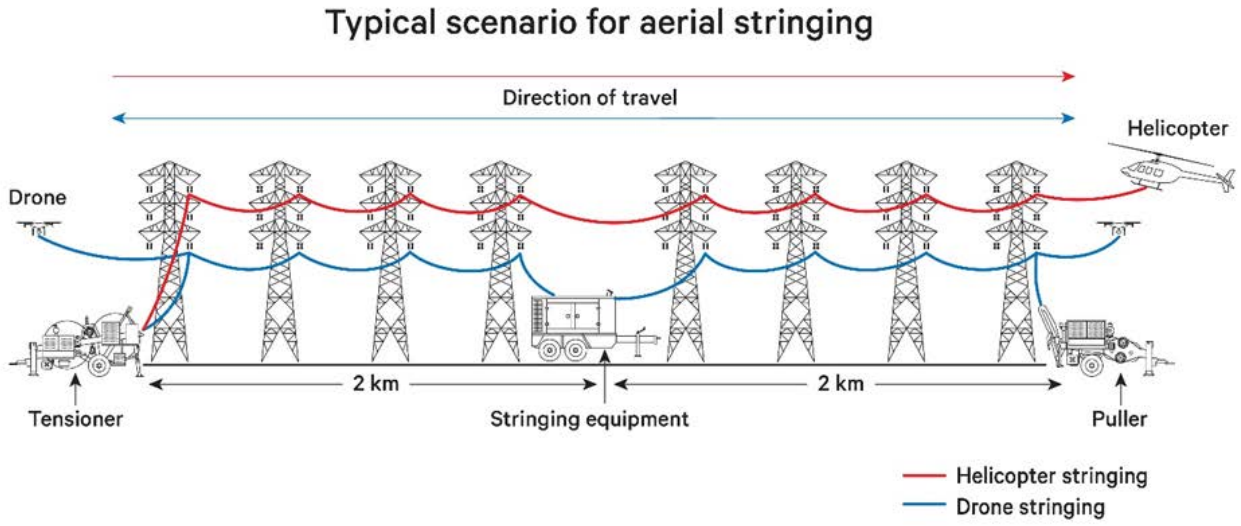


Figure 4-7b Diagram of how the transmission line would typically be strung using helicopters and drones

Transmission line crossings over waterways

The proposed transmission line would cross several key waterways including O'Briens Creek, Kyeamba Creek, Keajura Creek, Umbango Creek, Tarcutta Creek, ~~**Gilmore Creek**~~, Tumut River, Adjungbilly Creek, Murrumbidgee River **and** Lachlan River. ~~**Wollondilly River and Tarlo River**~~.

Generally, the design of the transmission line would include a transmission line structure on either side of each key waterway near the crossing location. A drone **or helicopter may** ~~**would**~~ then be used to take a ~~**lead**~~ **draw** wire over the waterway to allow cables to then be pulled and strung to each transmission line structure. In some locations ~~**(eg the crossing of the Wollondilly River and Pejar Dam)**~~ it may be impractical to use a drone **or helicopter**, and in such cases alternative methods, such as watercraft, might be required. **All stringing options are being considered at Pejar Dam, and would be confirmed in consultation with Goulburn Mulwaree Council, to minimise disruption to the community and impact on the dam.**

It is not envisaged that any bridges would be required for stringing the transmission line over key waterways due to the design and proposed construction method of the transmission line at these locations.

To minimise potential impacts on recreational users of Pejar Dam, a temporary exclusion zone would be established during stringing work. The exclusion zone would be about 100 metres wide either side of the proposed transmission line route and all water activity would be restricted in this zone. The exclusion zone would only be in place for a short duration (a matter of hours) for each conductor and OHEW. In total, 24 conductors and two OHEWs would need to be strung over a period of about two to three weeks. General access and use of other sections of the dam would be maintained for recreational activities.

Transmission line crossings over road and railway lines

The proposed transmission line would cross:

- several classified roads – Tumbarumba Road, the Hume Highway, Batlow Road, the Snowy Mountains Highway, Gocup Road, Burrinjuck Road, Rye Park Road, Grabben Gullen Road, Crookwell Road/ Goulburn Road and Taralga Road
- one operational railway line – the Main Southern Railway Line
- local roads
- four non-operational railway lines.

Similar to the proposed method for stringing the transmission line over the key waterways outlined above, the design of the transmission line would include a transmission line structure on either side of each road or rail crossing location.

During stringing work over roads, it is expected road closures would be required with specific arrangements confirmed during **further** detailed design in consultation with the relevant road authority and subject to the requirements of a road occupancy licence.

It is envisaged that all stringing work across the Main Southern Railway Line would be undertaken during rail possessions and would be undertaken in accordance with the rail line owner/operator's requirements. Stringing work across the four non-operational railway lines would have reduced construction and safety requirements and is unlikely to be restricted to certain time periods.

4.2.2.2. Substation construction and modification work

Overview

Substation work would be undertaken at the following locations:

- proposed Gugaa 500 kV substation: construction of a new 500/330 kV substation at Gregadoo, NSW
- Wagga 330 kV substation: modification of the existing 330/132 kV substation at Gregadoo, NSW to accommodate new bays for two new transmission line circuits
- Bannaby 500 kV substation: modification of the existing 500/330 kV substation at Bannaby, NSW to facilitate additional 500 kV transmission line circuits
- future Maragle 500 kV substation: connection to the future Maragle 500 kV substation previously approved under the Snowy 2.0 Transmission Connection Project (SSI-9717).

The final scope for the substation construction and modification work would be determined during **further** detailed design. Further detail on the associated construction activities is provided below.

Proposed Gugaa 500 kV substation

The construction methodology for the proposed Gugaa 500 kV substation would generally include:

- bulk earthwork to form the substation bench, access roads, drainage, and oil containment structures
- excavation and installation of concrete foundations, bund walls, fire walls, noise walls and kerbs
- installation of reinforced concrete and piled foundations for the electrical equipment and associated steel support structures
- excavation and installation of electrical conduits, electrical trenches, general site stormwater drainage, oil containment work and associated concrete pits, pipes and tanks
- construction of two auxiliary services buildings
- erection of galvanised steel structures to support electrical equipment
- installation of electrical equipment on foundations and/or steel support structures
- installation of conductors, cabling, wiring, electrical panels and electrical equipment
- erection of the substation site boundary security fencing, including site access gates
- connection of the proposed transmission lines to the substation.

It is expected that the maximum foundation depths (piling) for structures associated with the proposed Gugaa 500 kV substation would be about 20 metres.

Controlled blasting may be required, depending on ground conditions. This would be confirmed during **further** detailed design and ~~**further**~~ construction planning and would be subject to further investigation (refer to Chapter 15 (Noise and vibration) **of the EIS** for further detail).

Modification of the existing Wagga 330 kV substation

The construction methodology for the modification of the existing Wagga 330 kV substation would generally include:

- demolition and removal of redundant electrical equipment, fencing and cabling
- bulk earthwork to form the extended substation bench and modified drainage structures
- installation of concrete foundations and kerbs; the work would include excavation
- installation of reinforced concrete and piled foundations for the electrical equipment and associated steel support structures
- erection of galvanised steel structures to support electrical equipment
- installation of electrical equipment on foundations and/or steel support structures
- installation of electrical conduits, electrical trenches, and modified site stormwater drainage including excavation
- installation of conductors, cabling, wiring, electrical panels and electrical equipment
- installation of fencing, lighting and other security features
- connection of the proposed transmission lines to the substation.

It is expected that the maximum foundation depths (piling) for structures associated with the modified Wagga 330 kV substation would be about 20 metres.

Modification of the existing Bannaby 500 kV substation

The construction methodology for the modification of the existing Bannaby 500 kV substation would generally include:

- bulk earthwork to form the extended substation bench, new access road, modified stormwater drainage, modified oil containment and modified sediment control structures
- installation of concrete foundations, retaining walls, bund walls, fire walls and kerbs; the work would include excavation
- installation of reinforced concrete and piled foundations for the electrical equipment and associated steel support structures
- erection of galvanised steel structures to support electrical equipment
- installation of electrical equipment on foundations and/or steel support structures
- installation of electrical conduits, electrical trenches, site stormwater drainage, oil containment work and associated concrete pits, pipes and tanks; the work would include excavation
- installation of conductors, cabling, wiring, electrical panels and electrical equipment
- installation of fencing, lighting and other security features
- demolition of redundant fencing including footings and kerbs
- connection of the proposed transmission lines to the substation.

It is expected that the maximum foundation depths (piling) for structures associated with the modified Bannaby 500 kV substation would be about 20 metres.

Controlled blasting may be required, depending on ground conditions. This would be confirmed during **further** detailed design and ~~**further**~~ construction planning and would be subject to further investigation (refer to Chapter 15 (Noise and vibration) **of the EIS** for further detail).

Connection to the future Maragle 500 kV substation

The connection to the future Maragle 500 kV substation would generally include:

- stringing conductors between the proposed transmission line structures and the future Maragle 500 kV substation gantry (including OHEW and OPGW)
- installing droppers from the future substation gantry to the switchgear.

4.2.2.3. ~~Telecommunications hut construction and~~ Telecommunications connections

~~**One optical repeater telecommunications hut is proposed to be constructed near the transmission line route at Killimicat (refer to Figure 3-1). The construction methodology for the telecommunications hut would involve:**~~

- ~~**bulk earthwork to form the base for the telecommunications hut**~~
- ~~**excavation and preparation for concrete foundations**~~
- ~~**installation of reinforced concrete and piled foundations**~~
- ~~**excavation and installation of electrical equipment conduits, trenches and general site drainage work**~~
- ~~**installation of the building, site wiring and electrical equipment**~~
- ~~**erection of security fencing, including site access gates**~~
- ~~**surfacing and stabilising work for access, dust and vegetation suppression and drainage.**~~

~~It is expected that the maximum foundation depths (piling) for structures associated with the telecommunications hut would be about three metres.~~

Telecommunications connections are proposed to be installed between the transmission line corridor and the following existing Transgrid substations:

- **Rye Park 330 kV switching station. This would involve approximately 300 metres of trenching and cable installation.**
- **Gadara 132kV substation, Gadara. This would involve approximately 2.6 kilometres of trenching and cable installation.**
- **Gullen Range 330 kV substation, Bannister. This would involve approximately 1.1 kilometres of trenching and cable installation.**
- **Crookwell 2 330 kV substation, Woodhouselee. This would involve approximately 1.7 kilometres of trenching and cable installation.**

The construction methodology for the telecommunications connections would generally include:

- **excavation of trenches between around 0.8 and 3 metres in depth and up to 450 mm in width**
- **installation of the fibre optic cables (either direct buried or in conduit) and installation of marker tape**
- **backfilling of the trenches**
- **installation of cable pits and marker posts at surface level in specific locations**
- **installation of a layer of sand/ cement mix over fibre cable/ conduit for mechanical protection in some locations.**

~~**As discussed in Chapter 3 (Project description – infrastructure and operation), the project would connect with the Rye Park Wind Farm substation, which removes the need for a telecommunications hut in the eastern end of the project. The connection work would involve stringing OPGW between two proposed transmission line structures and the Rye Park Wind Farm substation. The connections between the transmission line structures and the Rye Park Wind Farm substation would be 200 to 350 metres long. The Rye Park Wind Farm substation will be constructed separately to the project in accordance with the approved Rye Park Wind Farm project (SSD-6693).**~~

4.2.3. Testing and commissioning

Pre-commissioning activities would form part of the final construction and installation work and would incorporate all tests and checks to confirm that construction quality assurance documentation, inspection and test plans, checklists and associated activities have been completed for each individual component of plant. This would be to ensure the project has been installed in accordance with the design and statutory standards and is safe to proceed to commissioning.

The key pre-commissioning and commissioning activities would include (but not be limited to):

- testing and commissioning of the new substation equipment
- point-to-point testing of the new transmission lines and substation connections
- earthing testing
- high voltage testing
- high voltage equipment operational checks
- testing of the installed protection, metering, control, and communication systems.

Once all high voltage and low voltage testing is completed, the electrical protection systems have been set and all quality assurance documentation has been completed, commissioning would proceed.

The key activities involved in the main commissioning process may include (but not be limited to):

- transmission line cut-in and connection to the electrical network
- protection, control and metering checks
- high voltage equipment operation and energisation
- audible noise, thermographic imaging and electric and magnetic field (EMF) testing
- any necessary testing of site related systems.

The new substation components would be commissioned and integrated with any Transgrid external facilities, as necessary.

4.2.4. Demobilisation and restoration/rehabilitation

Demobilisation and site restoration/rehabilitation would be undertaken progressively throughout the project footprint and would include the following typical activities:

- demobilisation of construction compounds and the worker accommodation ~~facility~~ facilities
- removal of materials, waste and redundant structures not required during operation of the project
- removal of temporary fencing and environmental controls.

Disturbed areas would be restored to their previous condition as far as practicable in accordance with *Managing Urban Stormwater: Soils and Construction – Volume 1, 4th Edition* (Landcom, 2004) or other comparable guidelines. Some areas would be landscaped, which would include replacement of topsoil and establishment of grass or suitable vegetation. Work may also be undertaken to restore:

- natural drainage in areas where temporary facilities were provided
- fences, gates and other property infrastructure, which may have been damaged during construction.

Installation of any permanent Transgrid property boundary fence surrounding the substation sites ~~and telecommunications hut~~ would also likely occur during this phase.

Topsoil stockpiled during site establishment would be reused for revegetation and rehabilitation work where required.

Construction areas that do not include permanent infrastructure and are outside of an APZ would be restored and/or rehabilitated (as applicable) as soon as practicable consistent with the existing surrounding landscape and any operational maintenance requirements. Where required, restoration and/or rehabilitation (as applicable) would be carried out in consultation with the relevant council and/or affected landowner/s.

4.3. Ancillary facilities for construction

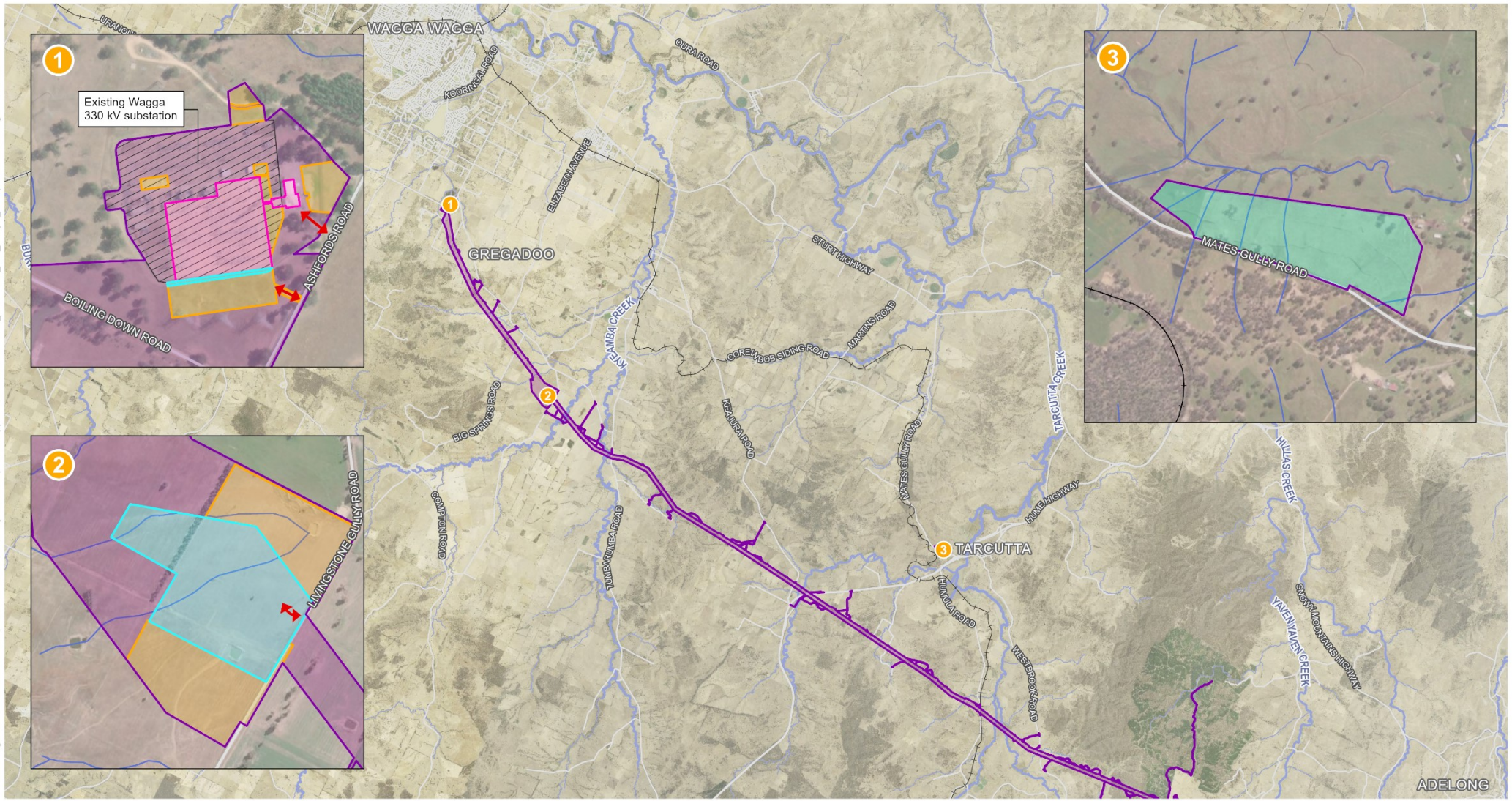
4.3.1. Construction compounds and worker accommodation facilities

Construction compounds and worker accommodation facilities would be required to support the construction of the project. As discussed in Chapter 2 (Strategic context and project need) of the EIS, potential construction compound and worker accommodation facility locations have been identified based on a number of factors and in consultation with relevant councils. ~~A shortlist of 14~~ Eleven potential

standalone construction compounds ~~**has**~~ **have** been nominated ~~**for consideration**~~ **for construction of the project** ~~**as part of the EIS**~~. **In addition, five combined worker accommodation facilities and construction compounds have been nominated for potential use by the construction contractors, which are located in Tarcutta, Adjungbilly, Yass, Crookwell and Green Hills.** This ~~**shortlisting**~~ has resulted in the unique construction compound **and/or worker accommodation facility** identifier not being sequential.

The ~~**14**~~ **11** potential construction compound sites are located in Gregadoo, ~~**Gilmore,**~~ Red Hill, ~~**Adjungbilly,**~~ Yass, Woodhouselee, Bannaby, Batlow, ~~**and**~~ Nurenmerenmong, **Green Hills, Buddong, Gadara and Ellerslie**. The proposed use of the construction compounds, the boundaries and layout would be refined as ~~**the project**~~ design develops in consultation with relevant stakeholders and the construction contractors. Depending on the construction phasing and methodology, the construction contractors may elect not to use all nominated potential construction compounds. The process described in Section 4.3.2.3 would be followed should additional construction compounds be required. **Any new or changed worker accommodation facility would be subject to additional environmental assessment in accordance with the process described in Chapter 26 (Environmental management) of the EIS, as required.**

Figure 4-8 shows the indicative location of construction compounds **and combined worker accommodation facilities and construction compounds**.



Project footprint

Construction compound site

Combined worker accommodation facility and construction compound

Modifications to existing substation

Indicative new substation area

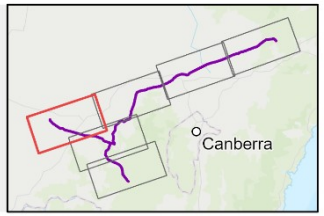
Indicative access point

Waterway

Railway

Construction ancillary facilities

1. Wagga 330 kV substation compound (C01)
2. Amended Gregadoo Road compound (C06)
3. Tarcutta accommodation facility and compound (AC03)



Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

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Projection: GDA 1994 MGA Zone 55

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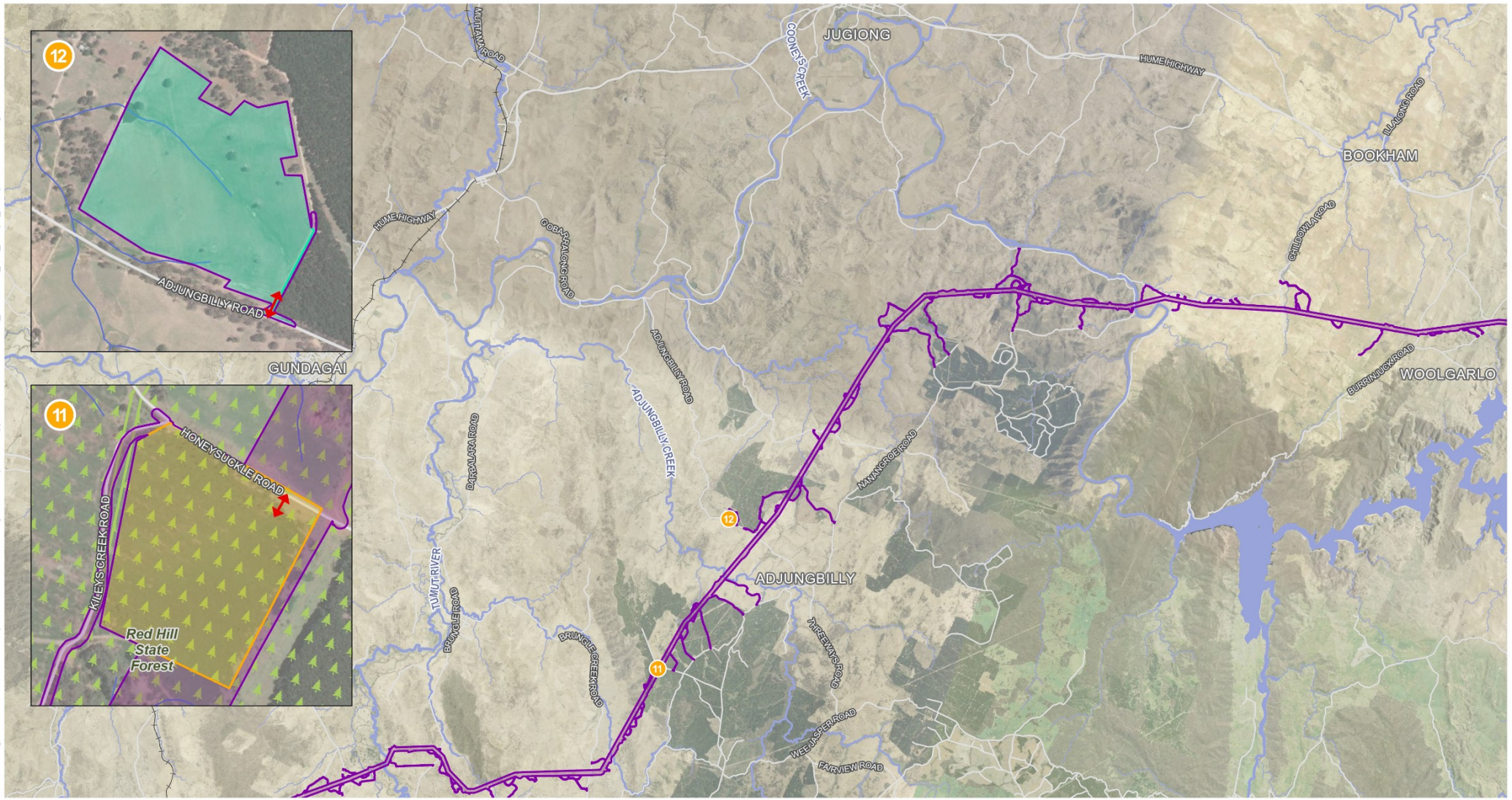
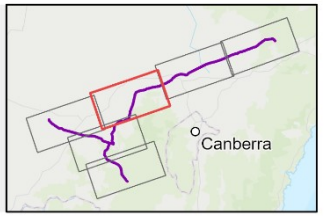
Figure 4-8a: Overview of ancillary facilities



Project footprint
Construction compound site
Combined worker accommodation facility and construction compound
Existing building
Indicative access point
Private plantation
State forest
Waterway
Railway

Construction ancillary facilities

11 Amended Honeysuckle Road compound (C07)
12 Adjungbilly accommodation facility and compound (AC04)



Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

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Projection: GDA 1994 MGA Zone 55

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Figure 4-8b: Overview of ancillary facilities

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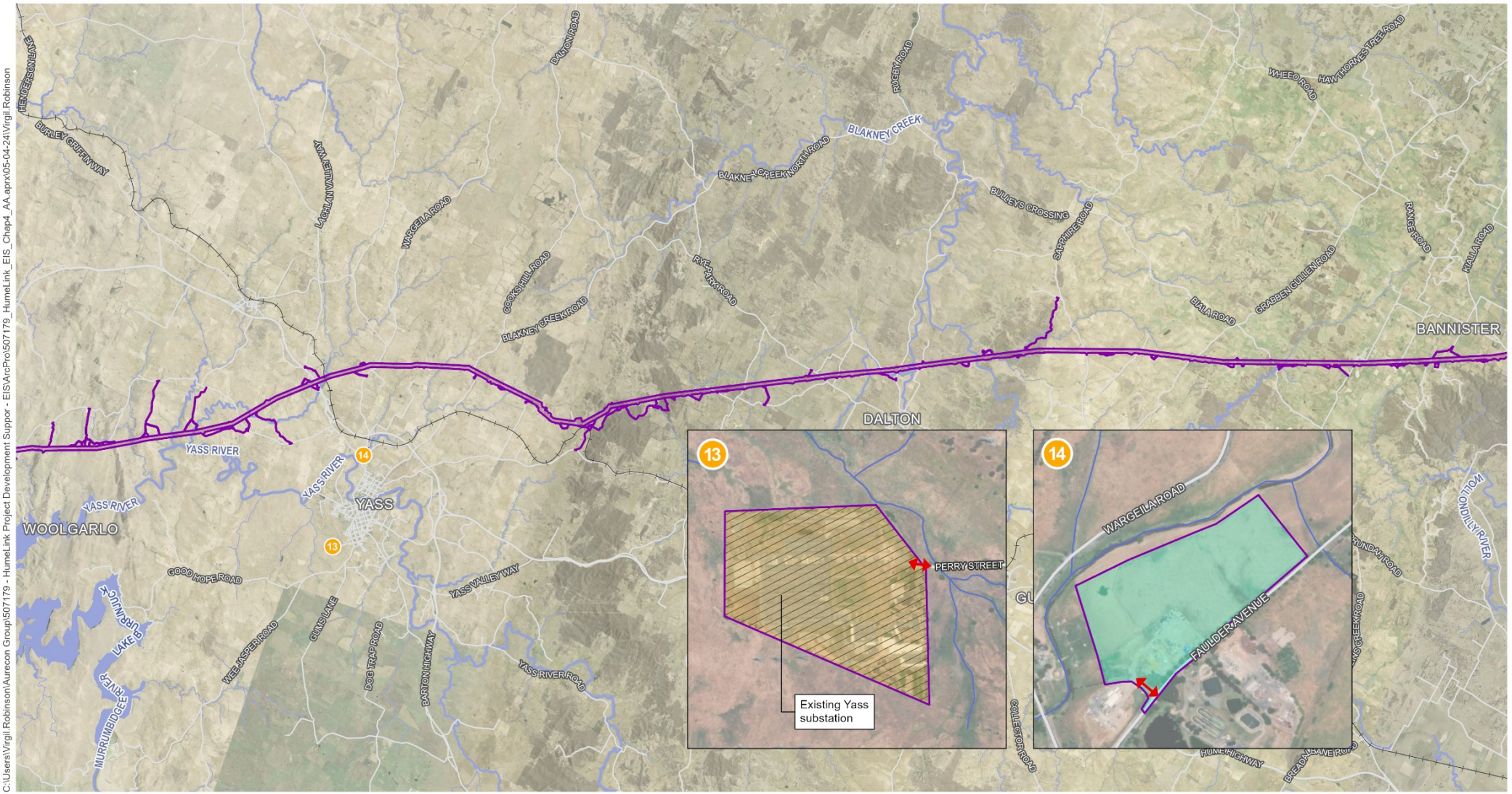

Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

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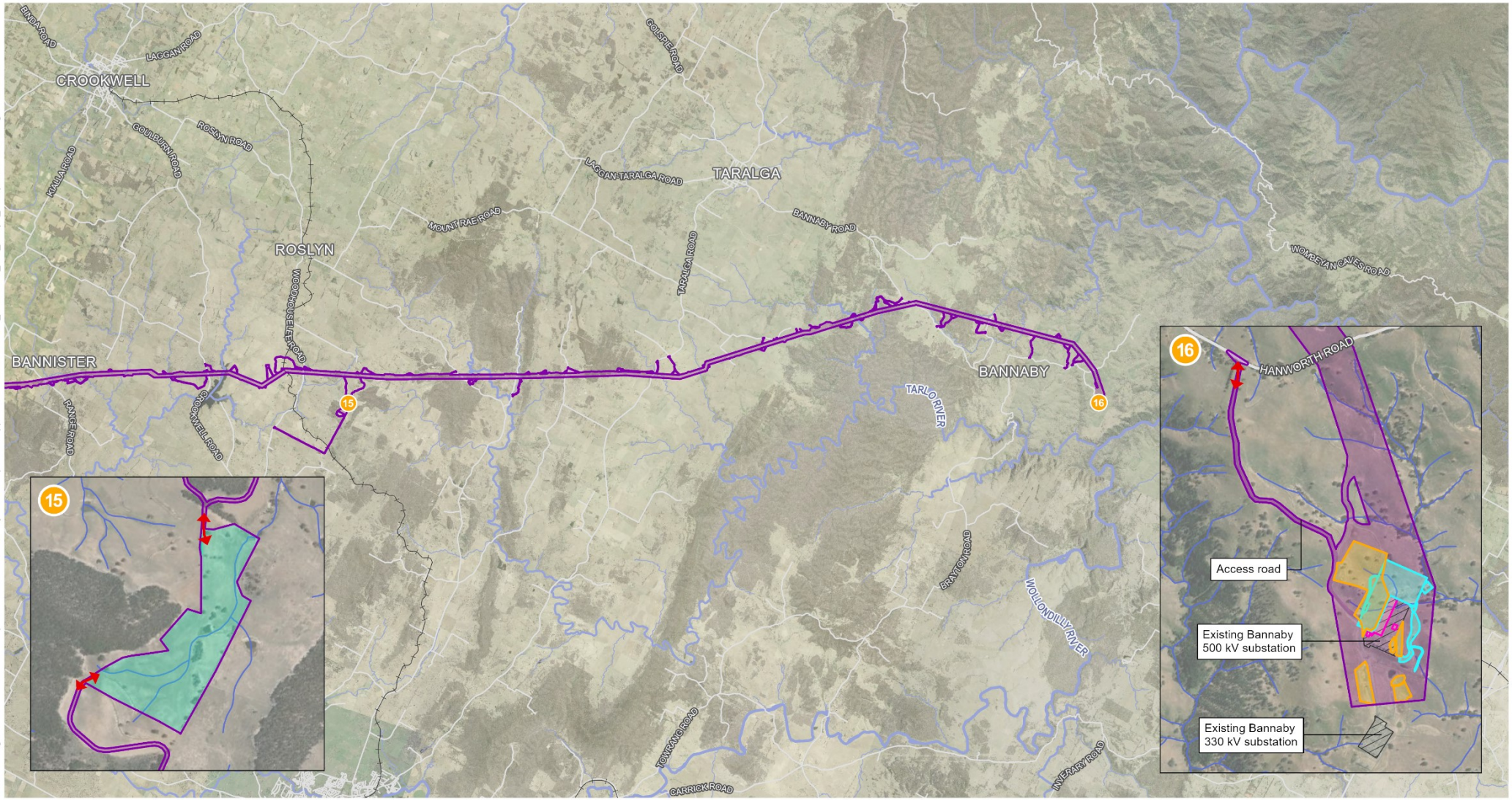
Projection: GDA 1994 MGA Zone 55

HumeLink

Figure 4-8c: Overview of ancillary facilities



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Project footprint

Construction compound site

Combined worker accommodation facility and construction compound

Modifications to existing substation

Indicative new substation area

Indicative access point

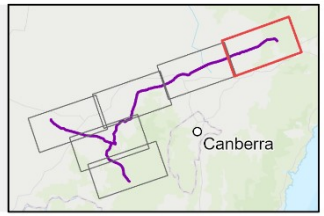
Waterway

Railway

Construction ancillary facilities

15 Crookwell accommodation facility and compound (AC06)

16 Amended Bannaby 500 kV substation compound (C12)



Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

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Projection: GDA 1994 MGA Zone 55

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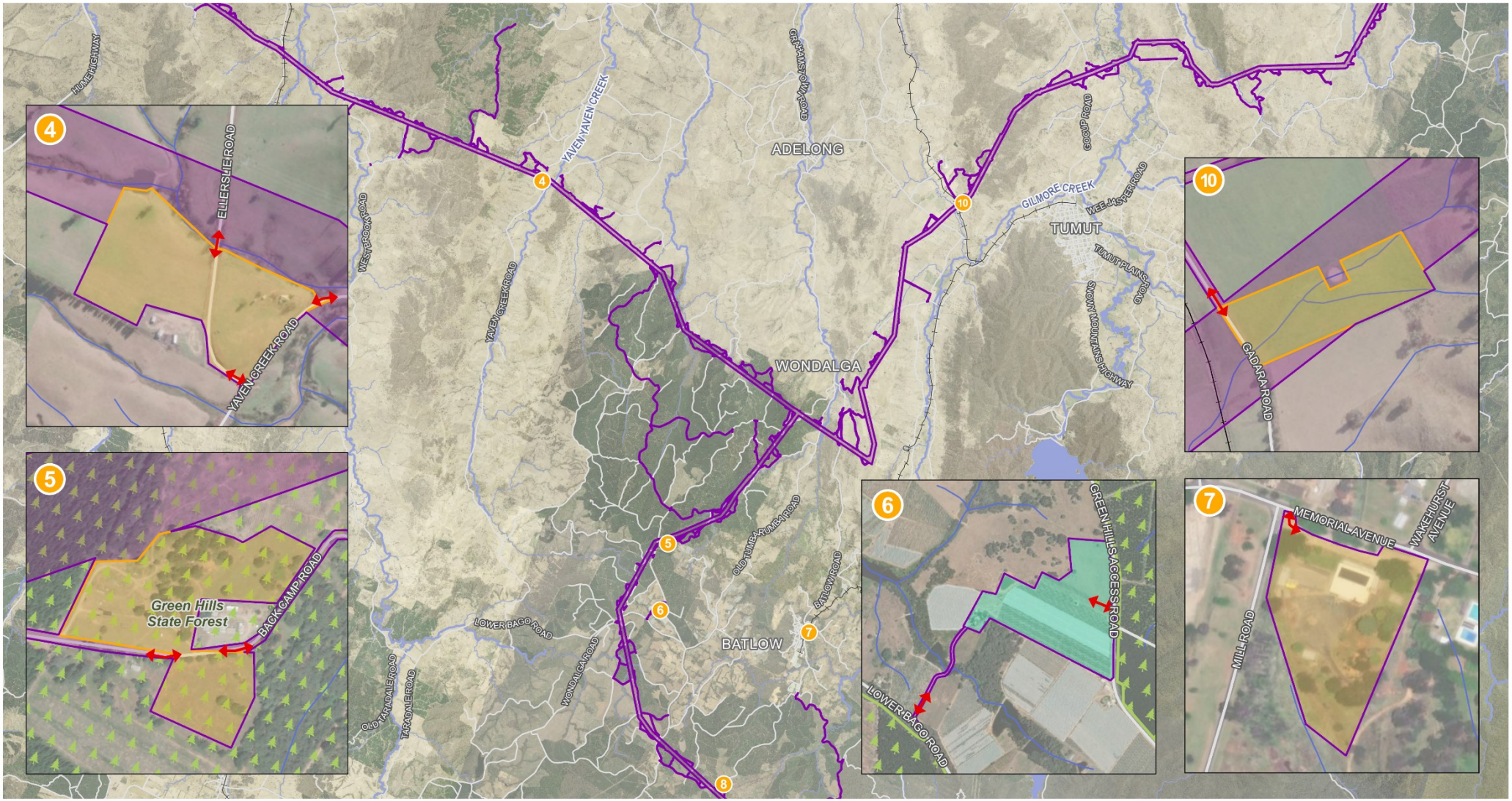
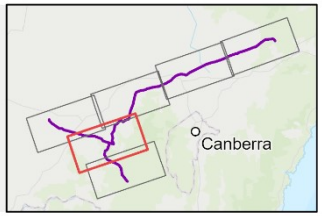
Figure 4-8d: Overview of ancillary facilities



Project footprint
Construction compound site
Combined worker accommodation facility and construction compound
Indicative access point
State forest
Waterway
Railway

Construction ancillary facilities

4 Ellerslie Road compound (C21)
5 Ardrossan Headquarters Road compound (C17)
6 Green Hills accommodation facility and compound (AC07)
7 Amended Memorial Avenue compound (C14)
8 Snubba Road compound (C18)
10 Gadara Road compound (C19)



Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

1:200,000
0 4 8km

Projection: GDA 1994 MGA Zone 55

HumeLink

Figure 4-8e: Overview of ancillary facilities

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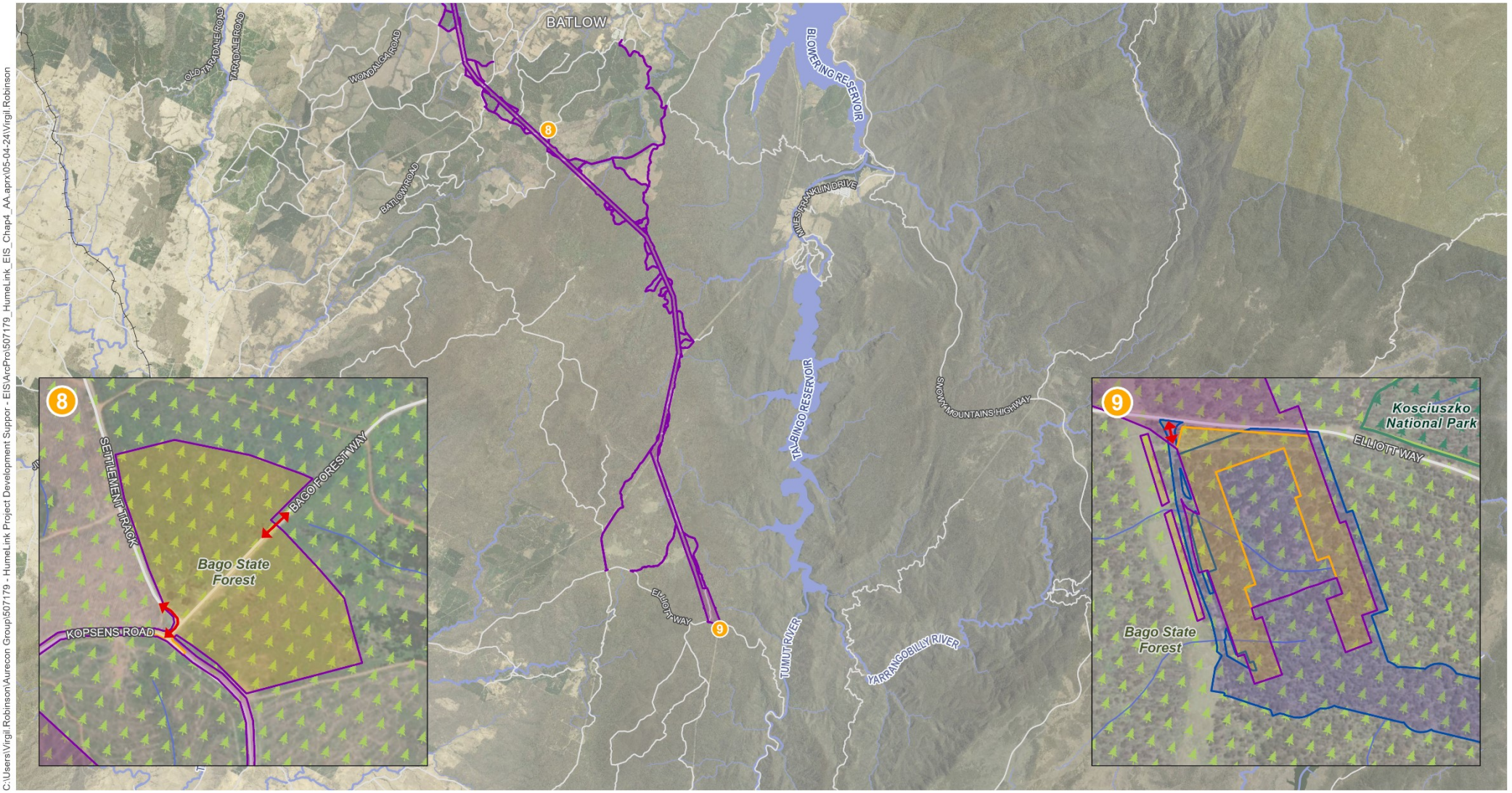


Project footprint

Construction compound site

Future Maragle 500 kV substation delivered as part of Snowy 2.0 Transmission Connection Project (SSI-9717)

Indicative access point

National park and reserve

State forest

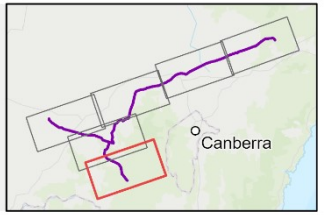
Waterway

Railway

Construction ancillary facilities

8 Snubba Road compound (C18)

9 Maragle 500 kV substation compound (C05)



Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

1:200,000

0 4 8km

Projection: GDA 1994 MGA Zone 55

HumeLink

Figure 4-8f: Overview of ancillary facilities

Before work begins at these construction compounds, temporary lease agreements would be established with property owners for use of their land **and/or any permit required under the Forestry Act 2012 would be obtained**.

The construction compounds would accommodate a range of facilities, which may include[2]:

- storage and laydown areas
- crushing and screening plants
- **concrete batching plants**
- **sediment basins**
- **helipad/helicopter facilities**
- **generators**
- stockpiling areas
- vehicle and equipment storage
- maintenance sheds
- chemical and fuel stores
- parking areas
- demountable site offices and amenities.

A concrete batching plant is expected to be established at **nine construction compounds** ~~**the Bannaby 500 kV substation compound (C12)**~~. It is anticipated that ~~**the**~~ **each** concrete batching plant would be a mobile plant with the capability of batching around 50 tonnes of concrete per hour. The plant would likely only be required early in the construction period for a period of two to three months. The type of concrete batching plant and expected establishment and duration timeframes would be confirmed during **further** detailed design and ~~**further**~~ construction planning. **The use of concrete batching plants has been assessed in Chapter 6 (Assessment of impacts) of the Amendment Report.**

All construction compounds **and worker accommodation facilities** would be appropriately fenced to secure the work site and provide a level of protection from external influences. If required, hoarding may be implemented. Where higher value equipment/material is being stored (eg cabling), additional security measures such as security patrols or security cameras may be employed to protect from theft. In addition, construction compounds **and worker accommodation facilities** would include temporary lighting, measures to protect against fire and appropriate water quality and erosion and sediment controls.

Wastewater treatment facilities may also be established at the **worker accommodation facilities and at the Amended** Gregadoo Road compound (C06) and the Bannaby 500 kV substation compound (C12) (refer to Section 4.5.2.1 for further detail).

The construction compounds would be in place throughout the entire construction period (up to 2.5 years) and would typically operate in accordance with the standard construction hours detailed in Section 4.6.

Following completion of construction, the construction compounds **and worker accommodation facilities** would be cleared of any temporary infrastructure and equipment and rehabilitated as detailed in Section 4.2.4.

[2] Any facilities not assessed for the project would be managed in accordance with the change management process described in Section 26.4 of the EIS.

Further detail on each construction compound **and worker accommodation facility** is provided in the following sections.

4.3.1.1. Wagga 330 kV substation compound (C01)

A construction compound is proposed to be established at the Wagga 330 kV substation to support transmission line construction as well as modification to the existing Wagga 330 kV substation. A summary of the key features of the construction compound is included in Table 4-5. The Wagga 330 kV substation compound (C01) is shown on Figure 4-8a.

Table 4-5 Key features of Wagga 330 kV substation compound (C01)

Key feature	Summary
Site area	Approximately 1.92 ha
Ownership	Transgrid
Land zoning	RU1 Primary Production
Site description	Located in the Wagga Wagga City LGA at the site of the existing Wagga 330 kV substation on the corner of Ashfords Road and Boiling Down Road, Gregadoo. The construction compound would be surrounded by residential and farm infrastructure land uses and is located on level ground. Ground conditions are a mix of hardstand associated with the existing Wagga 330 kV substation and vegetation consisting mainly of pasture grasses. Isolated trees surround the construction compound along Ashfords Road and Boiling Down Road. The closest sensitive receiver is a residential dwelling located about 270 m south-east of the construction compound. The closest waterbody to the construction compound is a farm dam about 170 m to the south-west. Boiling Down Creek is located about 270 m further west from the construction compound.
Access arrangements	Access to the construction compound would be via a temporary connection with Ashfords Road. Road improvement work would be required to facilitate access (refer to Section 4.2.1.6).
New ancillary facilities or connections	**None**

~~**Snowy Mountains Highway compound (C02)**~~

~~**A construction compound is proposed to be established adjacent Snowy Mountains Highway to support the transmission line construction. A summary of the key features of the construction compound is included in Table 4-6. Snowy Mountains Highway compound (C02) is shown on Figure 4-8e.**~~

~~Table 4-6 Key features of Snowy Mountains Highway compound (C02)~~

~~Key feature~~	~~Summary~~
~~**Site area**~~	~~**Approximately 1.38 ha**~~
~~**Ownership**~~	~~**Snowy Valleys Council**~~
~~**Land zoning**~~	~~**IN1 General Industrial**~~
~~**Site description**~~	~~**Located in the Snowy Valleys LGA, off the Snowy Mountains Highway, south of the Tumut Resource Recovery Centre at Gilmore.**~~ ~~**The construction compound would be in an area of agricultural land. However, the land was rezoned for industrial use in 2021 under the Tumut Local Environmental Plan 2012. The construction compound is located on moderately sloping land which has been largely cleared of vegetation. Groundcover consists of pasture grasses. Killarney Creek is located about 10 m south of the construction compound. The closest sensitive receiver is a residence about 500 m south-west of the construction compound.**~~

Key feature	Summary
Access arrangements	• Access to the construction compound would be via a temporary connection with Snowy Mountains Highway about 380 m north of its intersection with Gilmore Mill Road. Road improvement work would be required to facilitate access (refer to Section 4.2.1.6).

Snubba Road compound (C03)

A construction compound is proposed to be established adjacent Snubba Road to support transmission line construction. A summary of the key features of the construction compound is included in Table 4-7. Snubba Road compound (C03) is shown on Figure 4-8e.

Table 4-7 Key features of Snubba Road compound (C03)

Key feature	Summary
Site area	Approximately 5.12 ha
Ownership	Private property
Land zoning	RU1 Primary Production
Site description	Located in the Snowy Valleys LGA along Snubba Road, Gilmore, about 6 km east of Batlow town centre. The construction compound would be in an area of agricultural land, on moderately sloping land. Vegetation within the construction compound is limited to groundcover consisting mainly of pasture grasses. Bago State Forest surrounds the construction compound to east, south and west. Unnamed drainage lines are located to the east and west of the construction compound with the closest being about 360 m to the east. The closest sensitive receiver is a residence about 750 m north of the construction compound.
Access arrangements	Access to the construction compound would be via a temporary connection with Snubba Road. Minor roadwork would be required to facilitate access.

4.3.1.2. Maragle 500 kV substation compound (C05)

A construction compound is proposed to be established at the future Maragle 500 kV substation to support transmission line construction and connection to the future Maragle 500 kV substation.

The area proposed for the construction compound would overlap with the area required for construction and installation of the substation as described in *Snowy 2.0 Transmission Connection Project Amendment Report* (Transgrid, 2022). Coordination between the respective construction contractors of Snowy 2.0 Transmission Connection Project and HumeLink regarding the use of Maragle 500 kV substation compound (C05) may be needed to ensure any required environmental management requirements are satisfied. Refer to Chapter 25 (Cumulative impacts) **of the EIS** for further consideration of the Snowy 2.0 Transmission Connection Project.

A summary of the key features of the construction compound is included in Table 4-6. The Maragle 500 kV substation compound (C05) is shown on Figure 4-8f.

Table 4-6 Key features of Maragle 500 kV substation compound (C05)

Key feature	Summary
Site area	Approximately 11.97 ha
Ownership	Acquisition currently underway for Snowy 2.0 Transmission Connection Project
Land zoning	RU3 Forestry
Site description	Located in the Snowy Valleys LGA at the site of the future Maragle 500 kV substation at Nurenmerenmong, about 27 km west of Tumbarumba.

Key feature	Summary
	The construction compound would be surrounded by Bago State Forest. Vegetation within the construction compound consists of a mix of shrubby open forest and woodland which will be cleared as part of connection work to the future Maragle 500 kV substation. The construction compound consists of undulating land and includes two drainage lines, an unnamed drainage line in the northern portion and New Zealand Gully located in the southern portion. Yorkers Creek is located about 190 m to the north of the construction compound. There are no nearby sensitive receivers.
Access arrangements	Access to the construction compound would be via a temporary connection with Elliott Way. Road improvement work would be required to facilitate access (refer to Section 4.2.1.6).
New ancillary facilities or connections	**Sediment basin, potential helipad/helicopter facility**

4.3.1.3. Amended Gregadoo Road compound (C06)

A construction compound is proposed to be established at the proposed Gugaa 500 kV substation to support transmission line construction and construction of the proposed Gugaa 500 kV substation. A summary of the key features of the construction compound is included in Table 4-7. The **Amended** Gregadoo Road compound (C06) is shown on Figure 4-8a.

Table 4-7 Key features of **Amended** Gregadoo Road compound (C06)

Key feature	Summary
Site area	Approximately ~~**16.40**~~ **32.12** ha, **of which approximately 8 ha is expected to be utilised**
Ownership	Private property
Land zoning	RU1 Primary Production
Site description	Located in the Wagga Wagga City LGA on private property off Livingstone Gully Road, Gregadoo, about 20 km south-east of Wagga Wagga central business district. The construction compound would be in an area of agricultural land, on sloping land. Vegetation within the construction compound is mainly limited to groundcover consisting of pasture grasses. A row of trees is located in the western portion of the construction compound. The closest sensitive receiver is a residence located about 580 m north of the construction compound. Two unnamed drainage lines are located in the western half of the construction compound and a farm dam is located adjacent to the southern boundary. Big Spring Creek is located about 630 m west of the construction compound.
Access arrangements	Access to the construction compound would be via temporary connection with Livingstone Gully Road. Road improvement work would be required to facilitate access (refer to Section 4.2.1.6).
New ancillary facilities or connections	**Sediment basin, potential helipad/helicopter facility, wastewater treatment facilities, potential connection to existing utilities**

4.3.1.4. Amended Honeysuckle Road compound (C07)

A construction compound is proposed to be established adjacent Honeysuckle Road to support transmission line construction. A summary of the key features of the construction compound is included in Table 4-8. The **Amended** Honeysuckle Road compound (C07) is shown on Figure 4-8b.

Table 4-8 Key features of **Amended** Honeysuckle Road compound (C07)

Key feature	Summary
Site area	Approximately ~~**8.20**~~ **14.92** ha
Ownership	FCNSW
Land zoning	RU3 Forestry

Key feature	Summary
Site description	Located in Snowy Valleys LGA at the corner of Honeysuckle Road and Kileys Creek Road, Red Hill about 20 km north-west of Tumut. The construction compound would be in an area of forestry land within Red Hill State Forest, on moderately sloping land. Vegetation within the construction compound is limited to softwood forestry plantation. The nearest waterway to the construction compound is an unnamed drainage line located about 80 m to the west. Kiley Creek is located about 300 m south of the construction compound. There are no nearby sensitive receivers.
Access arrangements	Access to the construction compound would be via temporary connection with Honeysuckle Road. Road improvement work would be required to facilitate access (refer to Section 4.2.1.6).
New ancillary facilities or connections	**Concrete batching plant, sediment basin, potential helipad/helicopter facility**

~~Red Hill Road compound (C08)~~

~~A construction compound is proposed to be established adjacent Red Hill Road to support transmission line construction. A summary of the key features of the construction compound is included in Table 4.11. The Red Hill Road compound (C08) is shown on Figure 4-8b.~~

~~Table 4.11 Key features of Red Hill Road compound (C08)~~

~~Key feature~~	~~Summary~~
~~Site area~~	~~Approximately 2.59 ha~~
~~Ownership~~	~~FCNSW~~
~~Land zoning~~	~~RU3 Forestry~~
~~Site description~~	~~Located in the Cootamundra-Gundagai Regional LGA at the corner of Red Hill Road and Sawmill Creek Road, Adjungbilly about 22 km north-west of Tumut.~~ ~~The construction compound would be in an area of forestry land use within Red Hill State Forest, on relatively level land. The site is currently used to support forestry operations and the existing building located on the site would be incorporated and used as part of the construction compound. The nearest waterway to the construction compound is an unnamed drainage line located about 340 m to the west. Sawmill Creek is located about 440 m north-east of the construction compound at its closest point. A farm dam is also located adjacent the north-eastern corner of the construction compound. There are no nearby sensitive receivers.~~
~~Access arrangements~~	~~Access to the construction compound would be via the existing property accesses off Sawmill Creek Road and/or the unnamed road.~~

~~Adjungbilly Road compound (C09)~~

~~A construction compound is proposed to be established off Adjungbilly Road to support transmission line construction. A summary of the key features of the construction compound is included in Table 4.12. The Adjungbilly Road compound (C09) is shown on Figure 4-8b.~~

~~Table 4.12 Key features of Adjungbilly Road compound (C09)~~

~~Key feature~~	~~Summary~~
~~Site area~~	~~Approximately 12.09 ha~~
~~Ownership~~	~~Private property~~
~~Land zoning~~	~~RU1 Primary Production~~
~~Site description~~	~~Located in the Cootamundra-Gundagai Regional LGA off Adjungbilly Road, Adjungbilly, about 23 km east of Gundagai.~~

~~Key feature~~	~~Summary~~
	~~The construction compound would be on undulating land in the Black Flat forest area, which is a private plantation. Vegetation within the construction compound is limited to plantation forest. Unnamed drainage lines are located about 20 m adjacent to the northern and southern boundaries of the construction compound and the headwaters of Cotway Creek are located about 270 m to the west. The closest sensitive receiver is a residence about 780 m south-west of the construction compound.~~
~~Access arrangements~~	~~Access to the construction compound would be via the existing Black Flat forest area access from Adjungbilly Road.~~

4.3.1.5. Yass substation compound (C10)

A construction compound is proposed to be established at the existing Yass substation to support transmission line construction. A summary of the key features of the construction compound is included in Table 4-9. The Yass substation compound (C10) is shown on Figure 4-8c.

Table 4-9 Key features of Yass substation compound (C10)

Key feature	Summary
Site area	Approximately 21.44 ha
Ownership	Transgrid
Land zoning	SP2 Infrastructure
Site description	Located in the Yass Valley LGA at the site of the existing Yass substation at Perry Street, Yass. The construction compound would be in an operational Transgrid substation, and the project would only utilise available land and existing hardstand areas and facilities for the purposes of the project. The construction compound would be surrounded by residential and farm infrastructure land. Several unnamed drainage lines are located immediately north of the construction compound, with the closest being about 10 m. These drainage lines flow into Booroo Ponds which is located about 620 m west of the construction compound. The closest sensitive receiver is a residence about 640 m north-east of the construction compound.
Access arrangements	Access to the construction compound would be via the existing Perry Street access to the Yass substation.
New ancillary facilities or connections	**Potential connections to existing utilities**

~~Woodhouselee Road compound (C11)~~

~~A construction compound is proposed to be established off Woodhouselee Road to support transmission line construction. A summary of the key features of the construction compound is included in Table 4.14. The Woodhouselee Road compound (C11) is shown on Figure 4-8d.~~

~~Table 4.14 Key features of Woodhouselee Road compound (C11)~~

~~Key feature~~	~~Summary~~
~~Site area~~	~~Approximately 5.00 ha~~
~~Ownership~~	~~Private property~~
~~Land zoning~~	~~E3 Environmental Management~~
~~Site description~~	~~Located in Upper Lachlan Shire LGA on private property off Woodhouselee Road, Woodhouselee.~~ ~~The construction compound would be in an area of agricultural land, on sloping land. Vegetation within the construction compound is limited to groundcover consisting of pasture grasses. The closest sensitive receiver is a residence about 1.1 km east of the construction compound. Several unnamed drainage lines and farm dams are located south~~

~~Key feature~~	~~Summary~~
	~~of the construction compound, with the closest being about 80 m. These drainage lines flow into Pejar Creek and the Wollondilly River about 1.3 km to the south-west of the construction compound.~~
~~Access arrangements~~	~~Access to the construction compound would be via the existing property access on Woodhouselee Road. An additional access track would also be constructed to the site.~~

4.3.1.6. Amended Bannaby 500 kV substation compound (C12)

A construction compound is proposed to be established at the existing Bannaby 500 kV substation to support transmission line construction and modification of the existing Bannaby 500 kV substation. A summary of the key features of the construction compound is included in Table 4-10. The **Amended** Bannaby 500 kV substation compound (C12) is shown on Figure 4-8d.

Table 4-10 Key features of **Amended** Bannaby 500 kV substation compound (C12)

Key feature	Summary
Site area	Approximately ~~2.75~~ **9.61** ha, **of which approximately 4 ha is expected to be utilised**
Ownership	Transgrid
Land zoning	RU2 Rural Landscape
Site description	Located in Upper Lachlan Shire LGA at the site of the existing Bannaby 500 kV substation at Hanworth Road, Bannaby. The construction compound would be in an operational Transgrid substation, and the project would utilise available cleared land and existing hardstand areas for the purposes of the project. The construction compound is surrounded by agricultural land and several unnamed drainage lines. The closest drainage line is about 20 m to the south of the construction compound. Farm dams are also located surrounding the construction compound. The closest sensitive receiver is a residence about 480 m south-east of the construction compound.
Access arrangements	Access to the construction compound would be via the existing Hanworth Road access to the Bannaby 500 kV substation. The existing access would be upgraded as part of the project as discussed in Section 4.2.1.6.
New ancillary facilities or connections	**Concrete batching plant, sediment basin, potential helipad/helicopter facilities, wastewater treatment facility, potential connections to existing utilities**

4.3.1.7. Amended Memorial Avenue compound (C14)

A construction compound is proposed to be established adjacent Memorial Avenue to support transmission line construction. A summary of the key features of the construction compound is included in Table 4-11. The **Amended** Memorial Avenue compound (C14) is shown on Figure 4-8e.

Table 4-11 Key features of **Amended** Memorial Avenue compound (C14)

Key feature	Summary
Site area	Approximately ~~2.03~~ **2.09** ha
Ownership	Private
Land zoning	IN1 General Industrial
Site description	Located in the Snowy Valleys LGA at the corner of Memorial Avenue and Mill Road, Batlow. The construction compound would be in an area that is used for commercial services and surrounded by mixed use, recreational and residential land uses. The construction compound would be located on relatively level land and consists of an existing administration building, various sheds and maintenance facilities, and a hardstand area. The existing building and facilities would be used as part of the construction compound as required.

Key feature	Summary
	Amenity and street trees are predominantly located along the property boundary. Residential areas and other sensitive land uses surround the construction compound including Batlow Community Pool, Memorial Park, Railway Yard Rotary Park and Batlow Ambulance Station. The closet residence is about 35 m north of the construction compound on Wakehurst Avenue. The nearest waterway to the construction compound is an unnamed drainage line located within 10 m of the southern boundary.
Access arrangements	Access to the construction compound would be via the existing property access at the corner of Memorial Avenue and Mill Road.
New ancillary facilities or connections	None

~~**Bowmans Lane compound (C15)**~~

~~**A construction compound is proposed to be established adjacent Keenans Road/Bowmans Lane to support transmission line construction. A summary of the key features of the construction compound is included in Table 4-17. The Bowmans Lane compound (C15) is shown on Figure 4-8e.**~~

~~Table 4-17 Key features of Bowmans Lane compound (C15)~~

~~Key feature~~	~~Summary~~
~~Site area~~	~~Approximately 5.74 ha~~
~~Ownership~~	~~Snowy Valleys Council~~
~~Land zoning~~	~~RU1 Primary Production~~
~~Site description~~	~~Located in the Snowy Valleys LGA adjacent the Batlow waste depot along Keenans Road/Bowmans Lane, Batlow.~~ ~~The construction compound would be surrounded by an area of residential and farm infrastructure land use, on undulating land. The construction compound is cleared and has previously been used to store green waste following the 2019-2020 bushfires. The closest sensitive receiver is a residence about 50 m south of the construction compound. Other nearby dwellings are located along Keenans Road and Bowmans Lane. An unnamed drainage line is located in the northern portion of the construction compound which flows into Little Gilmore Creek about 170 m to the west of the construction compound. A farm dam is located about 20 m west of construction compound.~~
~~Access arrangements~~	~~Access to the construction compound would be via the existing property access on Keenans Road.~~

~~**Snubba Road compound (C16)**~~

~~**A construction compound is proposed to be established adjacent Snubba Road to support transmission line construction. Snubba Road compound (C16) is located about 10 kilometres south of Snubba Road compound (C03). A summary of the key features of the construction compound is included in Table 4-18. The Snubba Road compound (C16) is shown on Figure 4-8f.**~~

~~Table 4-18 Key features of Snubba Road compound (C16)~~

~~Key feature~~	~~Summary~~
~~Site area~~	~~Approximately 2.64 ha~~
~~Ownership~~	~~Crown land (managed by FCNSW)~~
~~Land zoning~~	~~RU3 Forestry~~
~~Site description~~	~~Located in the Snowy Valleys LGA along Snubba Road, Batlow, about nine km south of Batlow town centre.~~

~~Key feature~~	~~Summary~~
	~~The construction compound would be in an area of forestry land within Bago State Forest, on moderately undulating land. The location is currently cleared of vegetation but has previously supported softwood forestry plantation. Unnamed drainage lines of Gilmore Creek are the closest waterway to the construction compound and are located about 20 m to the west. The drainage lines flow into Gilmore Creek about 380 m west of the construction compound. There are no nearby sensitive receivers.~~
~~Access arrangements~~	~~Access to the construction compound would be via a temporary connection with Snubba Road. Road improvement work would be required to facilitate access (refer to Section 4.2.1.6).~~

4.3.1.8. Ardrossan Headquarters Road compound (C17)

A construction compound is proposed to be established within Green Hills State Forest to support transmission line construction. A summary of the key features of the construction compound is included in Table 4-12. The Ardrossan Headquarters Road compound (C17) is shown on Figure 4-8e.

Table 4-12 Key features of Ardrossan Headquarters Road compound (C17)

Key feature	Summary
Site area	Approximately 7.07 ha, of which approximately 7 ha is expected to be utilised
Ownership	The State of New South Wales (FCNSW)
Land zoning	RU3 Forestry
Site description	Located at Ardrossan Headquarters Road, Green Hills, about 7.6 km west of Batlow in the Snowy Valleys LGA. The proposed construction compound would be in an area of forestry within Green Hills State Forest and consists of cleared land surrounding buildings, including the FCNSW Ardrossan Depot facility. The area within the construction compound is not forested. The closest residence is about 30 m south of the construction compound, being a building owned by FCNSW providing seasonal FCNSW helicopter pilot accommodation. An associated helipad is located within the southern section of the construction compound. Use of these facilities is typically limited to the summer months. The next closest residences are about 1,000 m south-east of the construction compound. The nearest waterway to the construction compound is Germans Creek, located about 85 m to the east of the construction compound boundary.
Access arrangements	Access to the construction compound would be via the existing property access off Ardrossan Headquarters Road and Back Camp Road.
New ancillary facilities or connections	Concrete batching, sediment basin, potential helipad/helicopter facilities, potential connections to existing utilities.

4.3.1.9. Snubba Road compound (C18)

A construction compound is proposed to be established adjacent Bago Forest Way and Kopsens Road to support transmission line construction. A summary of the key features of the construction compound is included in Table 4-13. The Snubba Road compound (C18) is shown on Figure 4-8e.

Table 4-13 Key features of Snubba Road compound (C18)

Key feature	Summary
Site area	Approximately 16.25 ha, of which approximately 13 ha is expected to be utilised
Ownership	The State of New South Wales (FCNSW)
Land zoning	RU3 Forestry

Key feature	Summary
Site description	Located at Bago Forest Way, Batlow, about 7.7 km south of Batlow town centre in the Snowy Valleys LGA. The proposed construction compound would occupy land within Bago State Forest, which has been previously harvested and remains cleared. There are no nearby sensitive receivers. The nearest waterway to the construction compound is drainage lines of Wild Duck Gully located about 48 m east of the boundary. There are no nearby sensitive receivers.
Access arrangements	Access to the construction compound would be via the existing property access off Kopsens Road.
New ancillary facilities or connections	Concrete batching, sediment basin, potential helipad/helicopter facilities, no connection to existing utilities.

4.3.1.10. Gadara Road compound (C19)

A construction compound is proposed to be established adjacent Gadara Road to support transmission line construction. A summary of the key features of the construction compound is included in Table 4-14. The Gadara Road compound (C19) is shown on Figure 4-8e.

Table 4-14 Key features of Gadara Road compound (C19)

Key feature	Summary
Site area	Approximately 5.26 ha
Ownership	Private
Land zoning	RU1 Primary Production
Site description	Located along Gadara Road, Gadara, about 4.9 km west of Tumut in the Snowy Valleys LGA. The proposed construction compound would be in an area that is used for agricultural and primary production purposes including grazing native vegetation and grazing modified pastures. The closest sensitive receiver is about 686 m west of the construction compound on Gadara Road, Gadara. The nearest waterway to the construction compound is an unnamed drainage line of Sandy Creek, located within the boundary of the construction compound. An unnamed dam is also located about 4 m from the western edge of the construction compound boundary.
Access arrangements	Access to the construction compound would be via existing property access along Gadara Road.
New ancillary facilities or connections	Sediment basin, potential helipad/helicopter facilities, potential connection to existing utilities.

4.3.1.11. Ellerslie Road compound (C21)

A construction compound is proposed to be established adjacent to Ellerslie Road and Yaven Creek Road to support transmission line construction. A summary of the key features of the construction compound is included in Table 4-15. The Ellerslie Road compound (C21) is shown on Figure 4-8e.

Table 4-15 Key features of Ellerslie Road compound (C21)

Key feature	Summary
Site area	Approximately 10.41 ha, of which approximately 10 ha is expected to be utilised
Ownership	Private

Key feature	Summary
Land zoning	RU1 Primary Production
Site description	Located along Ellerslie Road, Ellerslie and Yaven Creek Road, Ellerslie, about 13.1 km south-west of Adelong in the Snowy Valleys LGA. The proposed construction compound would be in an area that is used for agricultural and primary production purposes including grazing native vegetation, grazing modified pastures and cropping. An existing, unoccupied residential building is located within the boundary and would be incorporated and used as part of the construction compound. The closest residence is located approximately 970 m north-east of the proposed construction compound on Yaven Creek Road. The nearest waterway to the construction compound is an unnamed drainage line of Yaven Yaven Creek, which intersects the northern border of the construction compound boundary. Yaven Yaven Creek is located about 45 m east of the boundary. There is also an unnamed dam partially located within the north-western section of the proposed construction compound boundary.
Access arrangements	Access to the construction compound would be via existing property access along Ellerslie Road.
New ancillary facilities or connections	Sediment basin, potential helipad/helicopter facilities, potential connection to existing utilities.

4.3.1.12. Tarcutta accommodation facility and compound (AC03)

A combined worker accommodation facility and construction compound is proposed to be established adjacent Mates Gully Road to support transmission line construction. A summary of the key features of the construction compound is included in Table 4-16. The Tarcutta accommodation facility and compound (AC03) is shown on Figure 4-8a.

Table 4-16 Key features of Tarcutta accommodation facility and compound (AC03)

Key feature	Summary
Site area	Approximately 13.48 ha, of which approximately 13 ha is expected to be utilised
Ownership	Private
Land zoning	RU1 Primary Production
Site description	Located along Mates Gully Road, Tarcutta, about 1.5 km south-west of Tarcutta in the Wagga Wagga City LGA. The accommodation facility and compound would be in an area that is used for agriculture and primary production purposes, including grazing native vegetation, grazing modified pastures and cropping. The accommodation facility and compound would be located on land which slopes downhill towards the north. A few rural residential properties are located near the accommodation facility and compound, with the closest residence about 170 m east of the construction compound on Mates Gully Road, Tarcutta. Five unnamed drainage lines intersect the accommodation facility and compound boundary.
Access arrangements	Access to the accommodation facility and compound would be via the construction of a new access along Mates Gully Road.
Facilities and use	520 beds and 100 office spaces.
New ancillary facilities or connections	Concrete batching, sediment basin, potential helipad/helicopter facilities, potential connection to existing utilities.

4.3.1.13. Adjungbilly accommodation facility and compound (AC04)

An accommodation facility and compound is proposed to be established adjacent Adjungbilly Road to support transmission line construction. A summary of the key features of the construction compound is included in Table 4-17. The Adjungbilly accommodation facility and compound (AC04) is shown on Figure 4-8b.

Table 4-17 Key features of Adjungbilly accommodation facility and compound (AC04)

Key feature	Summary
Site area	Approximately 33.22 ha, of which approximately 10 ha is expected to be utilised
Ownership	Private
Land zoning	RU1 Primary Production
Site description	Located along Adjungbilly Road, Adjungbilly, about 21.7 km east of Gundagai, within the Cootamundra-Gundagai Regional LGA. The accommodation facility and compound would be in an area that is used for agriculture and primary production purposes, including grazing native vegetation and grazing modified pastures. The accommodation facility and compound also intersects a marginal amount of plantation forestry land, about 0.1 ha. The accommodation facility and compound would be located on undulating land. Drainage lines from Gatleys Creek intersect the accommodation facility and compound boundary. An unnamed dam is also located within the western portion of the compound. The closest sensitive receiver is a residence located about 205 m west of the accommodation facility and compound boundary on Adjungbilly Road, Adjungbilly.
Access arrangements	Access to the accommodation facility and compound would be via existing property access from Adjungbilly Road.
Facilities and use	300 beds and 71 office spaces.
New ancillary facilities or connections	Concrete batching, sediment basin, potential helipad/helicopter facilities, potential connection to existing utilities.

4.3.1.14. Yass accommodation facility and compound (AC05)

An accommodation facility and compound is proposed to be established adjacent Faulder Avenue to support transmission line construction. A summary of the key features of the construction compound is included in Table 4-18. The Yass accommodation facility and compound (AC05) is shown on Figure 4-8c.

Table 4-18 Key features of Yass accommodation facility and compound (AC05)

Key feature	Summary
Site area	Approximately 11.09 ha, of which approximately 10 ha is expected to be utilised
Ownership	Private
Land zoning	E3 Productivity Support and RU1 Primary Production
Site description	Located along Faulder Avenue on the north-western outskirts of the town of Yass, in the Yass Valley LGA. The accommodation facility and compound would occupy land used for agricultural and industrial purposes. The closest sensitive receiver is a residence located about 120 m south-west of the accommodation facility and compound on Yass Valley Way. The nearest waterway is Bango Creek located within 25 m of the western boundary.
Access arrangements	Access to the accommodation facility and compound would be via existing property access along Faulder Avenue.

Key feature	Summary
Facilities and use	300 beds.
New ancillary facilities or connections	Concrete batching, sediment basin, potential helipad/helicopter facilities, potential connection to existing utilities.

4.3.1.15. Crookwell accommodation facility and compound (AC06)

An accommodation facility and compound is proposed to be established off Graywood Siding Road to support transmission line construction. A summary of the key features of the construction compound is included in Table 4-19. The Crookwell accommodation facility and compound (AC06) is shown on Figure 4-8d.

Table 4-19 Key features of Crookwell accommodation facility and compound (AC06)

Key feature	Summary
Site area	Approximately 21.71 ha, of which approximately 6 ha is expected to be utilised
Ownership	Private
Land zoning	C3 Environmental Management
Site description	Located off Graywood Siding Road, Woodhouselee, about 18.1 km north of Goulburn in the Upper Lachlan Shire LGA. The accommodation facility and compound would occupy undulating land, consisting of land used for agricultural purposes and also partially consisting of land that has been previously disturbed. This previously disturbed land is currently in use as a construction compound, as part of the construction of the Crookwell 3 Wind Farm (SSD-6695), however will be rehabilitated to its former agricultural land use at the completion of works. The closest sensitive receiver is a residence located about 2.1 km west of the accommodation facility and compound on Woodhouselee Road, Woodhouselee. Several unnamed drainage lines run through the accommodation facility and compound. These drainage lines run into Steeves Creek, located about 970m north-west of the accommodation facility and construction compound. An unnamed farm dam is also located within the boundary.
Access arrangements	Access to the accommodation facility and compound would be via Graywood Siding Road.
Facilities and use	300 beds and 71 office spaces.
New ancillary facilities or connections	Concrete batching, sediment basin, potential helipad/helicopter facilities, potential connection to existing utilities.

4.3.1.16. Green Hills accommodation facility and compound (AC07)

An accommodation facility and compound is proposed to be established adjacent Green Hills Access Road to support transmission line construction. A summary of the key features of the construction compound is included in Table 4-20. The Green Hills accommodation facility and compound (AC07) is shown on Figure 4-8e.

Table 4-20 Key features of Green Hills accommodation facility and compound (AC07)

Key feature	Summary
Site area	Approximately 25.49 ha, of which approximately 15 ha is expected to be utilised
Ownership	Private
Land zoning	RU1 Primary Production

Key feature	Summary
Site description	Located along Green Hills Access Road, Kunama, located about 6.5 km west of Batlow within the Snowy Valleys LGA. The accommodation facility and compound would be in an area that is used for agricultural purposes, including grazing modified pastures and irrigated perennial horticulture, as well as residential and farm infrastructure land. One existing residential building is located on the site and would potentially be incorporated and used as part of the accommodation facility and compound. The accommodation facility and compound also intersects about 0.4 ha of land used for transport and communication infrastructure and utilities. The closest sensitive receiver is a residence located about 120 m south of the accommodation facility and compound on Green Hills Access Road. Several unnamed drainage lines and farm dams are located near the accommodation facility and compound, the closest about 140 m south of the boundary. The drainage lines run to Yaven Yaven Creek, which is located about 2.1 km north-west of the accommodation facility and compound. One unnamed farm dam is also located within the boundary of the accommodation facility and compound.
Access arrangements	Access to the accommodation facility and compound would be via existing property access off Green Hills Access Road.
Facilities and use	420 beds and 60 office spaces.
New ancillary facilities or connections	Concrete batching, sediment basin, potential helipad/helicopter facilities, potential connection to existing utilities.

4.3.2. Other ancillary facilities and support sites

4.3.2.1. Work areas along transmission lines

A number of minor storage and laydown areas would be required along the project footprint for the temporary storage of materials, plant and equipment required to construct the various elements of the project (in particular, **at** transmission line structures).

These sites would be in place for shorter periods at locations suitable to support the construction work as they move along the transmission line route. Establishment of these sites would include appropriate water quality and erosion and sediment controls as required. Upon completion of work, these ancillary sites would be cleared of any temporary infrastructure and equipment and **restored/**rehabilitated as detailed in Section 4.2.4. These sites would be in place for shorter periods at locations suitable to support the construction work as they move along the transmission line route.

Before work begins at these sites, temporary lease agreements would be established with property owners for use of their land, where required.

4.3.2.2. Helipad/helicopter facilities

Helicopters may be used to deliver materials and equipment and to transfer personnel to construction areas, particularly within high alpine regions. Helicopters may also be used for stringing of the transmission lines (to be determined during **further** detailed design). To enable helicopters to operate safely and allow easy access to the site, a helicopter landing pad (helipad) would be required. The helipad is expected to occupy an area of around 30 metres by 30 metres, and would be remediated after construction. These areas would typically be located on existing disturbed land not subject to inundation and a reasonable distance from waterways, sensitive receivers and drainage lines.

~~The following locations~~ **Thirteen construction compounds** have been identified and assessed as potential helipad locations **(refer to Section 4.3.1). Impacts associated with the potential use of**

helicopters and helipads are presented in Chapter 6 (Assessment of impacts) of the Amendment Report.

- ~~**options for southern area of construction:**~~
  - ~~**Maragle 500 kV substation compound (C05), Bowmans Lane compound (C15), Snubba Road compound (C16) or Snubba Road compound (C03)**~~
- ~~**options for central area of construction:**~~
  - ~~**Honeysuckle Road compound (C07), Red Hill Road compound (C08), or Adjungbilly Road compound (C09)**~~
- ~~**options for north-east area of construction:**~~
  - ~~**Woodhouselee Road compound (C11) or Bannaby 500 kV substation compound (C12).**~~

~~**Only one of these options in each area is likely to be required during construction.**~~ The exact locations to be used would be confirmed during **further** detailed design by the construction contractors. In addition, the existing facilities at Wagga Wagga Airport and Tumut Airport may be used.

4.3.2.3. Additional ancillary facilities

The following factors, in general order of priority, would be considered when selecting sites for other ancillary facilities, helicopter landing pads, support sites and/or construction compounds, should any of these be required:

- located in areas which have previously been disturbed, or would already require disturbance as part of the construction of the project
- no impacts to threatened species (or their habitats) or threatened ecological communities (within the meaning of the *Biodiversity Conservation Act 2016* (BC Act) or the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act))
- located in areas of identified lower ecological and heritage value
- located an appropriate distance from waterways (refer to Chapter 17 (Surface water and groundwater quality) **of the EIS**)
- located an appropriate distance from sensitive receivers to minimise potential impacts (ie enabling adequate separation from residential buildings) with consideration of matters such as compliance with the *Interim Construction Noise Guideline* (DECC, 2009), traffic and access impacts, dust impacts, and visual (including light spill) impacts
- located on relatively level ground to minimise earthwork requirements and offsite drainage and flooding risks
- proximity to key construction activities to minimise duration of travel for workers and transport of materials and equipment
- easily accessible for heavy vehicle construction traffic (including deliveries).

Appropriate mitigation measures may be required at sites where factors cannot be adequately addressed. The selected sites would also be subject to additional environmental assessment or consistency review, as relevant. This would include considering consistency with the assessment contained in this environmental impact statement including relevant mitigation measures, environmental performance outcomes and any future conditions of approval.

4.3.2.4. Extractive material locations

Extractive materials are proposed to be sourced from existing local and regional quarries and borrow pits, to the extent that this is possible. For the western section of the project to the interface at Wondalga, the intention is to source material primarily from Coffee Pot Quarry and/or 3 Mile Creek Quarry in the Snowy Valleys Council LGA, subject to reaching agreement with FCNSW.

Extractive materials may be sourced from Coffee Pot Quarry and/or 3 Mile Creek Quarry provided it can be demonstrated in accordance with the change management process described in Section 26.4 (Managing project changes) of the EIS that quarry operations meet the performance-based criteria outlined below to avoid, minimise and mitigate potential environmental impacts.

Quarry operations for the project at Coffee Pot Quarry and/or 3 Mile Creek Quarry must:

- **only be carried out for the purpose of supplying extractive material to the project during the construction phase**
- **operate to a maximum extraction capacity in accordance with any required environment protection licence issued by the Environment Protection Authority**
- **not require clearing of threatened flora species, threatened ecological communities or impact threatened species habitat or groundwater dependant ecosystems beyond that already contemplated for the project**
- **not impact Aboriginal archaeological or cultural heritage objects, places or values**
- **not impact non-Aboriginal heritage items, values or conservation areas**
- **not moderately or highly noise affect sensitive receivers or other sensitive land uses (as defined by the Interim Construction Noise Guideline (DECC, 2009)), unless the sensitive receiver has given written acceptance to carry out the work**
- **operate during standard construction hours (7am to 6pm Monday to Friday, 8am to 1pm Saturday), unless otherwise carried out in accordance with an out-of-hours works protocol**
- **provide sufficient area for construction workforce parking, raw material storage, and other storage of any plant and equipment onsite**
- **be above the 5% AEP flood level unless a contingency plan to manage flooding is prepared and implemented**
- **be located outside the Vegetated Riparian Zone of waterways as defined by Controlled activities – Guidelines for watercourse crossings on waterfront land (DPE, 2022).**

~~**Worker accommodation facility**~~

~~**Existing accommodation facilities within towns adjacent to the project (eg Goulburn, Yass, Tumut, and Wagga Wagga) would provide temporary accommodation for the majority of the construction workers. However, a potential shortfall in available accommodation has been identified close to the project footprint.**~~

~~**A temporary worker accommodation facility on the corner of Courabyra Road and Alfred Street, Tumbarumba (Tumbarumba accommodation facility (AC1)) has been identified as a potential option to accommodate about 200 construction workers. The worker accommodation facility would include temporary fencing, lighting, fire protection and appropriate water quality and erosion and sediment controls.**~~

~~**However, the ultimate delivery of the project may include multiple temporary worker accommodation facilities in various forms, which would be outlined in the Worker Accommodation**~~

Strategy for the project. Transgrid and other stakeholders would be consulted to identify additional potential options in the Worker Accommodation Strategy for the project. Any new or changed worker accommodation facility would be subject to additional environmental assessment in accordance with the process described in Chapter 26 (Environmental management), as required.

A summary of the key features of the worker accommodation facility is included in Table 4-19 and the location is shown on Figure 4-8.

Table 4-19 Key features of Tumbarumba accommodation facility (AC1)

Key feature	Summary
Site area	Approximately 21.44 ha
Ownership	Snowy Valleys Council
Land zoning	RU1 Primary Production
Site description	Located in the Snowy Valleys LGA at the corner of Courabyra Road and Alfred Street, Tumbarumba, about 2 km north-west of the Tumbarumba town centre. The worker accommodation facility would be in an area of agricultural land, on gently sloping land. This area has been largely cleared of vegetation. Groundcover consists of pasture grasses. Two unnamed drainage lines run north to south through the worker accommodation facility area. The closest sensitive receiver is a residence about 50 m west of the worker accommodation facility. An additional four dwellings are located between 80 to 200 m north and south of the worker accommodation facility site.
Facilities and use	The facilities would include: • provision to accommodate about 200 construction workers including 20 15 m long demountable accommodation cabins and a mess hall • new connections to water, power and wastewater services, which may require some work to be carried out outside of the project footprint to ensure appropriate connections and minimal disruption to existing services • parking for about 100 light vehicles, 12 mini-buses and 12 heavy vehicles.
Access arrangements	Temporary access to the worker accommodation facility would be provided via Courabyra Road and Alfred Street. Road improvement work would be required to facilitate access (refer to Section 4.2.1.6).

4.4. Plant and equipment

An indicative list of construction plant and equipment likely to be required during construction is provided below. Not all the equipment identified below would be required for all phases of construction. The final list of plant and equipment required for construction would depend on the detailed construction methodology developed by the construction contractors.

- air compressor
- backhoe
- bobcat
- bulldozers
- concrete agitator
- concrete pump
- cranes (various sizes up to 400 tonnes)
- crawler crane with grab attachments
- **mobile cone/ jaw crusher**
- drill and blast units and associated support plant/equipment
- drones
- dumper trucks
- elevated working platforms
- excavators (various sizes)
- flatbed hiab trucks
- **front end loader**
- fuel trucks
- generators
- graders
- helicopters and associated support plant/equipment
- mulchers
- piling rig
- pneumatic jackhammers
- rigid tippers
- rollers (10 to 15 and 12 to 15 tonnes)
- **mobile screener**
- semi-trailers
- tilt tray trucks
- trenchers
- transport trucks
- **truck and dog**
- watercarts
- winches.

4.5. Resources and materials

4.5.1. Earthwork

Earthwork, including excavations and filling, would be required for activities such as construction of the transmission line structures and the new substation site, modification of the existing substation sites, drainage, earthing, installation of electrical conduits, and **upgrade/**construction of access tracks.

Excess spoil from excavations would be managed using the following hierarchy:

- reuse onsite wherever possible so that it would not substantially alter landform or drainage in the vicinity of the transmission line structures or substations
- reuse on other projects in accordance with the requirements of any applicable resource recovery order and exemption (this could include but may not be limited to rehabilitation of local quarries, or provided to councils, private property owners and/or local businesses)
- removal from site and disposal at an appropriately licensed facility.

Indicative earthwork volumes for the project, based on the current **estimates from the construction contractors** ~~**concept design**~~, are provided in Table 4-21. No earthwork is anticipated for the connection to the future Maragle 500 kV substation.

Table 4-21 Indicative earthwork volumes

Site	Indicative cut volume (m^3)	Indicative fill volume (m^3)
Proposed Gugaa 500 kV substation	~~339,430~~ 60,000	~~280,110~~ 100,000
Wagga 330 kV substation	~~5,020~~ 5,000	~~410~~ 5,000
Bannaby 500 kV substation	~~37,990~~ 40,000	~~22,060~~ 30,000
Transmission line – construction of structures~~, telecommunications hut~~ and associated construction compound establishment	~~60,000~~ 570,000	~~Nil~~ 780,000
Transmission line – construction of access tracks	~~223,590~~ 890,000	~~115,690~~ 940,000
Total	~~666,030~~ 1,565,000	~~418,270~~ 1,855,000

Note: Indictive earthwork volumes exclude topsoil strip. Many areas will require localised cut to fill operations which will be developed and optimised during further detailed design and construction planning and are not accounted for in this table.

The indicative earthwork volumes in Table 4-21 are based on the assumption that cut material can be used as fill for the project. Where spoil is determined not to be appropriate for reuse onsite, it may be necessary to import additional material to site to make up any deficit. Where this is required, material would be sourced locally and transported by road to the substation or transmission line sites.

Topsoil would be separated and stockpiled within or adjacent to (where appropriate) the work site and reused for revegetation and rehabilitation where required. Topsoil stockpiles would be managed throughout construction in accordance with *Managing Urban Stormwater: Soils and Construction – Volume 1, 4th Edition* (Landcom, 2004) or other comparable guidelines.

There would also be a requirement to maintain safe working clearances under the existing transmission lines where the project would be located in or adjacent to existing lines or existing substations. Accordingly, excavation work would generally commence where clearances from natural ground level to the above transmission lines exceed the safe working requirements. Benching and spoil removal would progress using rock breakers, excavators, and trucks. This methodology would ensure that safe clearances are maintained, and excavation work can proceed without the requirement to disconnect electrical transmission along these lines during construction.

4.5.2. Water supply and management

Water would be typically required during construction for:

- dust suppression at substation and transmission line construction sites and on access tracks
- civil work and earthwork compaction
- concrete batching activities
- equipment and vehicle washdown
- general worker facilities at the construction compounds and the worker accommodation facility.

It is estimated that about ~~564~~ 715 ML of water would be required during construction of the project. Indicative water volumes for construction of the transmission lines and substations are provided in Table 4-22.

Table 4-22 Indicative water quantities for construction of transmission lines and substations

Activity	Proposed Gugaa 500 kV substation	Wagga 330 kV substation	Bannaby 500 kV substation	Transmission line work[1]
Dust suppression and civil work	19.8 ML	12.1 ML	14.6 ML	381.6 ~~450.0 ML~~
Concrete batching	11.2 ~~2.7~~ ML	0.6 ML	0.9 ML	65.2 ~~19.2~~ ML
Equipment and vehicle washdown	-	-	-	1.1 ML
General worker facilities	~~1.4 ML~~	~~0.7 ML~~	~~0.7 ML~~	208 ~~40.2~~ ML
Total	~~23.9~~ 31 ML	~~13.4~~ 12.7 ML	~~16.2~~ 15.5 ML	~~510.5~~ 655.9 ML

Note:
1. Indicative water quantities required for the connection to the future Maragle 500 kV substation are included as part of transmission line work.

The water source to be used would depend on the location and nature of the construction activity and whether potable or non-potable water is required. Water sources would include:

- construction sedimentation basins
- farm dams
- rainwater tanks
- council standpipes or connection to council water supply systems
- groundwater bores
- purchase of water allocations from existing water users.

Where possible, non-potable water would be sourced from construction sedimentation basins and farm dams in agreement with the relevant landowners. However, these sources of water would not meet all the non-potable requirements in all locations. A more predictable and likely source of non-potable water would be the temporary purchase of water allocations from other water users. Refer to *Technical Report 12 – Surface Water and Groundwater Impact Assessment* ***Addendum*** for further discussion on the temporary purchase of existing water user allocations.

Potable water would be sourced from council standpipes via water carts and taken to the construction compounds, ~~**or**~~ from council water supply systems, **commercial suppliers, and on-site water treatment systems in conjunction with non-potable sources** as required.

Measures to avoid and minimise water consumption, particularly of potable water, would be considered during **further** detailed design and construction planning.

4.5.2.1. Onsite wastewater treatment

~~**The total annual volume of wastewater generated during construction is expected to be about 8.81 ML. The majority of this would be generated from the Tumbarumba accommodation facility (AC1) with about 7.52 ML expected per year. As discussed in Section 4.3.3, the Tumbarumba accommodation facility (AC1) is proposed to be connected to the local sewer network.**~~

Wastewater treatment facilities may be used to treat wastewater from **amenities at the nominated worker accommodation facilities and at the Amended Gregadoo Road compound (C06) and Amended Bannaby 500 kV substation compound (C12). Daily volumes of wastewater at each site (assuming a conservative 200 L per person) would range from 50 kL to 100 kL depending on the site and occupancy levels.**

~~**Wastewater treatment facilities may be used to treat wastewater from amenities at Gregadoo Road compound (C06) and Bannaby 500 kV substation (C12) in lieu of transporting it offsite for processing. The wastewater treatment facilities would be designed for the following staff numbers:**~~

- ~~**Gregadoo Road compound (C06) – 190 construction workers at peak**~~
- ~~**Bannaby 500 kV substation compound (C12) – 110 construction workers at peak.**~~

Any onsite systems would be designed, installed and maintained to the requirement of the relevant council standards. Typically, such a system takes the wastewater into one tank (or a section of the tank for smaller systems) where solids and liquids are separated. The liquid in this tank (or section) is then discharged into a second tank (or section). The first tank (or section) continually processes the solids for more treatment until it eventually breaks down and ends up in the second tank (or section).

Each tank is typically 2.4 metres in diameter (with a similar height) and buried. For multiple tank systems, the tanks are placed side by side (possibly with a one metre gap between tanks). If the load for the system is large, there may be a need for a third tank to ensure adequate digestion occurs. Investigations would be carried out on the loading expectation for the system to size the tank arrangement. The volume of wastewater to be processed would depend on the number of workers at the construction compound and associated water use at any one time throughout the construction period.

In is anticipated that some servicing of the first tank (or section) would be required (eg once a year, depending on system load) as not all solids are expected to break down and would be required to be collected. Any waste would be taken to an appropriately licensed facility for disposal.

The method for discharging treated wastewater would be confirmed during **further** detailed design but could involve discharge via sprinklers over a grassed area. A large system may require an area of grass, about 50 by 50 metres. Treated wastewater would not be discharged to waterways and it is not expected the treated wastewater would be used for construction activities.

The final design and requirements for onsite wastewater treatment facilities would be confirmed by the construction contractors during **further** detailed design in accordance with any relevant council standards.

For all other construction compounds, wastewater would be stored in a suitably sized tank and taken to an appropriately licensed facility for disposal at regular intervals.

4.5.3. Hazardous materials and chemicals

During construction, various hazardous materials and chemicals would ~~**likely**~~ be required to be used and/or stored onsite. Hazardous materials and chemicals would typically include (but not be limited to):

- acetylene, oxygen, liquid petroleum gas
- adhesives, glues and epoxies
- concrete and other mortar products
- contact cleaners
- cold-galvanising spray
- fuels, oils and lubricants (eg diesel and transformer mineral oil)
- pesticides, herbicides and other chemicals associated with biosecurity measures
- paints and other paint markers
- sulfur hexafluoride (SF_6) gas.

4.5.4. Other resources and materials

A range of other materials and resources would be required during construction of the project. Key additional materials and resources, including likely quantities, are listed in Table 4-23.

Table 4-23 Key additional materials and resources and indicative quantities

Site	Steel (t)	Aluminium (t)	Copper (t)	Concrete (m^3)
Proposed Gugaa 500 kV substation	1,880	170	60	14,840
Wagga 330 kV substation	400	70	40	3,390
Bannaby 500 kV substation	620	40	30	4,840
Transmission line work[1]	40,000	8,000	120	48,000
Total	**42,900**	**8,280**	**250**	**71,070**

Note:
1. Key additional materials and indicative quantities required for connection to the future Maragle 500 kV substation are included as part of transmission line work.

Around 3,800 kilometres of conductor and earth wire cables would also be required to construct the transmission lines.

4.6. Construction workers and working hours

4.6.1. Construction workers

Construction worker numbers would vary depending on the phase of construction and associated activities. During peak construction activities, the project is expected to employ up to ~~1,200~~ 1,600 full-time equivalent workers. Table 4-24 provides an overview of the anticipated workforce for the key construction activities.

Table 4-24 Anticipated construction workers for the project

Construction activities	Anticipated construction workers (estimate)
Substation work	
Construction of proposed Gugaa 500 kV substation	Total: 510, Monthly peak[1]: 190
Modification of existing Wagga 330 kV substation	Total: 270, Monthly peak: 80
Modification of existing Bannaby 500 kV substation	Total: 320, Monthly peak: 110
Transmission line work[2, 3]	
Site establishment, environmental controls and vegetation clearing	~~12 to 24~~ 100 to 140
Establishment of access points and tracks for construction of towers	~~14 to 22~~ 100 to 140
Installation of structure foundations	~~60 to 80~~ 80 to 120
Assembly and erection of structure	~~100~~ 140 to 160
Stringing of conductors	~~120~~ 100 to 200
Testing and commissioning	~~30~~ 30 to 50
Administrative and management staff	~~50 to 100~~ 100 to 150
Accommodation ~~camp~~ facilities and laydown support staff	~~20 to 50~~ 100 to 150

Note:
1. Monthly peak represents the estimated maximum monthly construction workforce number at any given month.
2. Anticipated construction workers for the connection to the future Maragle 500 kV substation are included as part of transmission line work.
3. Estimates consider workers across multiple work fronts.

4.6.2. Construction work hours

The standard construction hours would be as per the *Interim Construction Noise Guideline* (DECC, 2009):

- 7am to 6pm Monday to Friday
- 8am to 1pm Saturday
- no construction work on Sundays or public holidays.

In addition, as detailed in Section 4.6.3, some activities would be required outside these standard construction hours for safety, technical or public infrastructure operational reasons (eg to minimise utility or traffic disruptions).

Extension of the standard construction hours may be investigated to assist in the delivery of the project. Any proposed extension of standard construction hours would be subject to additional environmental assessment as required.

Controlled blasting may be required depending on geotechnical conditions. Where blasting is required, it would be undertaken in accordance with the recommended standard hours for blasting from the *Interim Construction Noise Guideline* (DECC, 2009):

- 9am to 5pm Monday to Friday
- 9am to 1pm Saturday
- no blasting on Sundays or public holidays.

4.6.3. Out-of-hours work

Work outside the standard construction hours is anticipated to include (but not be limited to):

- transmission line construction at crossings of a main road or railway as these locations are expected to have restricted construction hours requiring some night work for activities such as conductor stringing over the crossing(s)
- work where a road occupancy licence (or similar) is required, depending on licence conditions
- transmission line cutover and commissioning
- the delivery of equipment or materials outside standard hours requested by police or other authorities for safety reasons (such as the delivery of transformer units)
- limited substation assembly work (eg oil filling of the transformers)
- connection of the new assets to existing assets under outage conditions (eg modification and/or connection work at Bannaby 500 kV substation, Wagga 330 kV substation and future Maragle 500 kV substation), which is likely to require longer working hours
- operation of the ~~**Tumbarumba accommodation facility (AC1)**~~ **temporary worker accommodation facilities**
- emergency work to avoid the loss of lives and/or property and/or to prevent environmental harm
- work timed to correlate with system planning outages
- situations where agreement is reached with affected sensitive receivers
- activities that do not generate noise that exceeds the applicable noise management level at any sensitive receiver.

During **further** detailed design and ~~**further**~~ construction planning, a program would be determined to identify the required night work periods (including dates and durations).

Except for emergencies, construction work would be carried out in accordance with an out-of-hours work protocol and would not take place outside standard construction hours without prior notification to stakeholders in accordance with the protocol **(where required)**, which would be documented within the CEMP.

Due to the remote nature of the work, and the requirement to accommodate a rostered fly-in fly-out and drive-in drive-out workforce, construction hours would be extended across a seven-day work week between 7am and 7pm (extended construction hours) where necessary and appropriate. Any works undertaken during these extended construction hours would be undertaken in accordance with an out-of-hour work protocol. To support construction activities during these extended hours, operation of select construction compounds may also be required.

Additional measures would also be implemented where work would potentially exceed noise management levels in proximity to sensitive receivers, which would be included as part of Noise and Vibration Management Plan (NVMP).

4.7. Construction parking, access and vehicle movements

4.7.1. Construction vehicle movements

Construction vehicles would transport equipment, waste, materials and spoil, as well as workers:

- Larger volumes of heavy vehicles would occur during the main construction work associated with the substations and transmission lines and would mainly be associated with the delivery of materials to work sites and construction compounds.
- Most of the light vehicle movements would be limited to construction staff travelling to and from individual sites.
- Non-standard or oversized and/or overmass (OSOM) loads would be required for the substation work (eg for transformer transport).

~~**Indicative daily vehicle movements are outlined in Table 4-**~~ **Overall estimated traffic movements generated by the project during construction for roads in the vicinity of the construction compounds and worker accommodation facilities are outlined in Section 6.2 of *Technical Report 16 – Revised Traffic and Transport Impact Assessment*.** These vehicle movements are based on the expected typical and peak construction period. The vehicle movements stated in ~~**Table 4-25**~~ **Section 6.2** would be confirmed during **further** detailed design and ~~**further**~~ construction planning and included in the Traffic and Transport Management Plan (TTMP).

~~Table 4-25 Indicative vehicle movements during construction~~

~~Site~~	~~Light vehicles~~		~~Heavy vehicles~~	
	~~Typical daily movements~~	~~Maximum daily movements~~	~~Typical daily movements~~	~~Maximum daily movements~~
~~Proposed Gugaa 500 kV substation~~	~~86~~	~~190~~	~~36~~	~~102~~
~~Wagga 330 kV substation~~	~~52~~	~~106~~	~~26~~	~~92~~
~~Bannaby 500 kV substation~~	~~52~~	~~106~~	~~26~~	~~92~~
~~Transmission line work~~	~~346~~	~~656~~	~~99~~	~~155~~

~~Note - the following assumptions apply to the indicative vehicle movements:~~

- ~~vehicle movements are each way (ie a heavy/light vehicle arriving and leaving a site, either within a day or separate days counts as two movements)~~

~~• typical and maximum daily movements are based on the current program of work~~
~~• vehicle movements associated with the connection to the future Maragle 500 kV substation and the **telecommunications hut telecommunications connections** are included in transmission line work.~~

The timing of OSOM vehicle movements would be subject to ~~**further**~~ **additional** traffic studies during **further** detailed design and the requirements of the local road authorities. The indicative total OSOM vehicle movements for the duration of the project are likely to include:

- proposed Gugaa 500 kV substation – 28 movements
- Bannaby 500 kV substation – four movements.

Standard traffic management measures would be implemented to minimise short-term traffic impacts during construction. These measures would be identified in the TTMP.

Vehicle movements would be scheduled outside peak periods wherever possible. However, there would be a need for some vehicle movements during peak periods. Worker vehicle movements would also be required during both the morning and afternoon peak periods. Refer to Chapter 20 (Traffic, transport and access) **of the EIS** and *Technical Report 16 – **Revised** Traffic and Transport Impact Assessment* for further detail.

4.7.2. Construction access routes

Construction materials and equipment would be transported from multiple locations using national, state, regional and local road networks, as well as new and upgraded access tracks.

~~**Table 4-25 summarises the national, state, and regional roads, which are expected to provide access to the project footprint, with an overview provided on Figure 4-9. Local roads, which would provide access to construction compounds and the worker accommodation facility are also included.**~~ **Indicative and alternative construction access roads are outlined in Table 4-25 and shown in Figure 4-9.** ~~**Further detail and discussion regarding**~~ **Assessment of indicative** construction access routes is provided in ~~**Chapter 20 (Traffic, transport and access)**~~ **Section 6.14 of the Amendment Report** and *Technical Report 16 –**Revised** Traffic and Transport Impact Assessment*. **Roads providing alternative access, which were assessed within the EIS, may also be required during construction. The access route selection process flow chart (refer to Figure 4-2 of *Technical Report 16 –Revised Traffic and Transport Impact Assessment*) provides an outline of the method to be adopted for selecting the final construction access routes.** The construction compound and worker accommodation facility reference numbers have been provided after the road name as relevant to indicate the road provides access to these facilities.

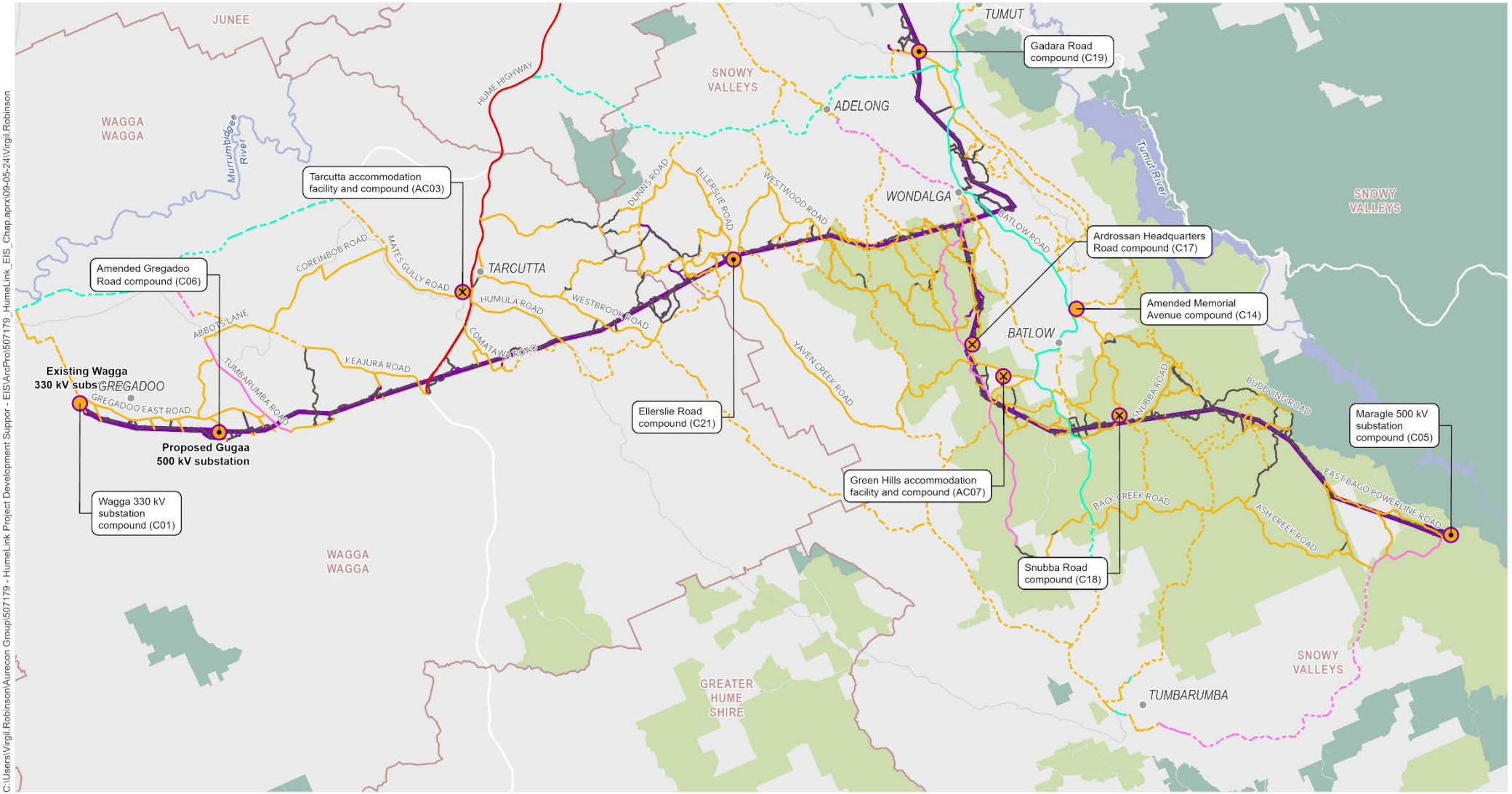
Table 4-25 ~~**Summary of proposed**~~ **Indicative and alternative** construction access ~~**routes**~~ **roads within the project LGAs**

Road	LGA	Type
Adelong Road	**Snowy Valleys**	**State**
Adjungbilly Road **(AC04)** ~~**(C09)**~~	Cootamundra-Gundagai Regional	Local
~~**Alfred Street (AC1)**~~	~~**Snowy Valleys**~~	~~**Local**~~
Ardrossan Headquarters Road (C17)	**Snowy Valleys**	**Local**
Ashfords Road (C01)	Wagga Wagga City	Local
Back Camp Road (C17)	**Snowy Valleys**	**Local**
Bago Forest Way (C18)	**Snowy Valleys**	**Local**
Batlow Road	Snowy Valleys	State

Road	LGA	Type
Barton Highway	Yass Valley	State
~~**Binda Road**~~	~~**Upper Lachlan Shire**~~	~~**Regional**~~
~~**Boorowa Road**~~	~~**Upper Lachlan Shire**~~	~~**Regional**~~
Britannia Street	**Upper Lachlan Shire**	**Regional**
~~**Brookland Street**~~	~~**Upper Lachlan Shire**~~	~~**Regional**~~
Bunnaby Street	Upper Lachlan Shire	Regional
Burley Griffin Way	**Yass Valley**	**State**
Burrinjuck Road	Yass Valley	Regional
Camp Street	**Upper Lachlan Shire**	**Regional**
Collector Road	Upper Lachlan Shire	Regional
Comur Street	**Yass Valley**	**Regional**
~~**Courabyra Road (AC1)**~~	~~**Snowy Valleys**~~	~~**Local**~~
Crookwell Road/Goulburn Road	Upper Lachlan Shire **Goulburn Mulwaree**	State
Dalton Road	Upper Lachlan Shire	Regional
Ellerslie Road (C21)	**Snowy Valleys**	**Local**
Elliott Way (C05)	Snowy Valleys	Regional
Faulder Avenue (AC05)	**Yass Valley**	**Local**
Gadara Road (C19)	**Snowy Valleys**	**Local**
Gocup Road	Snowy Valleys Cootamundra-Gundagai Regional	State
Grabben Gullen Road	Upper Lachlan Shire	Regional
Graywood Siding Road (AC06)	**Upper Lachlan Shire** **Goulburn Mulwaree**	**Local**
Green Hills Access Road (AC07)	**Snowy Valleys**	**Local**
Gregadoo East Road ~~**(C06)**~~	Wagga Wagga City	Local
Gundaroo Road	Upper Lachlan Shire	Regional
Gundaroo Street	Upper Lachlan Shire	Regional
Gunning Street	Upper Lachlan Shire	Regional
Hanworth Road (C12)	Upper Lachlan Shire	Local
Honeysuckle Road (C07)	Cootamundra-Gundagai Regional	Local
Hume Highway	Wagga Wagga City Cootamundra-Gundagai Regional Yass Valley Upper Lachlan Shire	National
Hume Street	Upper Lachlan Shire	Regional
~~**Keenans Road (C15)**~~	~~**Snowy Valleys**~~	~~**Local**~~
Lachlan Valley Way	**Upper Lachlan Shire**	**Regional**
Laggan Road	Upper Lachlan Shire	Regional
Laggan-Taralga Road	Upper Lachlan Shire	Regional

Road	LGA	Type
Laidlaw Street	Yass Valley	Regional
Livingstone Gully Road (C06)	Wagga Wagga City	Local
Mates Gully Road (AC03)	**Wagga Wagga City**	**Local**
Memorial Avenue (C14)	Snowy Valleys	Local
Mill Road (C14)	Snowy Valleys	Local
Mitchell Road ~~**(C01)**~~	Wagga Wagga City	Local
~~**Northcott Street**~~	~~**Upper Lachlan Shire**~~	~~**Regional**~~
Orchard Street	Upper Lachlan Shire	Regional
Perry Street (C10)	Yass Valley	Local
Red Hill Road ~~**(C08)**~~	Snowy Valleys Cootamundra-Gundagai Regional	Local
Rye Park Road	Upper Lachlan Shire	Regional
~~**Selwyn Street**~~	~~**Snowy Valleys**~~	~~**Regional**~~
Snowy Mountains Highway ~~**(C03)**~~	Snowy Valleys Cootamundra-Gundagai Regional	State
Snubba Road ~~**(C03 and C16)**~~	Snowy Valleys	Local
Sturt Highway	Wagga Wagga City	State
Taralga Road	Upper Lachlan Shire	Regional
~~**Tooma Road**~~	~~**Snowy Valleys**~~	~~**Regional**~~
Tumbarumba Road	Wagga Wagga City	Regional
~~**Tumut Street**~~	~~**Snowy Valleys**~~	~~**Regional**~~
Warrataw Street	Upper Lachlan Shire	Regional
Wee Jasper Road (including Grand Junction Road)	Snowy Valleys	Regional
West Street	Cootamundra-Gundagai Regional	Regional
Willis Street	Upper Lachlan Shire	Regional
Wondalga Road	Snowy Valleys	Regional
Woodhouselee Road ~~**(C11)**~~	Upper Lachlan Shire	Regional
Yass Street	Upper Lachlan Shire	Regional
Yass Valley Way	Yass Valley	Regional
Yaven Creek Road (C21)	**Snowy Valleys**	**Local**

Note: List of roads not exhaustive, refer to Figure 4-9 for roads which may be utilised.



Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

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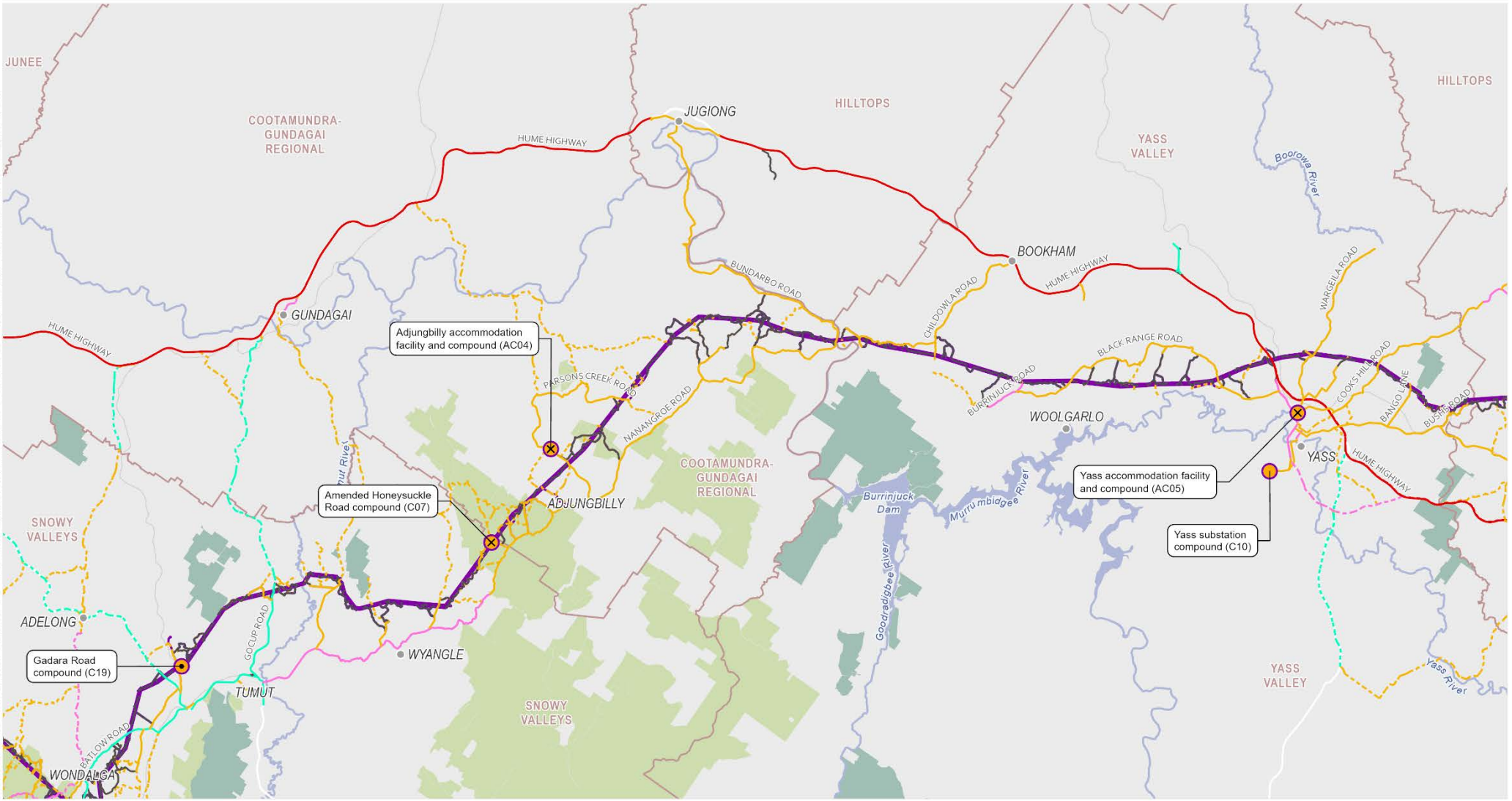
Projection: GDA 1994 MGA Zone 55

HumeLink

FIGURE 4-9a: Indicative and alternative construction access roads within the project LGAs



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Project footprint
Local Government Area
National park and reserve
State forest
Waterbody
Waterway
Major road
Railway
Construction ancillary facility
Potential helicopter landing pad location
Potential helicopter landing pad and concrete batch plant location

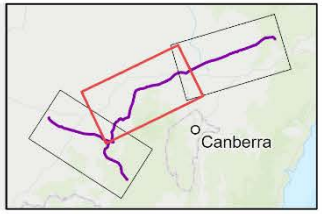
Roads providing indicative access

Local road
National road

Regional road
State road
Un-named local road / track

Roads providing alternative access
(if required, subject to access route selection process)

Local road - named / un-named / track
National road
Regional road
State road



Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

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Projection: GDA 1994 MGA Zone 55

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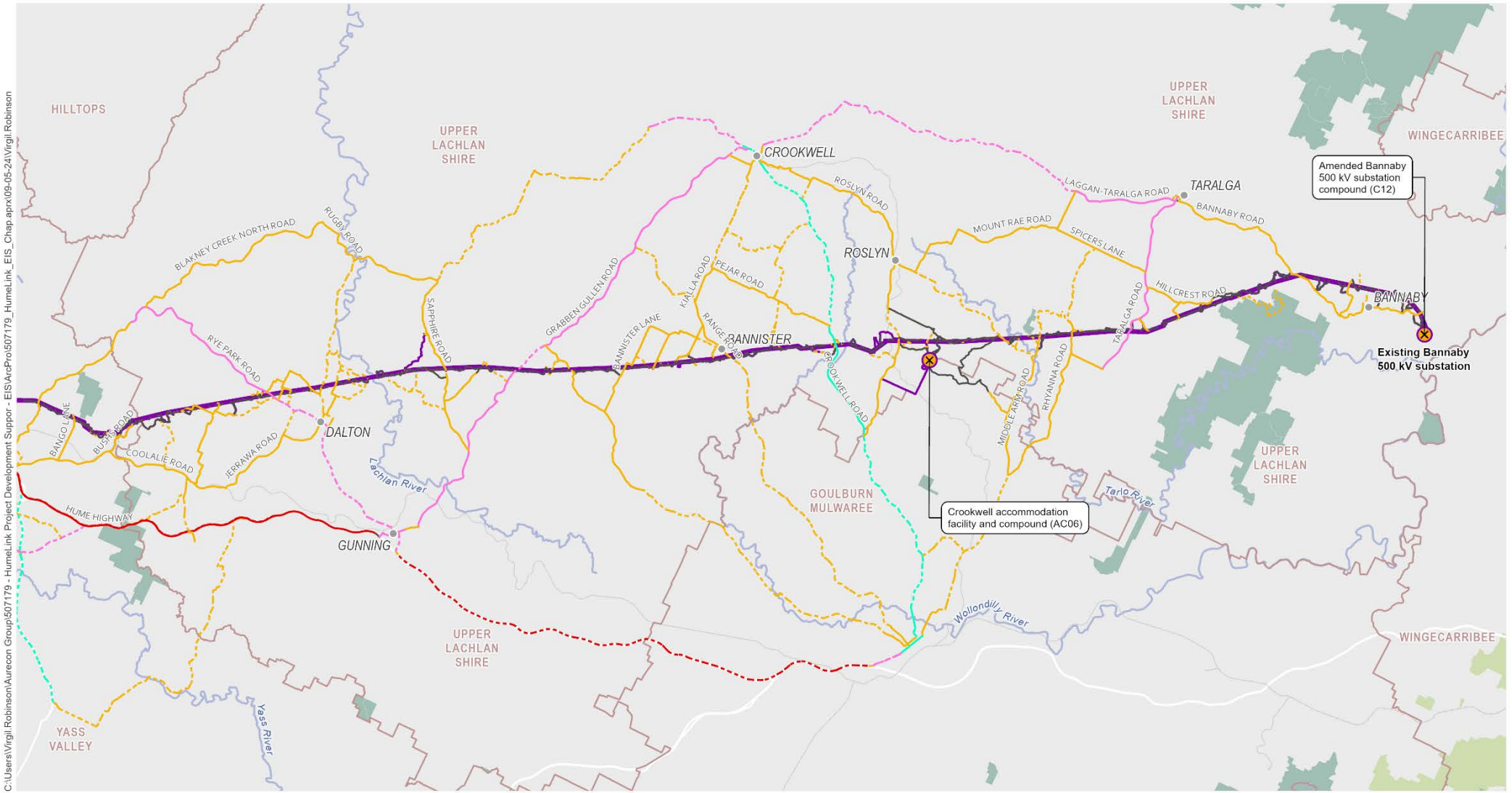
FIGURE 4-9b: Indicative and alternative construction access roads within the project LGAs



Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

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Projection: GDA 1994 MGA Zone 55

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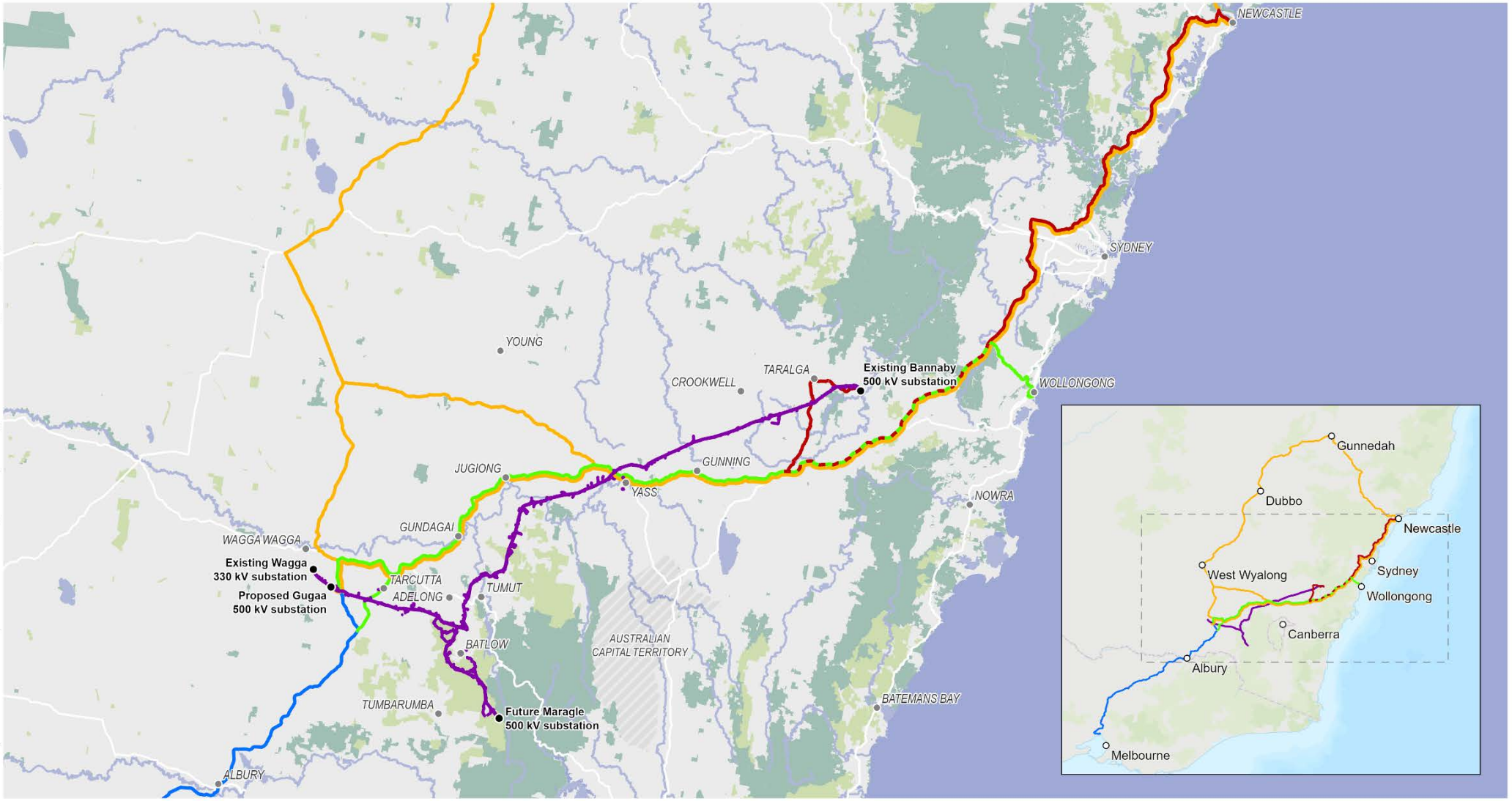
FIGURE 4-9c: Indicative and alternative construction access roads within the project LGAs

4.7.2.1. Oversized and overmass vehicle routes

As stated in Section 4.7.1, OSOM vehicle movements would be required to transport transformers and other large substation infrastructure and equipment to the proposed Gugaa 500 kV substation and Bannaby 500 kV substation. A ~~**preliminary**~~ route study has been carried out based on transporting the loads from **the** Port of Newcastle**, Port Kembla and Port of Melbourne** to each substation. The ~~**proposed**~~ **recommended** OSOM routes are provided in Table 4-26 and ~~**on**~~ **shown in** Figure 4-10.

Table 4-26 Proposed OSOM routes

OSOM route	Transport summary
Port of Newcastle to the proposed Gugaa 500 kV substation	Selwyn Street, George Street, Industrial Drive, Maitland Road, Newcastle Inner City Bypass, Newcastle Road, Thomas Street, Newcastle Link Road, M1 Motorway, Pennant Hills Road, M2 Motorway, M7 Motorway, M5 Motorway, Hume Highway, Sturt Highway, Elizabeth Avenue, Inglewood Road, Mitchell Road, Gregadoo East Road, Livingstone Gully Road. An alternative to above route includes using Tumbarumba Road instead of Elizabeth Avenue, Inglewood Road and Mitchell Road to reach Gregadoo East Road. **Alternative route:** **Quayside Cl, Selwyn St, George St, Industrial Dr, Pacific Hwy, Maitland Rd, New England Hwy, John Renshaw Dr, Hunter Expy, New England Hwy, Bell St, Victoria St, Market St, Bridge St, New England Hwy, Kamilaroi Hwy, Lennox St, Kamilaroi Hwy, Oxley Highway, Kamilaroi Hwy, Conadilly St, Warrabungle St, Oxley Highway, Newell Hwy, Thomas St, Moulden St, Back Trundle Rd, Ross Rd, Henry Parkes Way, Westime Rd, Hartigan Ave, Newell Hwy, Goldfields Way, Merino Rd, Byrnes Rd, Eunony Bridge Rd, Sturt Hwy, Tumburumba Rd, Gregadoo E Road, Livingstone Gully Road.**
Port of Newcastle to Bannaby 500 kV substation	Selwyn Street, George Street, Industrial Drive, Maitland Road, Maitland Road, Newcastle Inner City Bypass, Newcastle Road, Thomas Street, Newcastle Link Road, M1 Motorway, Pennant Hills Road, M2 Motorway, M7 Motorway, M5 Motorway, Hume Highway, Hume Street, Garroorigang Road, Sloane Street, Grafton Street, Reynolds Street, Union Street, Wilmot Street, Chantry Street, Tarlo Street, Taralga Road, Orchard Street, Bunnaby Street, Macarthur Street, Walsh Street, Bannaby Road, Hanworth Road. **Alternative route:** **Quayside Cl, Selwyn St, George St, Industrial Dr, Pacific Hwy, Maitland Rd, New England Hwy, John Renshaw Dr, Hunter Expy, New England Hwy, Bell St, Victoria St, Market St, Bridge St, New England Hwy, Kamilaroi Hwy, Lennox St, Kamilaroi Hwy, Oxley Highway, Kamilaroi Hwy, Conadilly St, Warrabungle St, Oxley Highway, Newell Hwy, Thomas St, Moulden St, Back Trundle Rd, Ross Rd, Henry Parkes Way, Westime Rd, Hartigan Ave, Newell Hwy, Goldfields Way, Victoria Street, Burley Griffin Way, Hume Motorway, Hume St, Cowper St, Clinton St, Sloane St, Grafton St, Reynold St, Union St, Chanty St, Taralga Road, Bannaby Road.**
Port Kembla to the proposed Gugaa 500 kV substation	**Tom Thumb Road, Springhill Road, Masters Road, Princes Motorway, Picton Road, Hume Motorway, Tumbarumba Road, Gregadoo E Road, Livingstone Gully Road.**
Port of Melbourne to the proposed Gugaa 500 kV substation	**Appleton Dock Road, Docklands Highway, Moreland St, Docklands Highway, Roberts Street, Somerville Road, Fairbairn Road, Boundary Road, Western Ring Road, Hume Freeway, Tumbarumba Road, Gregadoo E Road, Livingstone Gully Road.**



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Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

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Projection: GDA 1994 MGA Zone 55

HumeLink

FIGURE 4-10: Indicative haulage routes for OSOM deliveries to the project footprint

As discussed in Section 4.2.1, it is anticipated that the intersection of Gregadoo East Road and Livingstone Gully Road would be widened and modified to facilitate OSOM vehicle movements to the proposed Gugaa 500 kV substation. In addition, OSOM vehicle movements to the Bannaby 500 kV substation, based on the proposed route included in Table 4-26, could potentially require the temporary removal of several road signs and an isolated tree on Bannaby Road.

The final routes for the OSOM vehicle movements would be determined by the construction contractors during **further** detailed design and ~~**further**~~ construction planning in accordance with the relevant NSW heavy vehicle haulage guidelines and in consultation with the relevant road authority.

4.7.3. Construction worker parking

Construction worker parking would primarily be provided within the construction compounds and the worker accommodation ~~**facility**~~ **facilities** as described in Section 4.3.

The number of construction workers requiring parking would vary over the duration of the construction program. Table 4-27 provides indicative construction worker parking requirements for the construction compounds ~~**associated with each substation site**~~ and the worker accommodation ~~**facility**~~ **facilities**.

Table 4-27 Indicative construction worker parking requirements

Construction compound	Indicative number of light vehicles requiring parking	Indicative number of heavy vehicles requiring parking
Wagga 330 kV substation (C01)	17	3
Maragle 500 kV substation compound (C05)	~~**28**~~ **10**	~~**4**~~ **50**
Amended Gregadoo Road compound (C06)	~~**34**~~ **10**	~~**4**~~ **50**
Amended Honeysuckle Road compound (C07)	**105**	**15**
Yass substation compound (C10)	**4**	**6**
Amended Bannaby 500 kV substation compound (C12)	~~**20**~~ **52**	~~**3**~~ **10**
Amended Memorial Avenue compound (C14)	**10**	**5**
~~**Tumbarumba accommodation facility (AC1)**~~	~~**100 (and 12 mini-buses)**~~	~~**12**~~
Ardrossan Headquarters Road compound (C17)	**10**	**50**
Snubba Road compound (C18)	**10**	**50**
Gadara Road compound (C19)	**20**	**10**
Ellerslie Road compound (C21)	**10**	**50**
Tarcutta accommodation facility and compound (AC03)	**200**	**50 (and 10 mini-buses)**
Adjungbilly accommodation facility and compound (AC04)	**125**	**35**
Yass accommodation facility and compound (AC05)	**130**	**35**
Crookwell accommodation facility and compound (AC06)	**125**	**35**
Green Hills accommodation facility and compound (AC07)	**200**	**50 (and 10 mini-buses)**

Given the transient nature of the transmission line work, and potentially long distances, it is expected that workers would be transported by bus to site from nearby towns and the **worker accommodation facilities** ~~**Tumbarumba accommodation facility (AC1)**~~. Where other vehicles are used to access these sites, parking spaces for construction personnel would generally be within 30 metres of each transmission line structure.

4.8. Indicative construction program

The HumeLink EIS has been prepared on the basis of a concept design with the assumption that construction would commence in 2024 and be fully operational by late 2026. It is anticipated that overall construction would take about 2.5 years, subject to weather conditions. The indicative construction program is shown in Figure 4-11. The construction compounds and worker accommodation ~~**facility**~~ **facilities** ~~**at Tumbarumba**~~ would be in place throughout the entire **main** construction period.

However, the Australian Energy Market Operator's (AEMO) *2022 Integrated System Plan* (ISP) identifies a target date for completion by mid-2026, ahead of the previously projected date of late-2026. Transgrid recognises the benefits of the transition to renewable energy for energy consumers and is committed to working with our delivery partners, landowners and key stakeholders to meet this timeline.

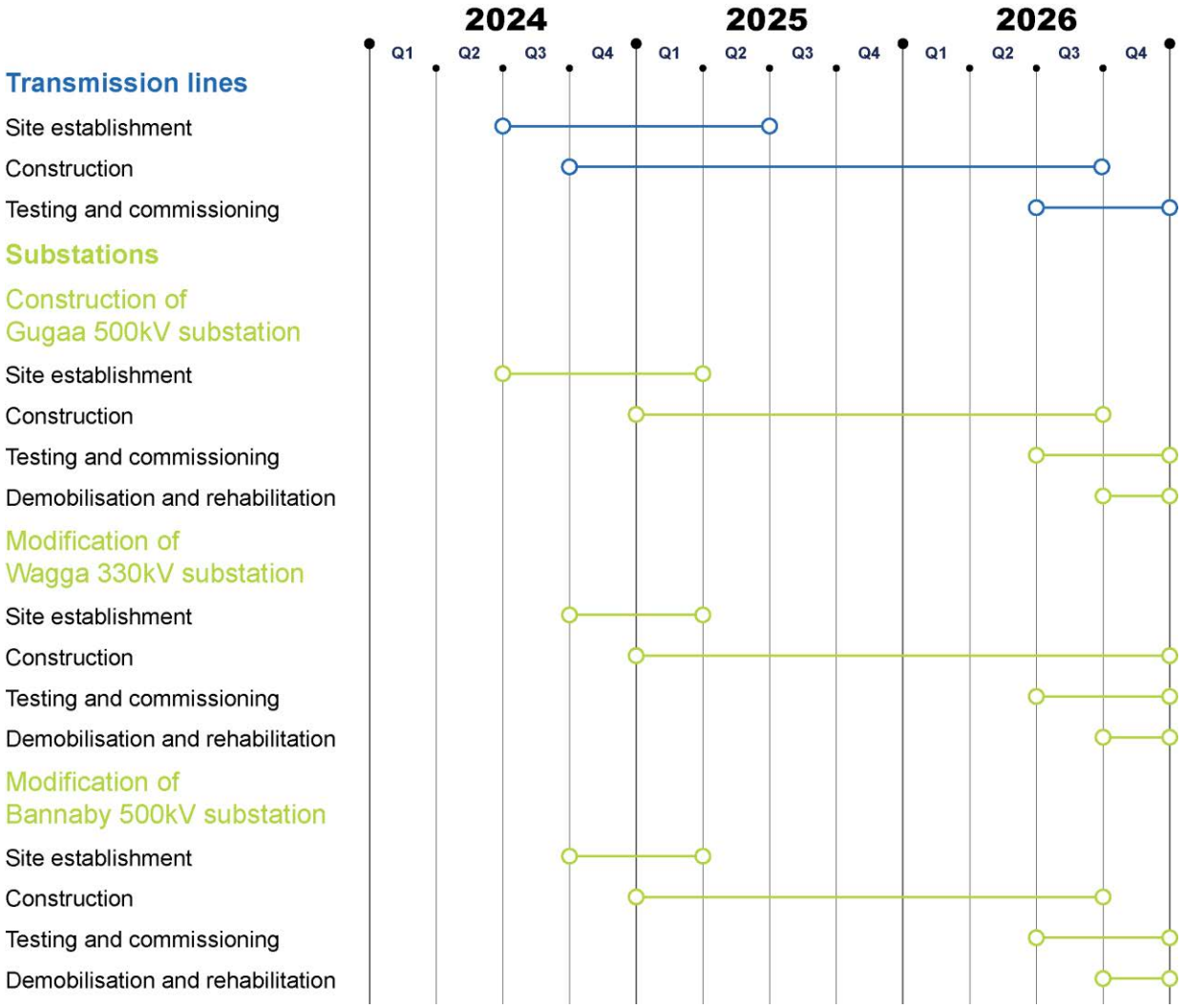

Figure 4-11 HumeLink indicative construction program

Construction at each transmission line structure would be transient and intermittent and construction activities would not occur at each structure location for the full duration for each phase of construction. However, following construction of the foundation, each transmission line structure would typically take one to three weeks to erect. Figure 4-12 presents an indicative duration of construction activities associated with an individual transmission line structure.

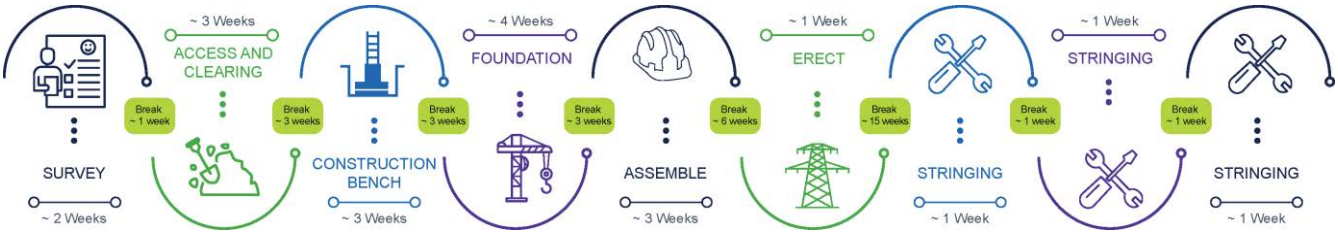

Figure 4-12 Indicative duration and sequence of construction activities for transmission line structures

The duration of any construction activity associated with an individual transmission line structure, and inactive/respite periods, may vary for a number of reasons including (but not limited to):

- multiple work fronts
- resource and engineering constraints
- environmental constraints
- work sequencing and location.

There would also be multiple work fronts. For example, foundation works, or structure erection, would occur in several locations along the transmission line route at the same time.

~~**Timeframes for some activities, such as the telecommunications hut construction, have only been shown as indicative in Figure 4-11 and would be confirmed by the construction contractors during detailed design and further construction planning. Site establishment, construction and testing, and commissioning of the telecommunications hut could occur at any time during the construction timeframe for transmission lines.**~~