



# VNI West Area of Interest environmental constraints

**Summary Report**  
June 2023

# Introduction

Transmission Company Victoria (TCV) engaged AECOM Australia Pty Ltd (AECOM) to undertake an assessment of transmission corridor options for the Victorian section of VNI West. The proposed new high capacity 500 kV double-circuit overhead transmission line is proposed to run from Dinawan terminal station in the Riverina region of New South Wales to Bulgana in Victoria, where it will connect to Western Renewables Link (WRL) via a new terminal station near Kerang.

A multi-criteria assessment (MCA) was previously carried out to identify constraints and opportunities and, through a methodical analysis, ranked options against project-specific objectives. The objectives were centred around critical social, environmental, cultural and engineering factors, in addition to technical and cost-benefit considerations. The results of the MCA, market modelling and information received through the Regulatory Investment Test for Transmission (RIT-T) process since 2019 informed the final option recommendation, which outperformed other options in key land, environment and planning assessment criteria.

AEMO Victorian Planning (AVP) and Transgrid have recently released the [Project Assessment Conclusions Report \(PACR\)](#) which identifies the preferred area of interest for VNI West, supported by orders made by the Victorian Minister for Energy and Resources under the National Electricity (Victoria) Act 2005 (NEVA). This process establishes the business case for the project and confirms that the investment, ultimately paid for by consumers, will deliver sizable economic benefits. The area of interest is shown in **Figure 1**.

Transmission Company Victoria (TCV) has been established by AVP to progress VNI West. AECOM was further engaged by TCV to conduct a desktop assessment of the environmental constraints within the area of interest, and a high-level evaluation of engineering and technical feasibility.

Desktop assessments of the area of interest were conducted by seventeen specialist environmental consultants, which resulted in identification of constraints including ecology, cultural heritage, landscape and visual amenity, areas subject to inundation, agricultural activities, proximity to settlements and the like. Information was also gathered by TCV through community and stakeholder discussions, including with Traditional Owners, and shared with AECOM as input to the assessment process.

The environmental and technical constraints identified within the area of interest are discussed in this report.

The next phase of the project will focus on the communities within the area of interest and working with the important stakeholders including landholders and Traditional Owners to continue to refine the route.

Based on the information received from community consultation, the environmental constraints identified, and an assessment of engineering and technical issues, a potential corridor within the area of interest will be identified where it appears feasible to locate transmission infrastructure and minimise environmental and social impacts. This corridor, of approximately 500 metres to 1 kilometre will be the subject of further environmental and technical evaluation and engagement with landholders to determine an indicative route alignment.

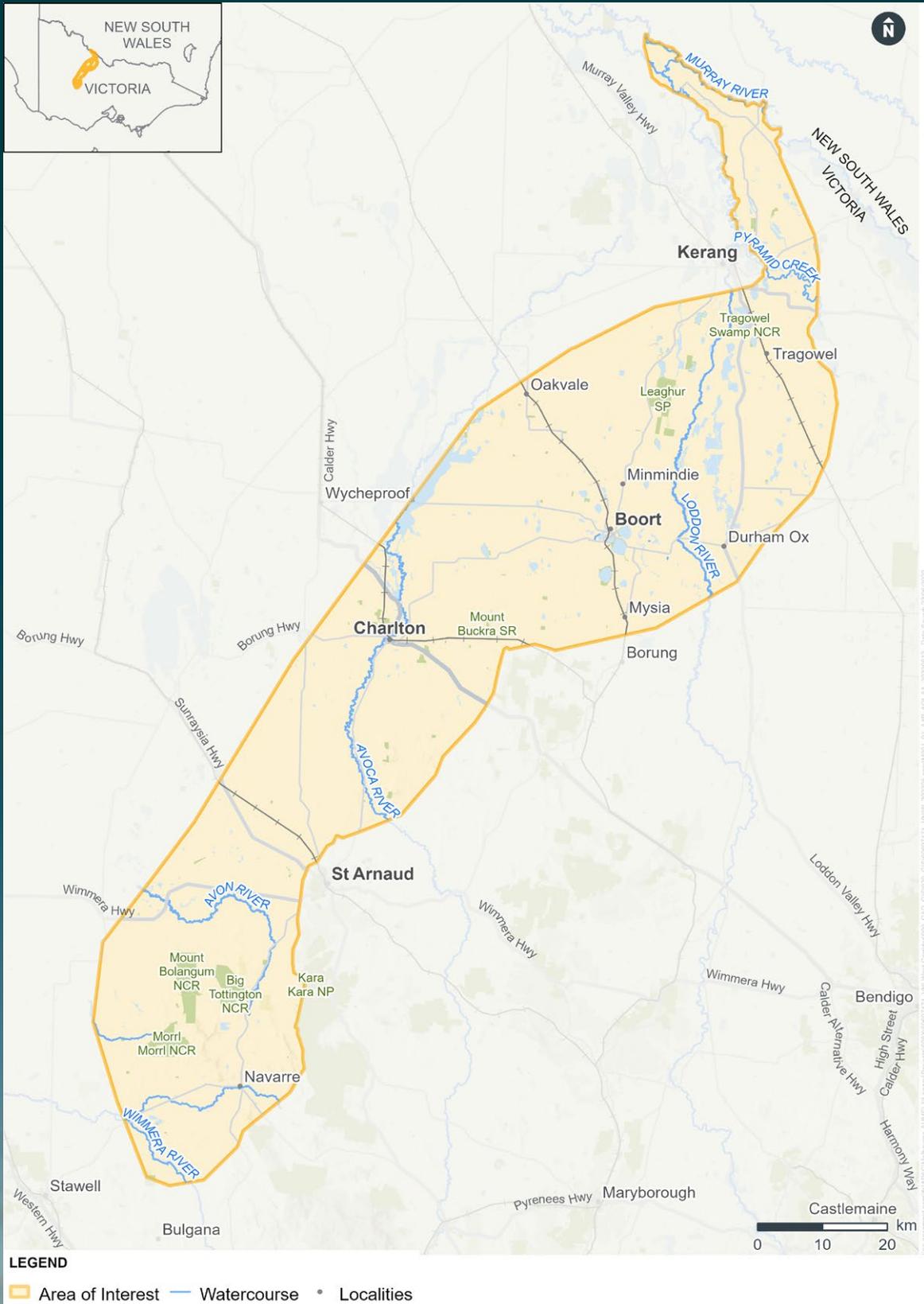


Figure 1: Area of Interest for VNI West

# Constraints identification and analysis

With the final report in the VNI West regulatory process published (that is, the PACR) and a preferred area of interest identified, the recent focus has been to identify environmental and technical constraints at a more granular level within the area of interest to further inform selection of a transmission corridor.

The assessment outlined in this report investigated environmental and technical constraints which included:

	Places of Aboriginal cultural heritage significance		Proximity to dwellings, schools and hospitals		Overall length required for the transmission route and number of landowners impacted
	Biodiversity and threatened habitat, including conservation and flora reserves		Incompatible land uses such as transport networks, airfields and airports		Reducing the number of transmission line angle deviations where possible
	Existing and future land use including agriculture and infrastructure requirements		Geography and topography of the land, including terrain and waterbodies		Accessibility for renewable energy developers

Data and information was gathered from publicly available sources, private data, community engagement, including an interactive map where stakeholders could pinpoint issues they wished to raise, stakeholder discussions, including with Traditional Owners, and information gathered from other projects. Specialists in the relevant environmental and technical fields made an initial assessment of the level of constraint which each assessment factor represented for the location of transmission infrastructure. For example, National Parks and populated areas such as townships were considered to be a very high constraint and areas to be avoided. Conversely, areas remote from townships, houses, parks and reserves, significant vegetation and the like were considered to be less constrained.

Potential constraints within the area of interest were identified through collaborative workshops involving the engineering design team and planning and environment specialists and advisors.

In further refining the area of interest to identify a transmission corridor, it will not be possible to avoid all areas of constraint. For example, the northern section of the area of interest has extensive areas which are flood prone and will need to be traversed by transmission

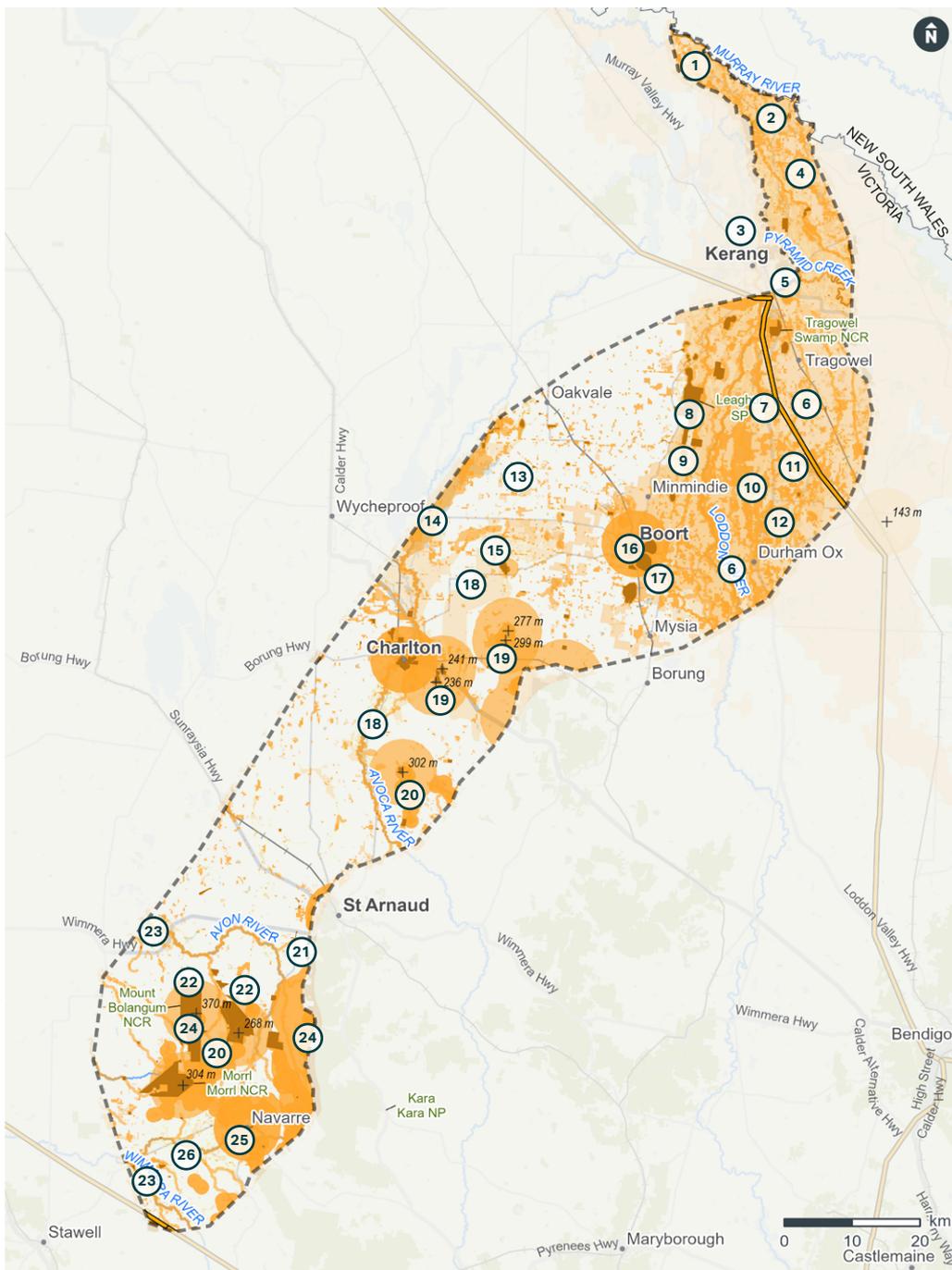
infrastructure which may necessitate different engineering solutions to less constrained areas but is still technically feasible.

Once a more refined transmission corridor is identified, potential constraints will be assessed in considerably more detail with a view to avoiding as many constrained areas as possible to minimise potential impacts.

Environmental constraints which have spatial elements and could be mapped were included in a Geographic Information System (GIS). **Figure 2** shows the location of key environmental and technical constraints identified within the area of interest.

The main environmental and technical constraints identified within the area of interest are discussed below in the following sections:

- Aboriginal cultural heritage
- Agriculture
- Ecological Values
- Flooding
- Land use and infrastructure
- Engineering.



**LEGEND**

- Area of Interest
- High Points
- Power Transmission
- Localities

- 1 Aboriginal Cultural Heritage:** Registered areas of Aboriginal cultural heritage sensitivity adjacent to the Murray River and at Pentall Island
- 2 Land Use:** Murrabit town centre
- 3 Ecology:** RAMSAR listed Kerang Wetlands
- 4 Agriculture:** Goulburn Murray Irrigation District stretches from the NSW border to Boort, supporting hundreds of farms in the area
- 5 Land Use:** OLS protected area surrounding Kerang Airport
- 6 Agriculture:** This broader area from Boort to the NSW border intersects intensive agriculture uses (including horticulture, irrigated pastures and irrigated cropping)
- 7 Flooding:** Extensive area of floodplains across the Loddon River catchment area
- 8 Ecology:** Black Box wetland and woodland habitat
- 9 Land Use:** Cluster of private aerodromes
- 10 Ecology:** Network of ecologically sensitive wetlands along Bannagher Creek
- 11 Ecology:** Scattered areas of high Strategic Biodiversity Value present in this broader area
- 12 Engineering:** Steep topography in this area is incompatible with transmission line infrastructure
- 13 Ecology:** Stream-side reserves and roadside reserves scattered throughout the AOI support remnant native vegetation
- 14 Ecology:** Ecologically sensitive wetlands
- 15 Aboriginal Cultural Heritage:** Sensitivity encompassing Lake Marmal
- 16 Land Use:** Boort town centre
- 17 Aboriginal Cultural Heritage:** Significant levels of cultural heritage sensitivity encompassing Boort and surrounding areas
- 18 Flooding:** Extensive Floodway Overlay and Land Subject to Inundation Overlay areas
- 19 Visual Impact:** High points at Mt Buckra Scenic Reserve, Charlton East Bushland Reserve and in Wychitella Nature Conservation Reserve
- 20 Engineering:** Steep topography in this area is incompatible with transmission line infrastructure
- 21 Land Use:** OLS protected area surrounding St Arnaud Airport
- 22 Ecology:** Parks and reserves with high Strategic Biodiversity Values, home to native flora and fauna
- 23 Aboriginal Cultural Heritage:** Cultural heritage sensitivity along these waterways
- 24 Visual Impact:** Scenic high points present within parks and reserves, including Karra Karra National Park
- 25 Land Use:** Navarre Airport and Navarre Township, both have associated planning constraints and can not be intersected
- 26 Flooding:** Network of waterways with adjacent flood-prone areas

**Figure 2:** Overview of key constraints within the area of interest

# Aboriginal Cultural Heritage

To make a preliminary assessment of Aboriginal cultural heritage constraints within the area of interest, a search was undertaken of databases which hold information about known Aboriginal cultural heritage places within Victoria. Registered cultural places are locations where physical cultural material has been identified and recorded in the past. These places may consist of singular artefacts or sites; or may contain multiple individual components within a single place. There are a significant number of cultural heritage places recorded throughout the entire area of interest which will need to be further considered as the corridor refinement process progresses. In addition, areas of intangible cultural heritage as identified by Traditional Owners will need to be taken into account.

Publicly available data indicates that the area of interest contains areas of cultural heritage sensitivity shown in **Figure 3**. Areas of cultural heritage sensitivity are defined in the Aboriginal Heritage Regulations 2018 and relate to landforms and soil types where Aboriginal places are more likely to be located. These include land within at least 200 metres of named waterways and land within 50 metres of registered Aboriginal cultural heritage places<sup>1</sup>.

National Parks and waterways are generally areas of high cultural and archaeological sensitivity. Some of these areas include:

- Area surrounding Joel Joel Nature Conservation Reserve and Greens Creek
- North of Karra Karra National Park
- The Wimmera River
- North and south of Charlton
- Around and adjacent to Boort
- Between Boort and Lark Marmal (West of Boort)
- West of Oakvale
- Along the Avoca River, west of Teddywaddy and around Wooroonook Lakes

<sup>1</sup> 200 metres is a distance specified in regulation; however it is recognised that a larger radius of up to 500 metres is likely to hold cultural significance

## Aboriginal cultural heritage places that are likely to be encountered within the area of interest include:

**Scarred trees** – A scarred tree or a culturally modified tree, is one that has been permanently marked by First Peoples' communities. The bark can be used to make tools or equipment or to mark boundaries or important events in the life of the community.

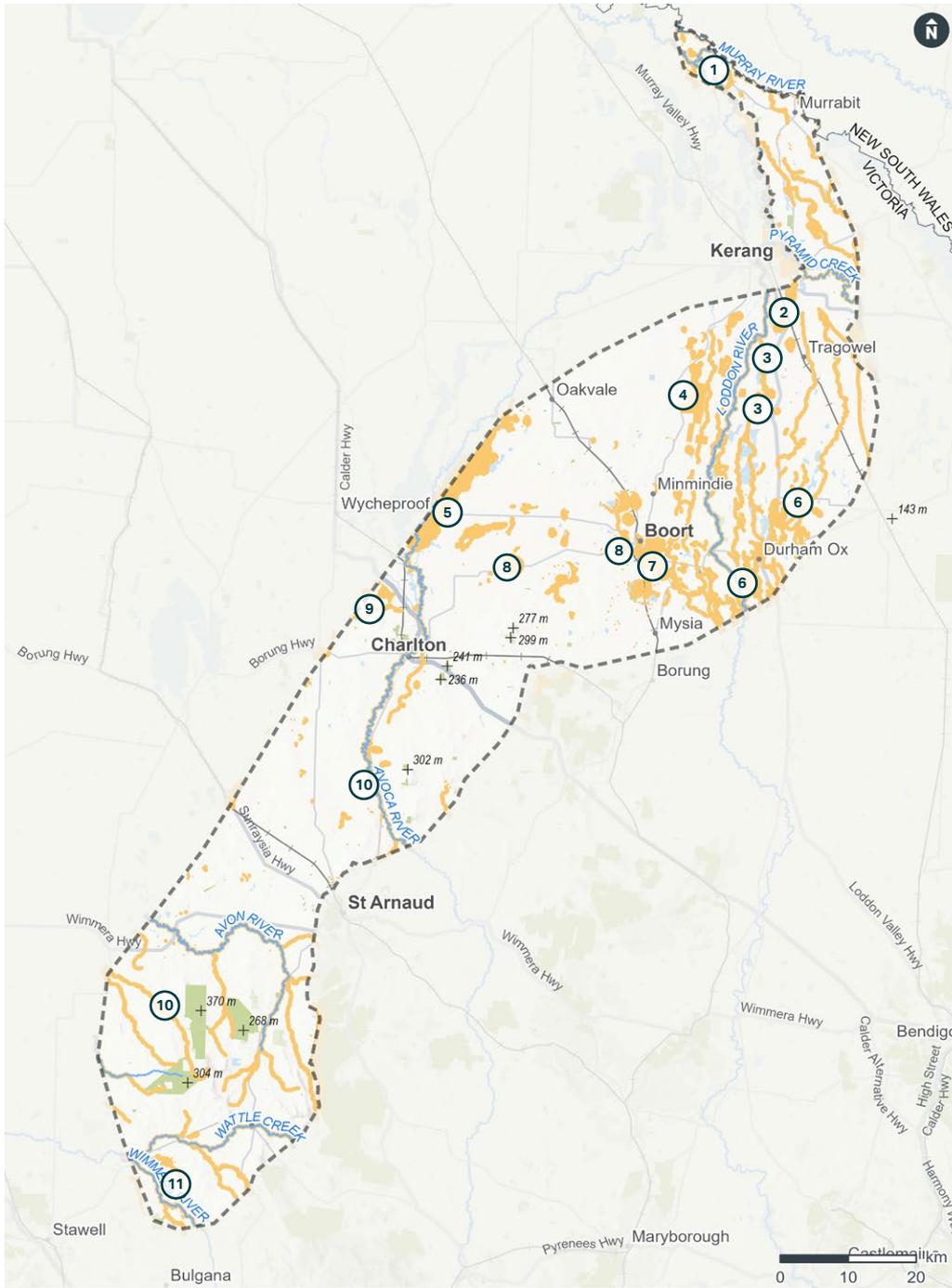
**Artefact scatter** – Artefact scatters are the remains of past Aboriginal activities. These scatters usually contain stone artefacts but can contain other materials.

**Historical reference** – A location important because of its associations with and cultural significance to Aboriginal people.

- Loddon River
- Northwest of Benjeroop
- Around Tragowel Swamp and adjacent waterways
- The Murray River
- National Parks and Nature Conservation Reserves.

Areas of cultural sensitivity and known Aboriginal cultural heritage places will be avoided where possible when the area of interest is refined. On-Country days and cultural heritage surveys will be undertaken with the relevant Traditional Owners for each Traditional Owner area as part of the alignment refinement process to avoid or minimise project impacts.

There is ongoing engagement with Traditional Owners in the region to identify cultural values (as opposed to physical elements of cultural heritage) which will provide for a greater appreciation of Aboriginal cultural values such as knowledge sharing and oral histories. Areas with high cultural significance should be avoided when locating transmission infrastructure.



- 1 Registered areas of Aboriginal cultural heritage sensitivity adjacent to the Murray River and at Pentland Island
- 2 Registered areas of Aboriginal cultural heritage sensitivity at Tragowel Swamp and adjacent waterways
- 3 Cultural heritage sensitivity associated with existing and historic waterways along the lower Loddon River catchment
- 4 Registered areas of Aboriginal cultural heritage sensitivity at Leaghur State Park
- 5 Cultural heritage sensitivity along the upper Avoca River
- 6 Cultural heritage sensitivity associated with existing and historic waterways along the lower Loddon River catchment
- 7 Registered areas of Aboriginal cultural heritage sensitivity encompassing Lake Lyndger, Lake Boort and Woolshed Swamp Wildlife Reserve
- 8 Registered areas of Aboriginal cultural heritage sensitivity surrounding Joel Joel and along the Wimmera River
- 9 Scattered areas of cultural heritage sensitivity West of Teddywaddy
- 10 Cultural heritage locations are more likely to be found within 200m of a waterway
- 11 Registered areas of sensitive cultural heritage locations surrounding Joel Joel and along the Wimmera River

**LEGEND**

- ▭ Area of Interest
- Localities
- Cultural Heritage Sensitivity
- + High Points

**Figure 3:** Preliminary identification of Aboriginal cultural heritage within the area of interest

# Agriculture

**Figure 4** shows the agricultural land uses and irrigation districts within the area of interest.

It is recognised that the location of transmission infrastructure in agricultural areas will have some level of impact irrespective of the farming type.

The northern section of the area of interest enters the Goulburn Murray Irrigation District (GMID) with the potential for impacting more intensive irrigated agriculture when compared to the agricultural production systems generally utilised throughout the rest of the area of interest.

The presence of transmission corridor infrastructure has the potential to interfere with the efficient delivery of water to irrigation bays and impact areas with overhead spray irrigation infrastructure (centre pivots and lateral move irrigators).

While it will not be possible to avoid the entire irrigation district, further detailed investigations will be completed to minimise the impact as far as practicable. Areas with existing overhead spray irrigation infrastructure (centre pivots and lateral move irrigators) will be avoided where possible or other design mitigation measures investigated.

The area of interest is also characterised by a variety of intensive agricultural activities including horticulture, feedlots, piggeries, poultry farms and the like. Due to the intensity of agricultural activity and the extent of associated infrastructure which often characterises these operations, it is recommended that locating transmission infrastructure on these properties should be avoided.

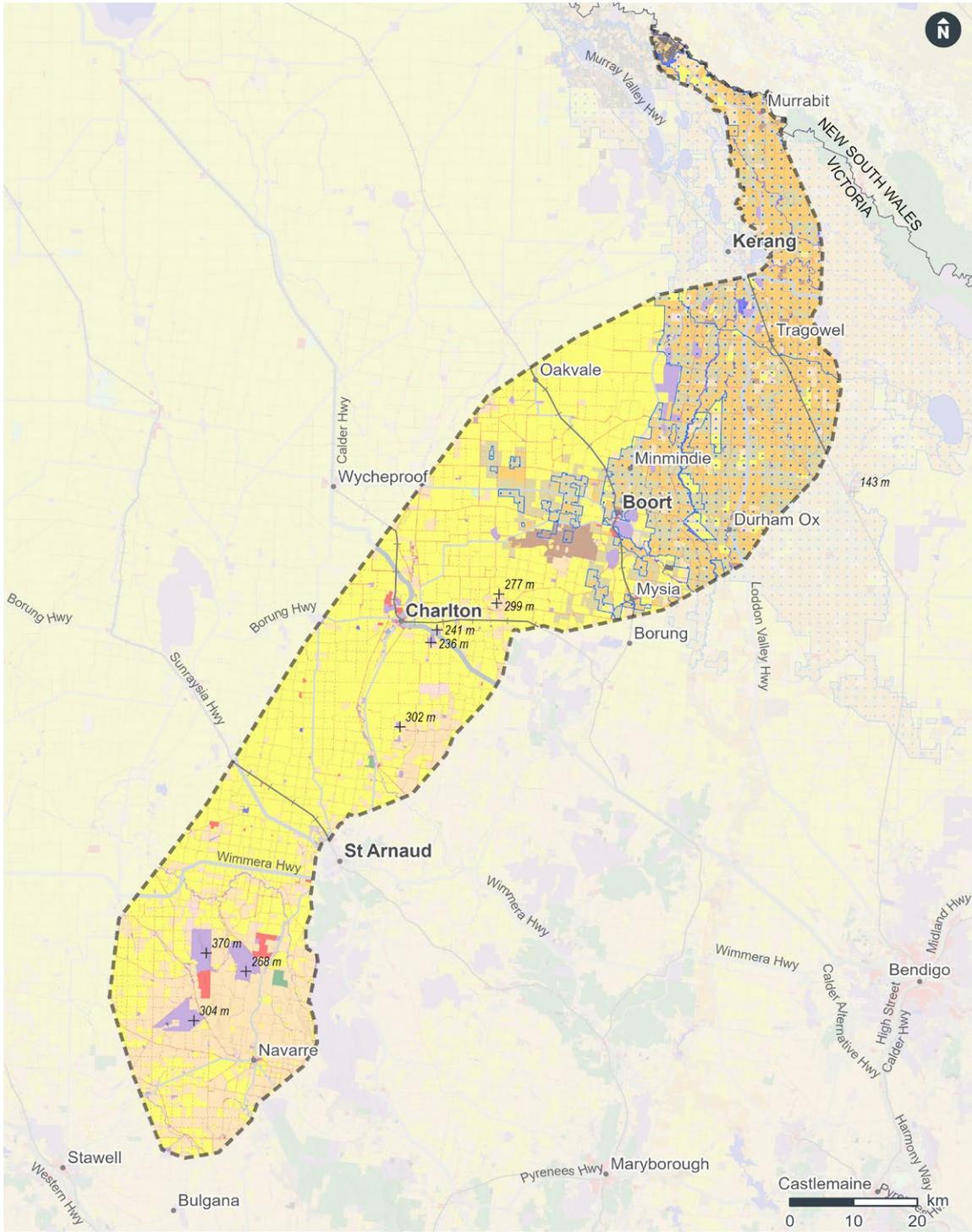
The mid and southern sections of the area of interest are dominated by dryland cropping, which gives way to grazing (mostly sheep) in the south of the area. It is generally considered that location of transmission infrastructure in dryland cropping and grazing areas is less constrained than in areas of intensive agriculture including irrigated farms. While this is sound from a technical perspective there may also be impacts on cropping and grazing activities such as restrictions on equipment use under powerlines, potential impacts on the use of drones and crop dusters.

## What is the Goulburn Murray Irrigation District?

The Goulburn-Murray Irrigation District (GMID) system is the largest irrigation system in Victoria. It covers 9,950 square kilometres and accounts for more than 70 per cent of water stored in Victoria and almost 90 per cent of water used in irrigation across the State.

Farmers can run livestock, grow cereal and many other food crops within transmission line easements. As a general rule, equipment up to approximately 5 metres in height can be used unrestricted under the transmission lines and up to approximately 8 metres in height based on a safety case determined with the transmission operator.

Whilst impacts to pasture and cropping land (as opposed to irrigated farming and other intensive agriculture) may be considered less of a constraint overall, careful consideration will need to be given to the specific locations of transmission infrastructure within the entire area of interest to minimise the potential for impacts to farming and agriculture in the region. During future detailed discussions, working directly with landholders on "micro-siting" required infrastructure will be important to minimise impacts on the operation of individual properties and farms.



**LEGEND**

Area of Interest	Grazing modified pastures	Irrigated horticulture
Irrigation district	Plantation forests (commercial and other)	Urban intensive uses
Nature conservation	Dryland cropping	Intensive horticulture and animal production
Managed resource protection	Dryland horticulture	Rural residential and farm infrastructure
Other minimal use	Land in transition	Mining and waste
Grazing native vegetation	Irrigated pastures	Water
Production native forests	Irrigated cropping	

**Figure 4:** Agricultural land uses within the area of interest

# Ecological Values

**Figure 5** shows the Strategic Biodiversity Values located within the area of interest. Areas of high Strategic Biodiversity Value are scattered throughout the entire area of interest. There are large continuous areas of high Strategic Biodiversity Value located:

- East and west of the Loddon River
- Around the Kerang Wetlands Ramsar Site up to the Murray River.

There is one National Park and several Nature Conservation Reserves located within (or directly adjacent to) the area of interest including:

- Kara Kara National Park
- Big Tottington Nature Conservation Reserve
- Morri Morri Nature Conservation Reserve
- Mount Bolangum Nature Conservation Reserve
- Mt Buckra Scenic Reserve
- Lake Marmal Lake Reserve
- Lake Meran Wildlife Reserve
- Woolshed Swamp Wildlife Reserve
- Leaghur State Park
- Lake Murphy Wildlife Reserve
- Tragowel Swamp
- Lake Boort Wildlife Reserve
- Great Spectacle Lake Complex Wildlife Reserve.

These reserves are important from an ecological viewpoint and contain significant native vegetation and biodiversity in comparison to the surrounding pastureland and are important refuges for native wildlife.

Ecological Vegetation Classes (EVC) are the standard unit for classifying vegetation types in Victoria. Endangered EVC's are located across the entire area of interest, the most commonly occurring being Plains Woodland.

## Strategic Biodiversity Values

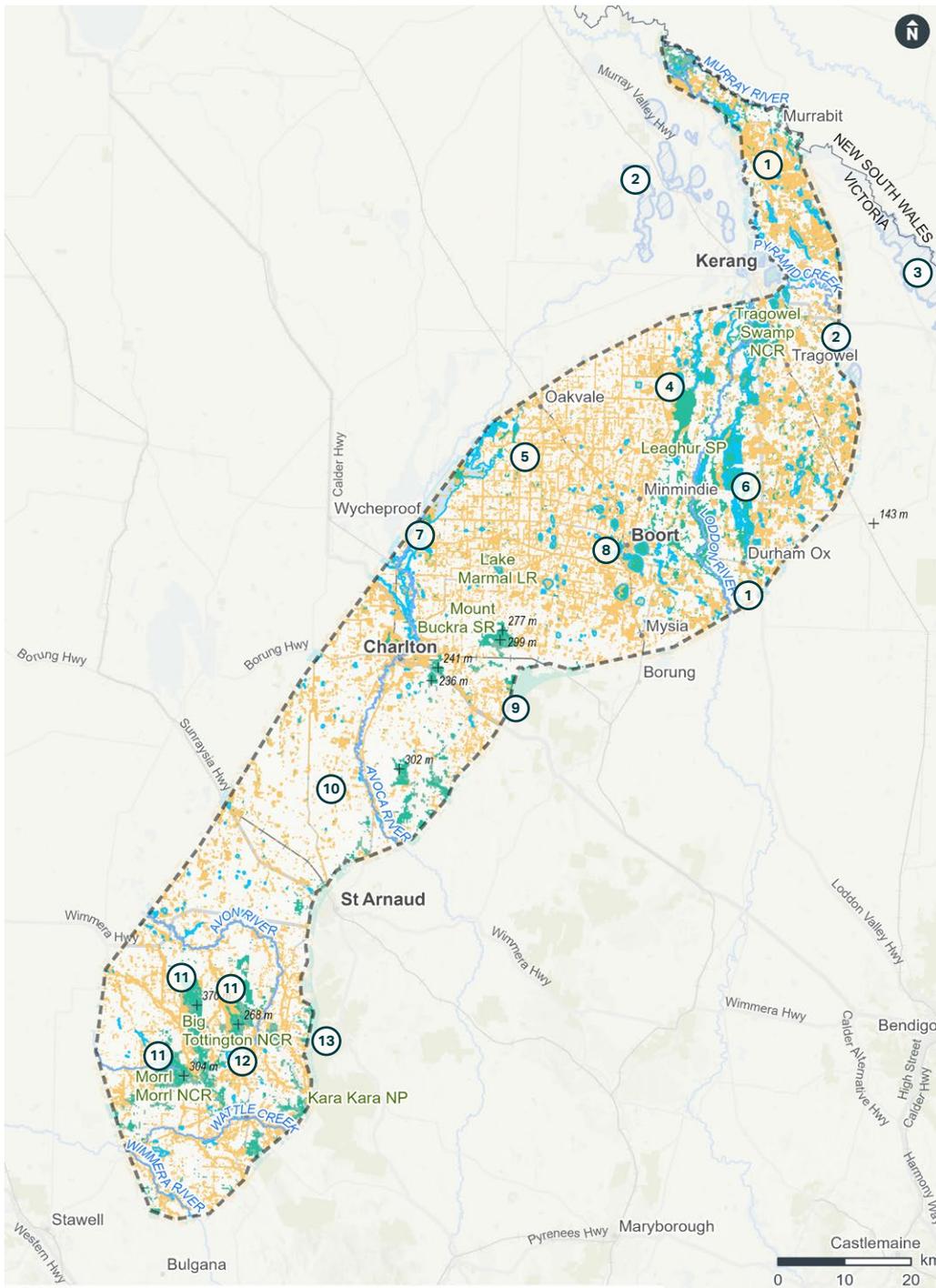
The Strategic Biodiversity Values map combines information on areas important for threatened flora and fauna, and vegetation types and condition to provide a view of relative biodiversity importance of all parts of the Victorian landscape. This can help to identify priority areas for protection.

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) is Australia's key legislation for the protection of threatened species and ecological communities. EPBC Act listed species and communities identified in the area of interest are typical within this region of Victoria and occur in generalised habitat types such as grasslands, woodlands, and aquatic environments.

The northern section of the area of interest is within proximity to the Kerang Wetlands Ramsar Site which forms a network of ponds in this area. Ramsar wetlands are wetlands of international importance listed under the Convention on Wetlands (Ramsar, Iran 1971). Whilst the area of interest does not directly impact any Ramsar sites, indirect impacts will need to be considered for listed species.

When refining the area of interest, important ecological values including those below will be avoided where possible:

- scattered trees in paddocks
- roadside vegetation
- impacts on waterways, including wetlands, and remnant vegetation located in these areas
- all Ramsar sites
- all National Parks and Nature Conservation Reserves
- areas of high Strategic Biodiversity Value.



- 1 Scattered areas of high Strategic Biodiversity Values stretch from the Murray River towards Durham Ox
- 2 RAMSAR listed Kerang Wetlands support the nesting and feeding of over 50 waterbird species
- 3 Gunbower Forest RAMSAR site
- 4 Black Box wetland and woodland habitat in Leaghur State Park
- 5 Roadside reserves in this area support remnant native vegetation
- 6 This floodplain area hosts a series of current wetlands that run along Bannagher Creek, adjacent to the Loddon River
- 7 Banguluke Wetlands, Tyrrell Creek and Lalbert Creek Floodplains carry high ecological sensitivity
- 8 Small series of scattered wetlands north-west of Boort
- 9 Wychitella Nature Conservation Reserve
- 10 Remnant native grassland is scattered throughout the broader area of interest
- 11 Morri Morri Nature Conservation Reserve, Mt Bolangum Nature Conservation Reserve and Big Tottington Nature Conservation Reserve are significant nature reserves with high Strategic Biodiversity Values
- 12 EPBC Act listed Swift Parrot habitat
- 13 Karra Karra National Park is partially intersected by the area of interest

**LEGEND**

- ☐ Area of Interest
- ☐ Endangered EVC
- + High Points
- ☐ Wetland Current
- ☐ High Strategic Biodiversity Value
- Localities
- ☐ RAMSAR wetlands
- ☐ Medium Strategic Biodiversity Value

**Figure 5:** Ecological values within the area of interest

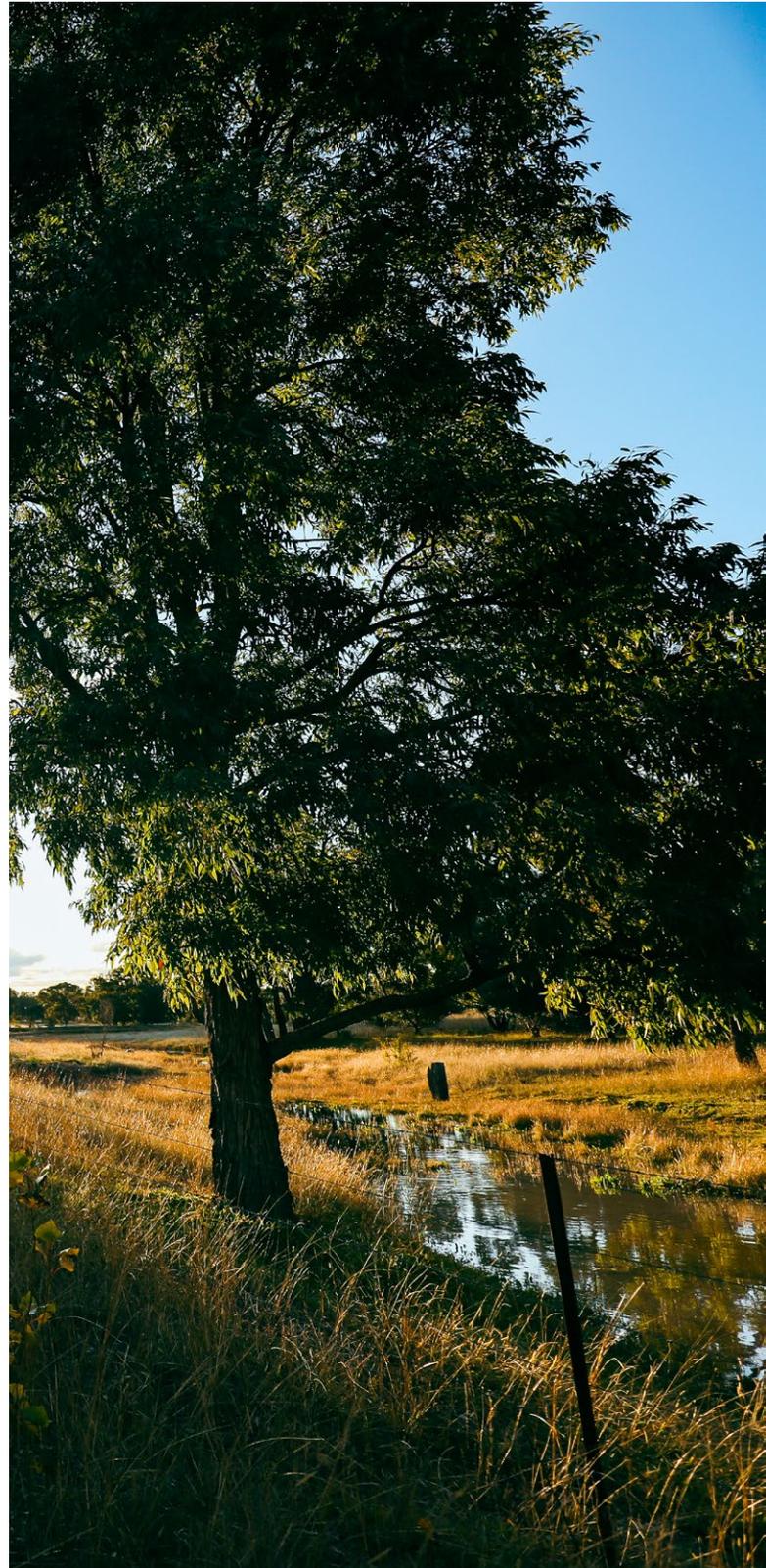
# Flooding

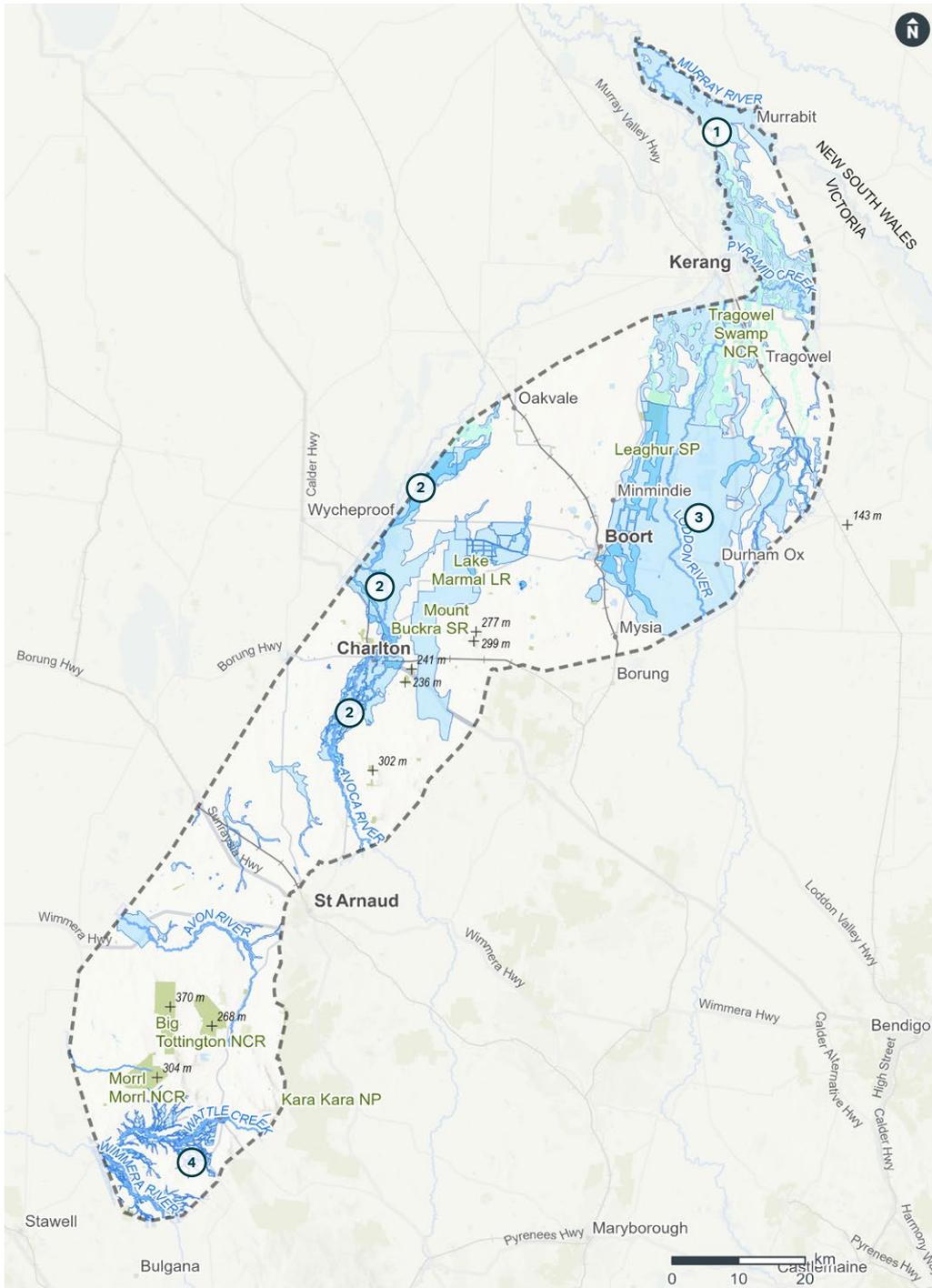
The entire area of interest is subject to periodic flooding, particularly in the northern section as indicated in **Figure 6**. Flooding is not expected to impact the viability of transmission infrastructure but may necessitate different engineering approaches where flood prone areas are unavoidable and may pose challenges due to construction accessibility difficulties.

**Figure 6** shows the following planning scheme overlays related to flooding within the area of interest:

- Land Subject to Inundation Overlay (LSIO) - These are planning scheme controls that apply to land affected by flooding associated with waterways and open drainage systems. Such areas are commonly known as floodplains.
- Floodway Overlays (FO) - These apply to land that's identified as carrying active flood flows associated with waterways and open drainage systems. This overlay is categorised by depths in excess of one metre.

The area northwest of Murrabit was subject to severe flooding in January 2011 and again in November 2022. The aftermath of the floods caused extended road closures due to remnant flood waters for several months. Flood prone land in the north of the area of interest near the Loddon River will have to be intersected to enable transmission infrastructure to reach the final Victoria to NSW crossing point when identified, and more detailed assessment will be required to identify a transmission corridor which minimises the extent of floodplain crossing.





- 1 Extended flooding event in 2011 and again in 2022, resulting in prolonged road closures
- 2 Areas adjacent to the Avoca River are at risk of flooding
- 3 Broad area at risk of extended periods or inundation and major flooding
- 4 The Wimmera River and associated streams and creeks are flood prone

**LEGEND**

- Area of Interest
- Land Subject To Inundation
- + High Points
- Floodway
- Rural Floodway
- Localities

**Figure 6:** Flood overlays within the area of interest

# Land use and infrastructure

While agriculture is the primary land use within the area of interest, there are many other uses in the area which represent constraints to the location of transmission infrastructure. **Figure 7** shows a number of the non-agricultural land uses in the area which potentially constrain the location of VNI West infrastructure. In particular, avoidance of Residential and Township zones is a high priority as well as avoiding proximity to Rural Living Zones and individual farmhouses wherever possible. Townships within the area which require substantial buffer distances include Navarre, St Arnaud, Charlton, Boort and Kerang.

Parks and reserves which have conservation, landscape and recreational values are also areas to avoid where possible. There are several significant parks and reserves in the area. In the southern area, these include Kara Kara National Park, which adjoins but is outside the area of interest, Big Tottington Nature Conservation Reserve and Morri Morri Nature Conservation Reserve.

In the central area, Mt Buckra State Park adjoins the area of interest and Lake Marmal Lake Reserve is located to the west of Boort.

The northern section of the area includes the Leaghur State Park, Great Spectacle Lake Complex Wildlife Reserves and Tragowel Swamp Nature Conservation Reserve. Parks and reserves are not only important for their ecological values but are also for landscape values and are used by people for nature-based pursuits which are generally not compatible with the presence of infrastructure. As such, locating transmission infrastructure as far as possible away from these areas is an objective.

The area of interest has areas of visual sensitivity, such as high points and parks and reserves where transmission infrastructure may be more visible than in other locations. Known high points in the area include Mt Bolangum, Yowang Hills, Mt Gowar, Mt Doboobetic, Klunders Hill and Mt Buckra. In the southern section, the areas around Kara Kara National Park and Big Tottington Nature Conservation Reserve are regarded as being visually sensitive and represent a constraint to the location of infrastructure between, and in proximity, to these parks.

In the central area, location of infrastructure in proximity to the St Arnaud Regional Park is not considered desirable. While a significant portion of the area is relatively flat, there are other high points in the general vicinity of Boort and Charlton in the central area where transmission infrastructure would be more visible. Throughout the central and northern sections of the area of interest, there are several Environmental Significance and Vegetation Protection Overlays along rivers, roadsides and around other waterbodies which contain remnant vegetation having both ecological and landscape value. Examples in the central area include Lake Boort and the Lake Lyndger Wildlife Reserve.

In the northern section, many of the visually sensitive areas coincide with the various parks, reserves and waterbodies located throughout the area, many of which have Planning Scheme Overlays aimed at protecting ecological and landscape values. Notable examples include State Forests along the Murray River which are proximal to the area of interest including the Berwell, Campbells Island and Guttram State Forests, riverine environments along many watercourses including the Avoca and Loddon Rivers and important areas such as Tragowel Swamp, Nature Conservation Reserve, Lake Mehran and the numerous wetland environments in and around Kerang.

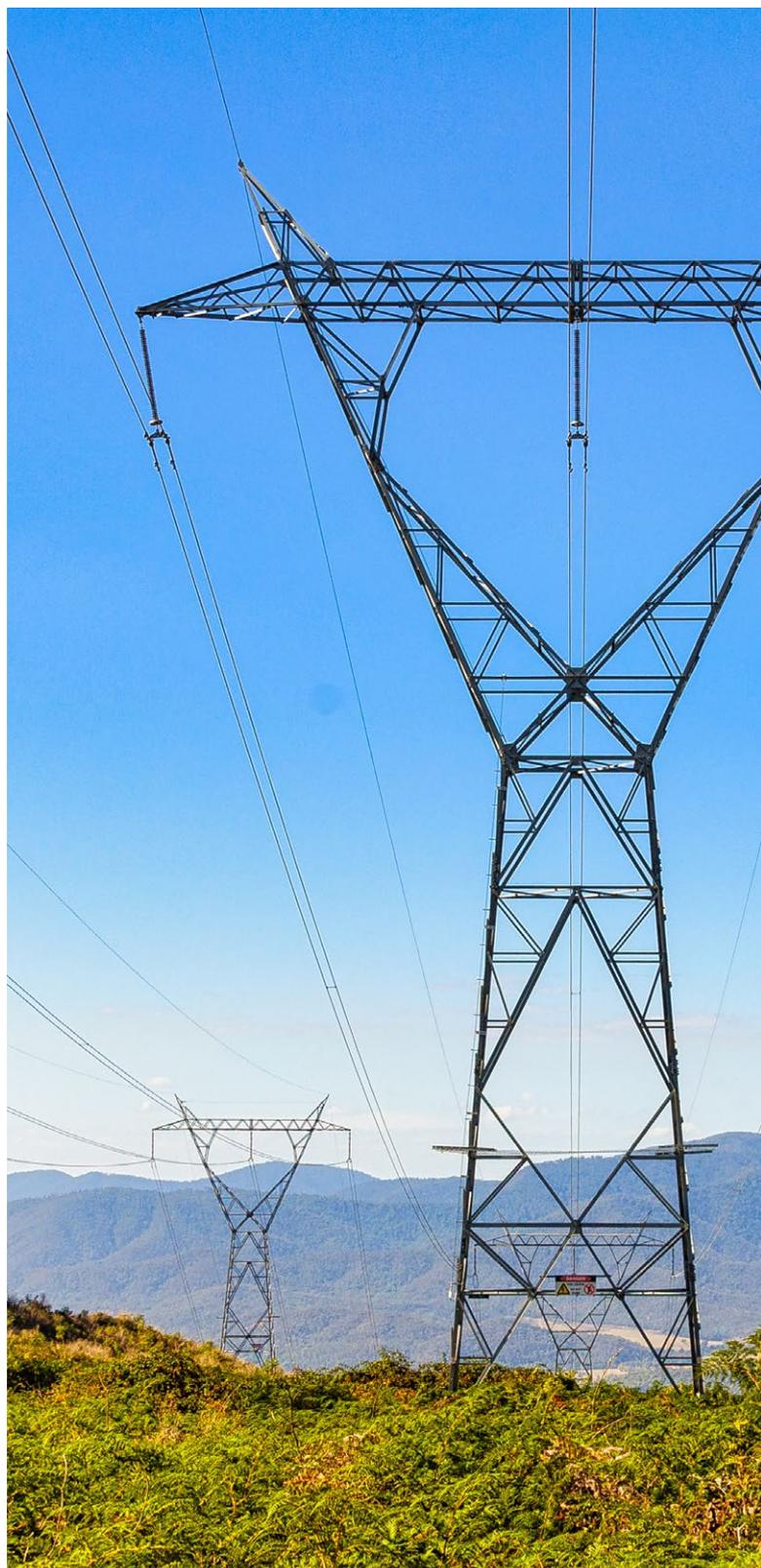
While it is not possible to totally avoid infrastructure traversing areas with landscape values, maximising distances from critical viewpoints is an important consideration as refinement of the area of interest continues.

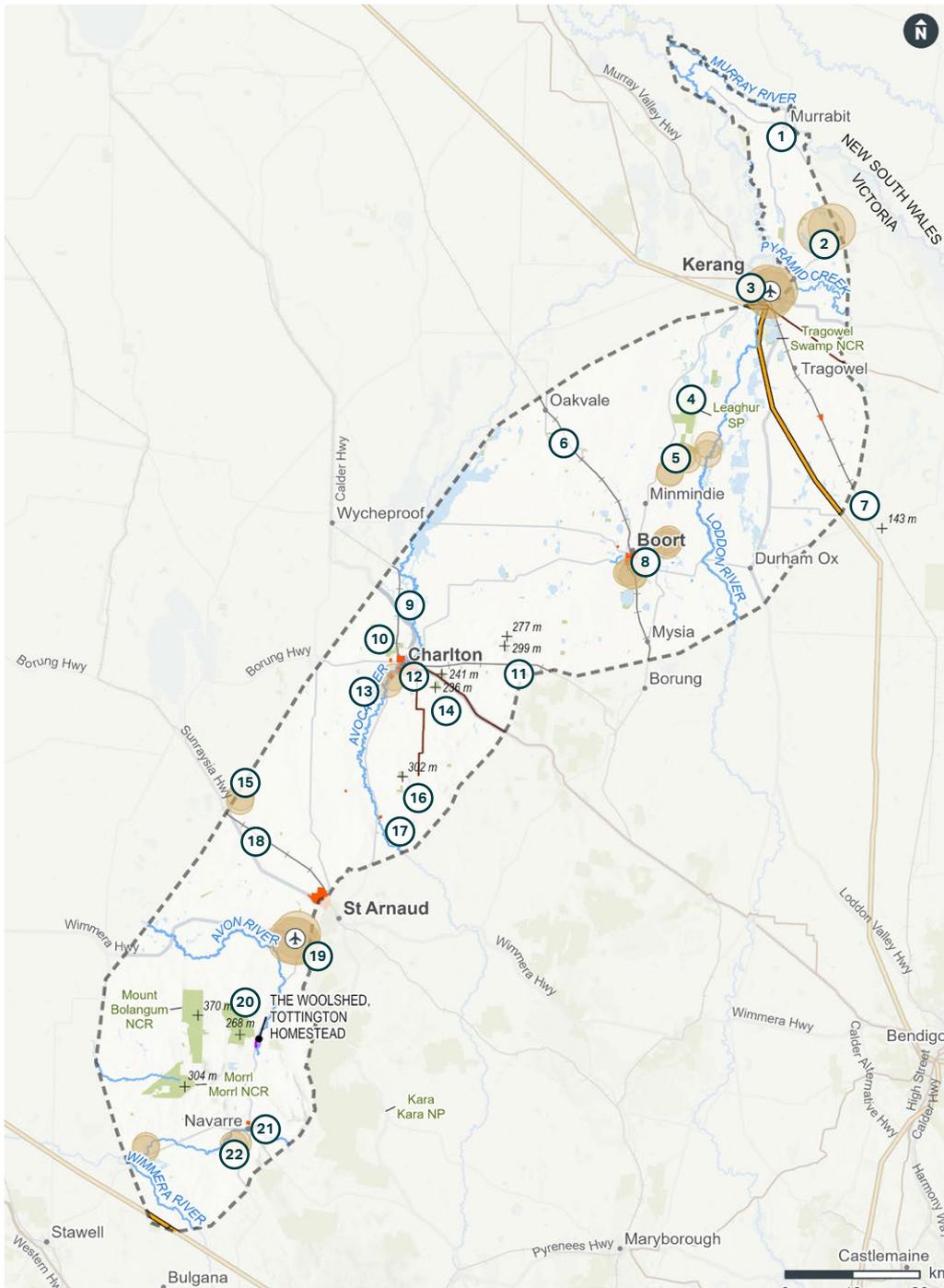
There are several Heritage Overlays within the area of interest which include Navarre Station (formerly Heiffer Station), the Woolshed, Tottington Homestead and Stone Cottage and the Swanwater Homestead Ruins which should be avoided when considering the location of transmission infrastructure.

The area of interest and surrounds contains 12 identified airfields shown in Figure 7. Of the 12, only two are classified as Certified Aerodromes, namely Kerang, which is outside of the area, but its Obstacle Limitation Surface (OLS) falls within the area, and St Arnaud airport. The remaining 9 airfields identified are not certified and have less stringent controls applied to them with several likely to be privately owned on farm properties. Any proposed transmission infrastructure will be required to comply with the locational requirements of the Civil Aviation Safety Authority (CASA). Consideration will also need to be given to the location of infrastructure proximal to the uncertified airfields to avoid conflicts.

Bushfire risk is a constraint requiring consideration within the area of interest although much of the area is not characterised by heavily vegetated areas and steep slopes which can support extreme fire intensity. Throughout the area, land identified with higher fire risk potential correlate with the parks and reserves and streamside and roadside vegetation. Such areas include Kara Kara National Park, Big Tottington and Morri Morri Nature Conservation Reserves in the southern section, Wychitella Nature Conservation Reserve which adjoins the area of interest in the central section and scattered areas to the north-west of both Boort and Kerang.

It is noted that high voltage transmission infrastructure such as the proposed VNI West line generally do not start bushfires. In instances where fires have been caused by power lines, they are generally associated with the smaller distribution lines running along roads and the like.





- 1 Murrabit Golf Course and Murrabit Group School
- 2 Robins Aviation airstrip
- 3 Kerang Airport
- 4 Leaghur State Park Campground
- 5 Cluster of private aerodromes
- 6 Robinvale Railway Line
- 7 Pangil Railway Line
- 8 Boort District P-12 School
- 9 Reeve Earth Moving Pty Ltd sand and gravel quarry
- 10 Charlton Golf Club and Klunders Hill Lookout
- 11 Kulwin Railway Line
- 12 Charlton College
- 13 Charlton Airfield
- 14 Boral Resources (Vic) Pty Ltd hard rock quarry
- 15 Cope Cope Airport
- 16 WindLab - Coonooer Bridge Wind Farm
- 17 Future Energy - Yawong Wind Farm
- 18 Yelta Railway Line
- 19 St Arnaud Airport
- 20 Cluster of sand and gravel quarries
- 21 Navarre Primary School
- 22 Navarre Airport

**LEGEND**

Area of Interest	High Points	Airstrip OLS	Rail
Power Transmission	CASA Certified Aerodromes	Township Zoning	
Power Distribution (HV)	Heritage Register		

Figure 7: Land use and infrastructure within the area of interest



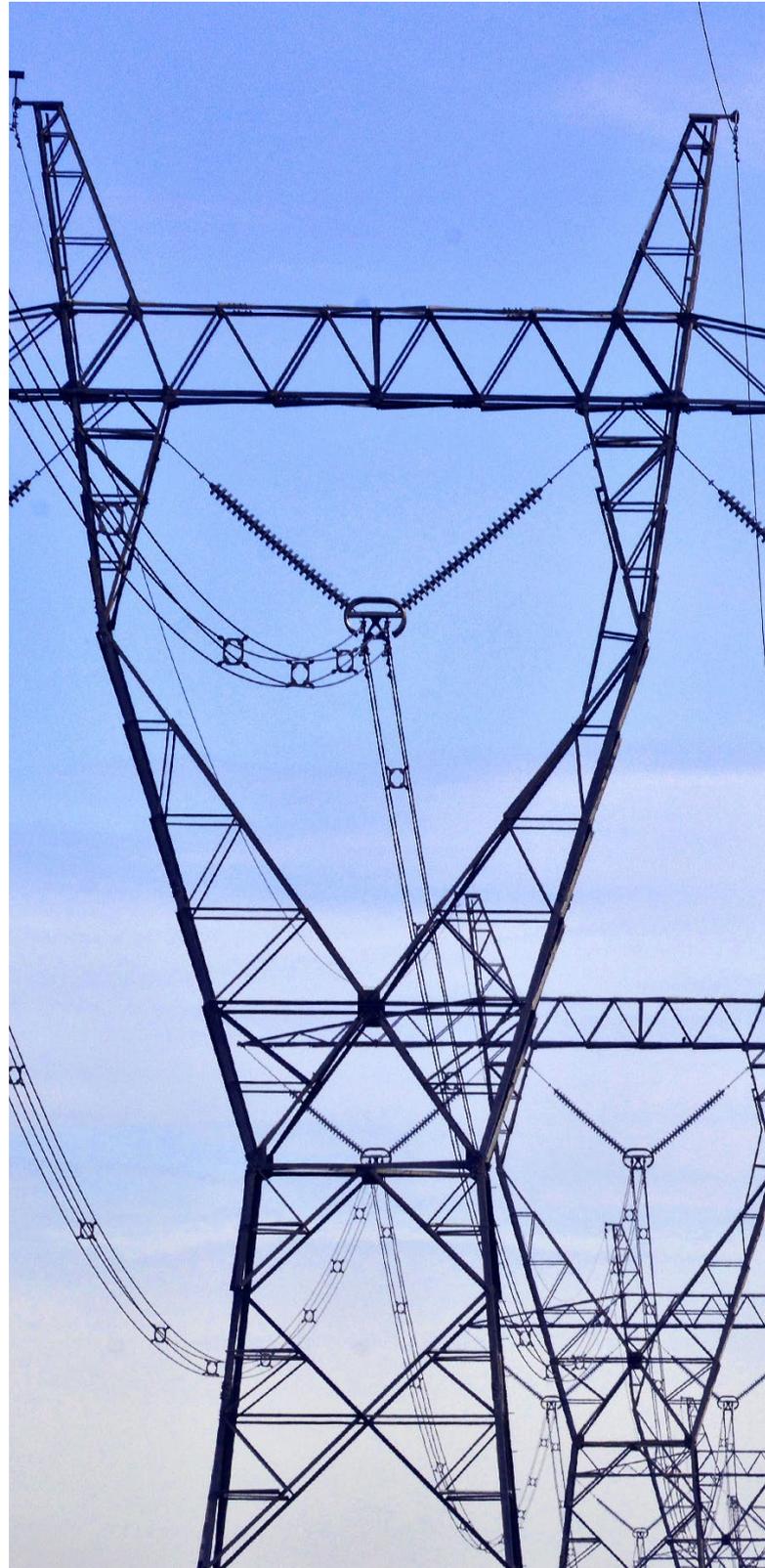
# Engineering design

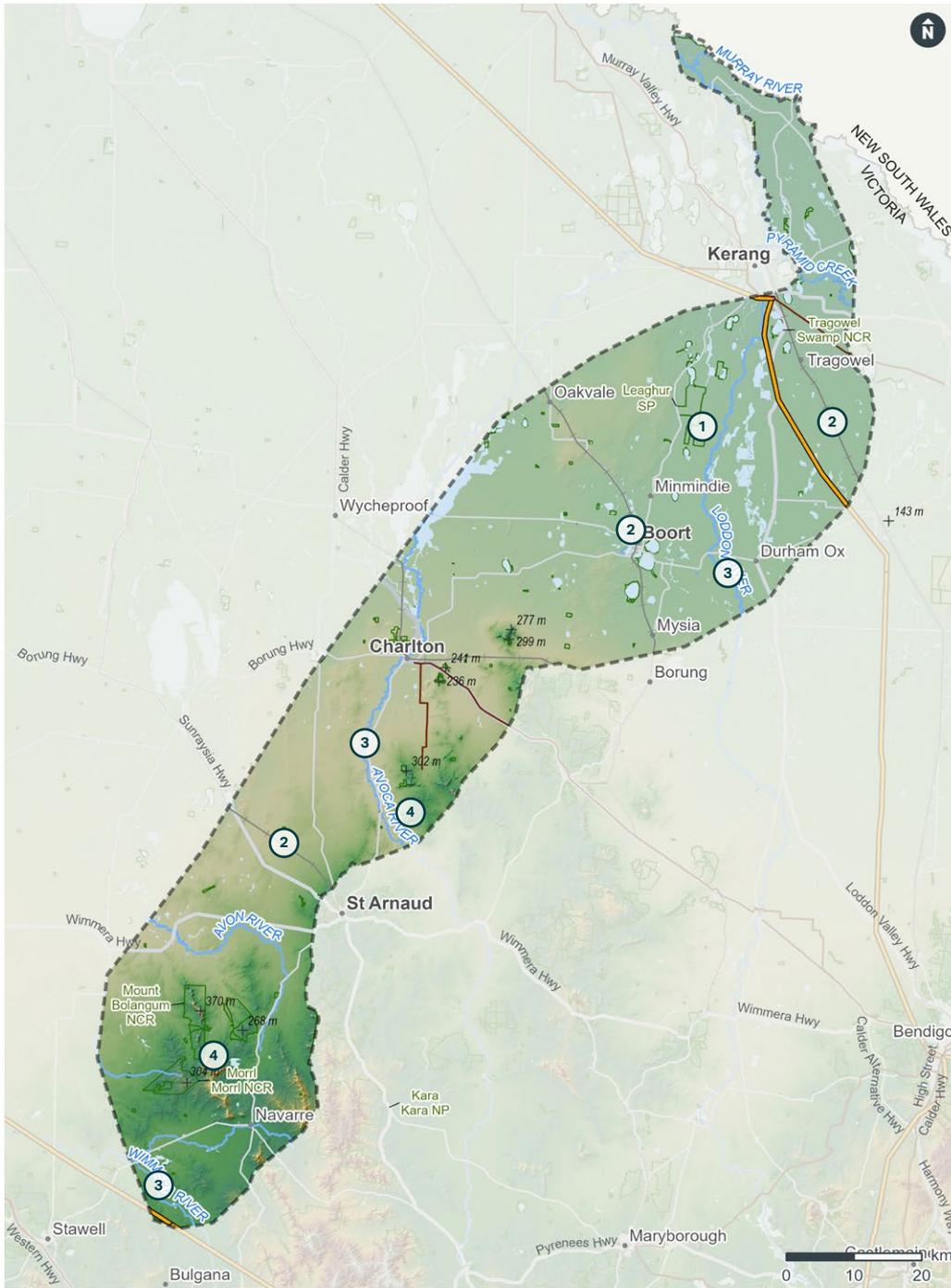
In addition to environmental and other constraints identified in this report, there are also technical constraints which impact on the engineering feasibility of locating transmission infrastructure. Some of which are shown in **Figure 8**.

Technical criteria which will influence the location of infrastructure include:

- Total transmission line length
- Current and future network requirements
- Accessibility for construction and operation
- Electrical standards and regulations
- Geological and geotechnical conditions
- Steep and undulating terrain
- River, road and rail crossing points
- Feasible span lengths between transmission towers (generally between 400-500 m)
- Minimising the amount and angle of line deviations to reduce technical complexity and overall project cost
- Intersection with the existing 220 kV line to the Kerang terminal station (design, costs, outage times)
- Consideration of renewable energy connection points and proposed developments, where known

While constraints will be identified in any location which is required for the construction of major new linear infrastructure, it is the overarching objective of the corridor refinement process, from an engineering and technical viewpoint, to identify absolute 'no go' areas and to avoid as many other areas of constraint as possible. While the MCA that informed the PACR identified this area of interest to be less constrained than other options, it is evident from **Figure 2**, that a large proportion of the area of interest is constrained to some degree and it will not be possible to avoid all of these areas. In these instances, a variety of engineering design outcomes will need to be considered. For example, in order to traverse sensitive landscape areas, the option of differing tower heights or deviations from a 'straight line' transmission alignment will be assessed to determine the most suitable solution to navigate through areas of constraint.





- 1 Unfavourable soil conditions over flood plain, therefore, preference to cross as perpendicular as possible
- 2 Major rail crossings
- 3 Major river crossings at Wimmera River, Avoca River and Loddon River
- 4 Steep terrain, difficult for access

**LEGEND**

Area of Interest	Power Transmission	Localities	Elevation (m)
Parks and Reserves	Power Distribution (HV)	High Points	

**Figure 8:** Engineering constraints within the area of interest

# Conclusion and next steps

This report provides a summary of the environmental and technical constraints identified through desktop assessments for the area of interest adopted by TCV for the VNI West project. It represents a high-level overview of constraints which will be used to further refine the VNI West area of interest and inform selection of a final transmission corridor.

Next steps in the process include:

- TCV continuing the engagement with stakeholders to refine the route corridor
- AECOM to continue further engineering and environmental studies to refine the proposed corridor, including incorporating feedback from community sessions, Traditional Owner engagements and the interactive map located on TCV's website
- TCV adopting the refined corridor and commencing engagement with landholders within this corridor
- AECOM developing an initial proposed reference design utilising these constraints and stakeholder feedback to further refine the corridor and to inform referrals to both the State and Commonwealth Government's
- Referral of the project to both the State and Commonwealth Government's seeking decisions on the level of environmental assessment required
- AECOM undertaking further environmental assessments involving a range of detailed technical studies and fieldwork to assess the potential impacts of the project for the consideration of regulatory authorities





**AECOM Australia Pty Ltd**

Wurundjeri and Bunurong Country, Tower 2, Level 10, 727 Collins Street, Melbourne VIC 3008, Australia  
T +61 3 8670 6800 [www.aecom.com](http://www.aecom.com)  
ABN 20 093 846 925

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