Western Victoria Transmission Network Project

NOVEMBER 2021

Underground construction summary

Purpose

This document provides information about underground construction in relation to the Western Victoria Transmission Network Project (WVTNP). It covers high voltage direct current (HVDC) and high voltage alternating current (HVAC) technology, underground construction, underground routes for the WVTNP and the key differences in environmental impacts.

Why is underground construction being investigated?

AusNet Services is required by the Environment Effects Statement scoping requirements to consider feasible project alternatives, including full and partial underground construction.

Communities and landholders along the project corridor have provided feedback that underground construction should be considered, particularly where the visual impact of overhead transmission lines is a community concern.

We have further work to do as part of the Environment Effects Statement, but we have had lots of requests for information about undergrounding the WVTNP so we wanted to share the preliminary findings as early as possible with you.

Where is this information from?

Based on the feedback we have received from communities and landholders, AusNet Services commissioned an independent investigation into underground construction of the WVTNP. The technical specialists who completed this work are experts in route selection, electricity transmission and cost estimation.

An independent peer review will be conducted of the investigation into underground construction done to date. Work is also continuing on a number of technical aspects identified in this investigation, including partial underground construction.

Electricity transmission

Electricity is the transfer of energy through a conducting medium or material, for example transmission line conductors/wires. Higher power transfer capacity is achieved by increasing the voltage. High voltage allows for lower current within the conductor material and therefore reduces energy losses such as heat within the conductor.

Generation

Electricity is generated from traditional and renewable energy sources.

Voltage transformer

Power transformer steps up voltage.

Transmission

Transmission line carries high voltage electricity over long distances.

Voltage transformer

Power transformer steps down voltage.

Distribution

Distribution line carries electricity to houses.

Consumers

Power transformer on pole steps down voltage before entering houses.

For illustrative purposes only

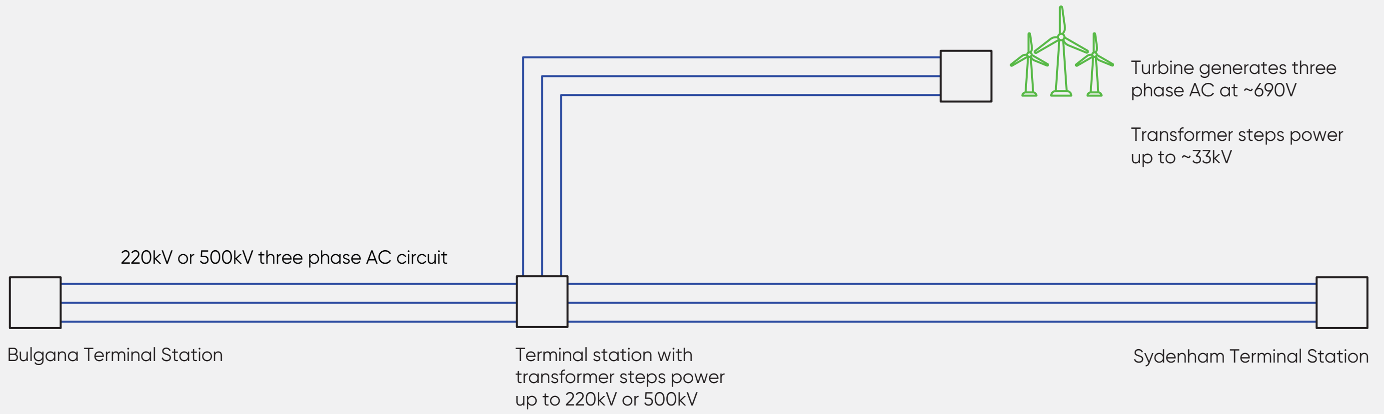
What is HVAC and HVDC?

Overhead transmission lines and underground cables can be high voltage alternating current (HVAC) or high voltage direct current (HVDC).

- Alternating current – the direction of flow of electrons changes at regular intervals or cycles (50Hz in Australia).
- Direct current – the flow of electrons is constant in one direction. A torch using batteries is an example of direct current.

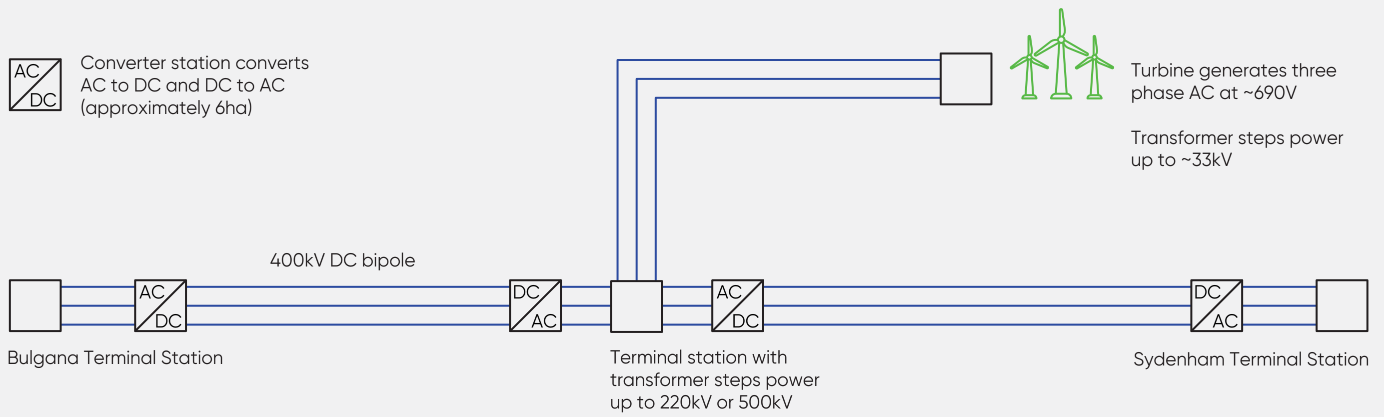
In Victoria, HVAC is used for transmission because alternating current is more easily and economically transformed from the low voltages at which power is generated to the high voltage used for transmission and vice versa. A key objective of the WVTNP is to facilitate renewable energy development in western Victoria by providing cost effective connections for renewable energy generators which can only be achieved with a HVAC solution. This is an important consideration when designing transmission lines and selecting technologies.

HVAC transmission circuit



For illustrative purposes only

HVDC transmission circuit



For illustrative purposes only

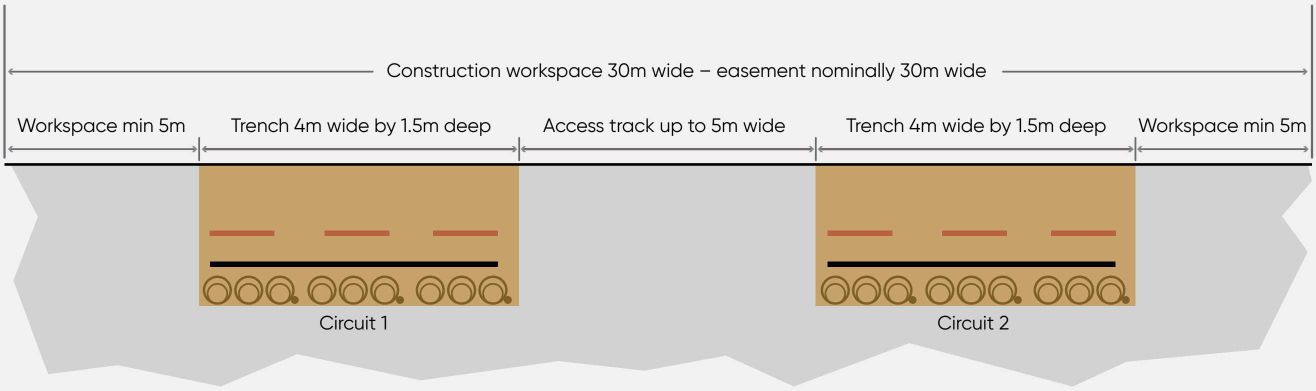
How do HVAC and HVDC technology compare for underground transmission?

The following table compares HVAC and HVDC underground technology for the WVTNP based on equivalent design parameters.

Table 1

	HVAC	HVDC
Cables	HVAC transmission lines have three phases, each phase requires a separate cable with additional cables necessary for increased power transfer/ capacity. 18 cables would be required for the WVTNP high-capacity double circuit 500kV transmission lines and 12 cables for the 220kV section.	HVDC transmission lines are installed as either a Monopolar link (two cables comprising a power cable and a metallic return cable) or Bipolar link (three cables comprising two power cables and a metallic return cable) with additional links necessary for increased power. Up to five links, each with three cables, may be required to achieve the capacity of the WVTNP high-capacity double circuit 500kV transmission lines.
Trenches	Two trenches, one for each circuit. At 500kV, each trench will be approximately 4m wide, 1.5m deep and at least 3m apart. At 220kV, each trench will be approximately 1.6m wide, 1.5m deep and at least 3m apart.	Up to five trenches, one for each link. Each trench will be approximately 2.5m wide and 1.5m deep and at least 3m apart.
Cable joints	At 500kV, six cable joint pits are required approximately every 550m to join the 18 cables. At 220kV, four cable joint pits are required approximately every 800m to join the 12 cables. A workspace approximately 30m by 180m is required for installation of the cable joint pits. For WVTNP, around 1200 cable joint pits would be required to make and protect the more than 4000 cable joints.	For HVDC, five cable joint pits are required approximately every 550m to join the 15 cables. A workspace approximately 30m by 180m is required for installation of the cable joint pits. For WVTNP, around 1700 cable joint pits would be required to make and protect the more than 5000 cable joints.
Easement	Approximately 30m for the 500kV double circuit.	Approximately 35m for five HVDC links.
Efficiency	Higher losses compared to HVDC.	Lower losses compared to HVAC.
Above ground infrastructure	4 ha reactive compensation stations are required to offset the capacitance of the cable approximately every 30km along the 500kV line and 50km along the 220kV line.	Converter stations up to 6 ha in size are required at each end of the HVDC links to connect into the HVAC grid.
Connections for generators	A terminal station with traditional step-up power transformers.	A terminal station with AC<>DC converter stations is required for intermediate locations where generators connect, making it significantly more expensive to connect new generators such as wind farms.

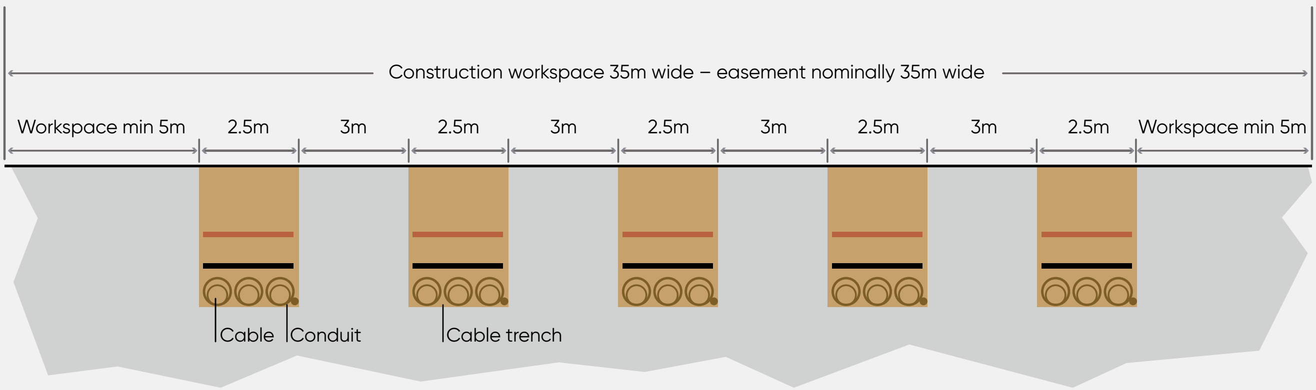
Concept WVTNP 500kV HVAC underground cable design



- Marker/warning tape
- Concrete or polymetric tiles
- Topsoil
- Thermal backfill

For illustrative purposes only

Concept WVTNP HVDC underground cable design



- Marker/warning tape
- Concrete or polymetric tiles
- Topsoil
- Thermal backfill

Up to five trenches, one for each link.
Each trench will be approximately 2.5m wide and 1.5m deep and at least 3m apart.

For illustrative purposes only

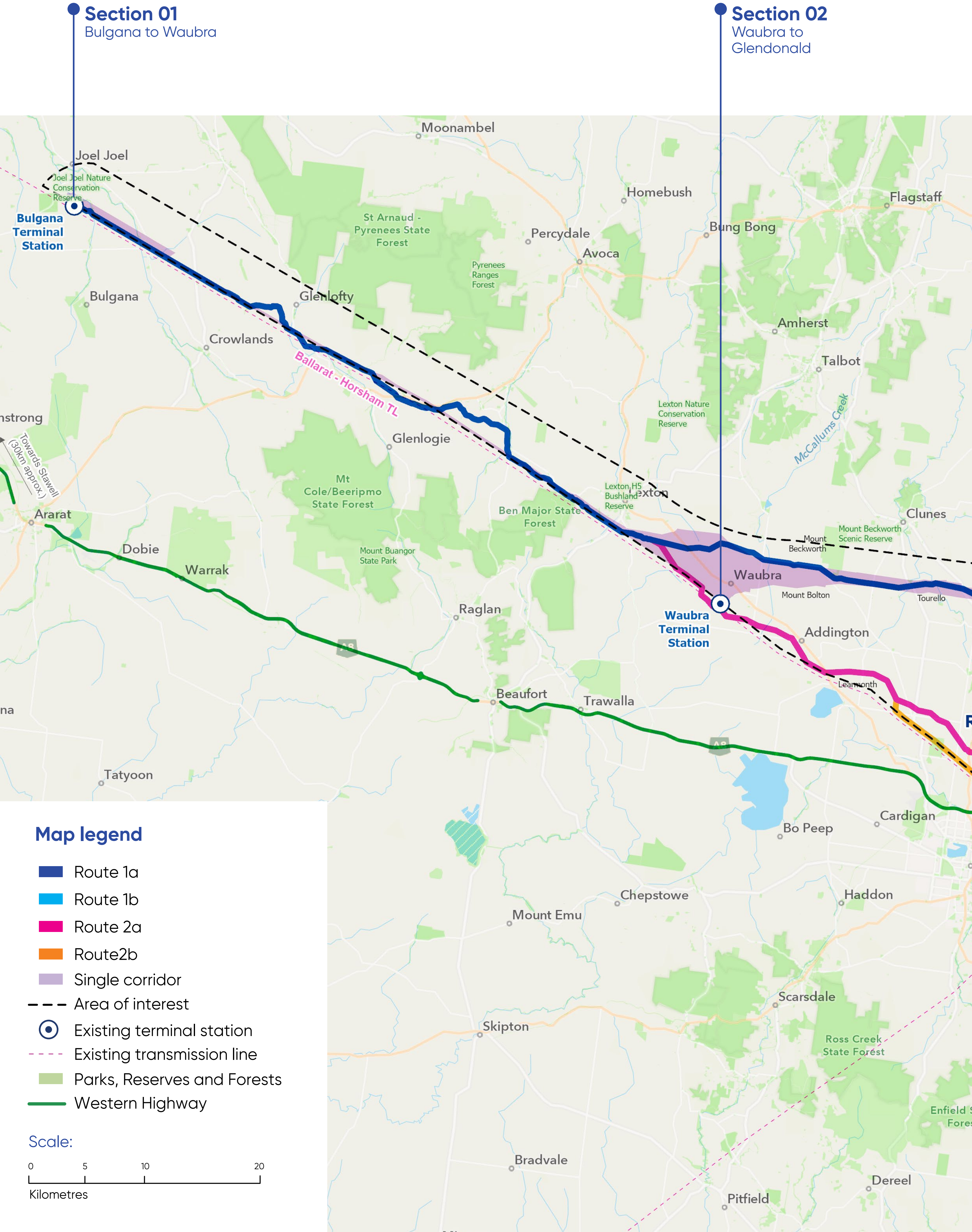
What is involved in HVAC and HVDC underground construction?

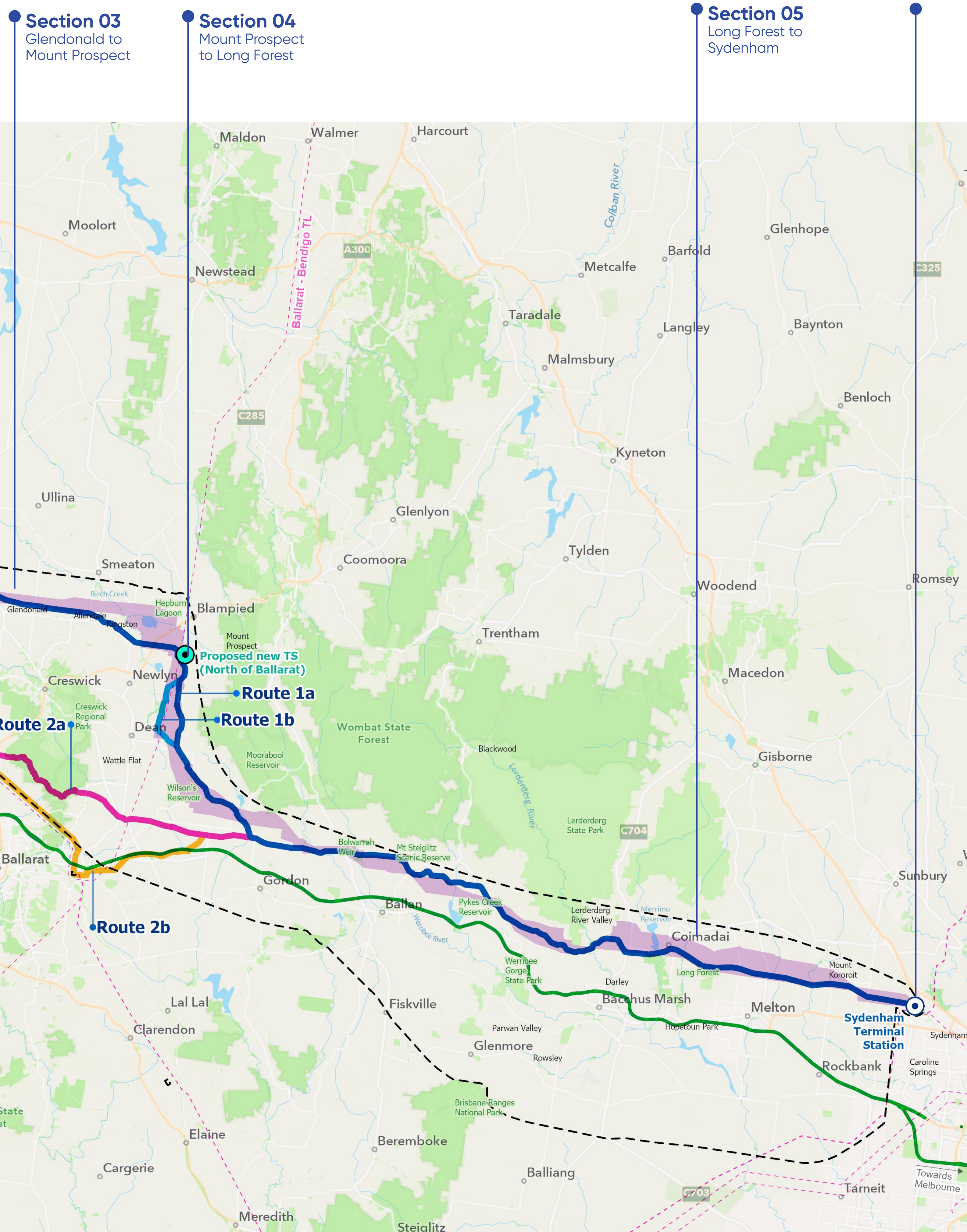
Table 2

Trenches	Vegetation is cleared in the 30 to 35m wide construction zone and easement. Two or more open trenches 1.6 to 4m wide and 1.5m deep are dug along the length of the route to lay the cables.
Transporting cables	Each 500 to 1100m long cable comes on a cable drum weighing about 30 tonnes, and requires a heavy vehicle to transport.
Laying cables	Underground cables for high voltage transmission circuits are buried 1 to 2m under the surface, typically within a conduit, covered with a layer of thermal backfill and a final layer of topsoil.
Cable joints	Underground cables are joined in concrete walled cable joint pits, every 500 to 1100m. Cable joint pits are typically around 10m long by 3m wide and 2m deep. Cable joint pits can come in precast sections or be poured in-situ. Cable joint pits also provide access to the cables along the route for maintenance, testing and repair. Concrete or polymetric tiles and marker tape are placed above the cables to alert people to their presence.
Construction areas	A construction workspace of approximately 30 to 35m wide is required for the length of the route, with larger areas required for construction of cable joint pits and where trenchless construction methods are used.
Above ground infrastructure	4 to 6 ha above ground stations are required to enable underground transmission. The infrastructure varies depending on whether HVAC or HVDC technology is used. HVAC requires a 4ha station every 30 to 50km depending on the voltage of the line. HVDC requires a 6ha station at the start and end of the line where it connects into the HVAC grid and for intermediate locations where generators connect.
Trenchless construction	Trenchless underground construction methods, such as directional drilling, may be used if geotechnically feasible. Trenchless construction is typically used in short sections under roads, rail lines, major watercourses or in environmentally sensitive areas. As cable joint pits are still required, the maximum bore length is limited to 500 to 1,100m. Where directional drilling is used, a construction area approximately 60m by 100m either end of the boring section may be required. Depending on geotechnical conditions and the separation required between cables, the easement may be up to 80m wide where trenchless construction is used to install the cables.

What underground routes were considered?

The technical specialists considered two underground routes (each with a variation) for the WVTNP from Bulgana to Sydenham. One alternative generally follows the single corridor identified for the WVTNP overhead transmission line. The other alternative is a more direct route, passing between Ballarat and Creswick. Both routes seek to minimise the length of cables due to the substantial cost of underground compared to overhead transmission lines.





Section 03
Glendonald to Mount Prospect
Section 04
Mount Prospect to Long Forest
Section 05
Long Forest to Sydenham
Maldon
Walmer
Harcourt
Moolort
Newstead
Ballarat - Bendigo TL
A300
Coliban River
Glenhope
Barfold
Metcalfe
C325
Taradale
Langley
Baynton
Malmsbury
Benloch
C285
Kyneton
Ullina
Glenlyon
Tylden
Coomoora
Smeaton
Woodend
Romsey
Birch Creek
Hepburn Lagoon
Blampied
Glendonald
Allendale
Kingston
Mount Prospect
Trentham
Proposed new TS (North of Ballarat)
Creswick
Newlyn
Route 1a
Macedon
Route 2a
Creswick Regional Park
Dean
Route 1b
Wombat State Forest
Wattle Flat
Moorabool Reservoir
Blackwood
Lerderderg River
Gisborne
Wilson's Reservoir
Lerderderg State Park
C704
Bolwarrah Weir
Mt Steiglitz Scenic Reserve
Ballarat
Gordon
Sunbury
Ballan
Pykes Creek Reservoir
Lerderderg River Valley
Merrimu Reservoir
Coimadai
Werribee River
Route 2b
Werribee Gorge State Park
Mount Kororoit
Long Forest
Darley
Bacchus Marsh
Lal Lal
Fiskville
Melton
Sydenham Terminal Station
Hopetoun Park
Sydenham
Clarendon
Parwan Valley
Glenmore
Rowsley
Rockbank
Caroline Springs
Brisbane Ranges National Park
Elaine
Beremboke
Cargerie
Balliang
Towards Melbourne
C703
Tarneit
Meredith
Steiglitz

How were the underground routes selected?

There are common environmental, cultural and social route selection criteria and technical considerations that guide route selection whether overhead or underground, and there are considerations specific to underground construction.

In summary, the criteria used in identifying the underground routes for WVTNP, as far as possible given the constraints, are:

- Maximise distance to dwellings and other facilities, with a target separation of at least 300m where practicable.
- Align the route at the back/rear of properties to reduce impacts on land use and land access.
- Follow existing transmission line easements where possible and where houses or other infrastructure have not been built up to the edge of the easement.
- Avoid native vegetation where practicable.
- Maintain straight lines and avoid acute angles that exceed the cable bending radius.
- Preferentially avoid highly erosive soils and landslip hazard areas.

Terrain is an important factor in underground route selection and technical feasibility because underground construction cannot span difficult terrain and features in the same way as overhead transmission lines. Routes running perpendicular to slopes and along spurs and ridge crests are preferred for underground construction. Deeply incised watercourses introduce constructability issues, particularly where horizontal directional drilling is proposed. Gently sloping watercourse valleys and crossings are preferred.

In the project area, the existing linear infrastructure corridors are highly constrained in places due to abutting residential and rural residential subdivisions and existing assets including roads, transmission lines and third-party infrastructure, e.g., telecommunication cables and water pipelines.

Road and rail reserves, stock routes and existing transmission line corridors were assessed for colocation of underground cables for the WVTNP depending on their features including:

- Available space.
- Existing and third-party infrastructure, for example can the underground cables be safely co-located with a steel pipeline or existing transmission line.
- Asset owner requirements, for example planned road or rail upgrades and expansions.
- Safety of working in the area.
- Aboriginal cultural heritage values.
- Biodiversity values.
- Historic heritage.
- Current and planned land use.

Route comparison

The following table compares the underground routes identified.

Table 3

Route	Advantages	Disadvantages / constraints
Route 1a (via Mount Prospect) Length = 191km	• Follows property boundaries for much of the route. • Follows roads in sections.	• Unavoidably traverses Glen Pedder historic property due to constraints imposed by the Pykes Creek Reservoir, terrain and landslip hazard areas along the escarpment north of the Pykes Creek Reservoir. • Traverses the infrastructure areas of the sand quarries north-east of Darley. • Does not connect to Waubra Terminal Station.
Route 1b (via Mount Prospect); a variation on Route 1a Length = 192km	• Follows property boundaries for much of the route. • Follows the Ballarat–Bendigo 220kV transmission line where practicable. • Follows roads in sections.	• The Central Highlands water main, farm dams and steep side slopes on Bullarook Hill force the route away from the existing transmission line. • Does not connect to Waubra Terminal Station.
Route 2a (via Creswick Plantation) Length = 187km	• Most direct route. • Avoids constraints along the Ballarat-Horsham 220kV transmission line as it approaches Ballarat Terminal Station. • Utilises plantation access roads and forest access roads to reduce impacts on adjacent native vegetation. • Avoids historic gold mining water races in Glen Park State Forest.	• Passes through Creswick Plantation and Glen Park State Forest. • Traverses White Swan Reservoir catchment. • Impact on native vegetation in the Glen Park State Forest (deep-rooted vegetation not permitted in easement). • Loss of land available for plantation.
Route 2b (via Ballarat Terminal Station); a variation on Route 2a Length = 191km	• More direct route utilising the existing Ballarat–Horsham 220kV easement.	• Highly constrained workspace at Brown Hill where residential subdivision abuts easement. • Constrained workspace in rural residential subdivisions around Ballarat.

What are the key environmental differences between overhead vs underground construction and operation of the assets?

The key differences in environmental impacts between overhead and underground construction mostly relate to visual impact and ground disturbance, and the ability to avoid impact through design.

Underground construction has less visual and landscape impact compared to an overhead transmission line, but ground disturbance and easement restrictions of underground construction impact on vegetation, biodiversity, Aboriginal cultural heritage, and agriculture and other land uses along the length of the transmission line. For an overhead design, ground disturbance occurs at the tower locations every 450 to 550m. Towers can be positioned to avoid or span over sensitive areas. For underground construction, ground disturbance occurs along the length of the route to a width of approximately 30 to 35m. Clearing for access tracks is required for both overhead and underground construction.

Preliminary estimates undertaken indicate that underground construction of the WVTNP using HVAC technology could cost at least 16 times more than the equivalent overhead transmission line.

The following table compares overhead and underground construction for the WVTNP based on equivalent design parameters.

Table 4

	Overhead	Underground
Aboriginal cultural heritage	Aboriginal cultural heritage sites can be avoided in design. Potential for visual impact on intangible cultural heritage associated with a place.	Aboriginal cultural heritage sites cannot easily be avoided in design. Lower potential for visual impact on intangible heritage with less overhead infrastructure.
Aviation	Overhead infrastructure presents a potential risk to aviation that in most cases can be managed.	Underground infrastructure presents no risk to aviation.
Biodiversity (vegetation management)	Biodiversity values can be fully or partially retained on an overhead transmission line easement. Vegetation up to 3m in height can be retained within the easement. Taller vegetation permitted where the minimum clearance and fuel load densities are maintained. Native grasslands and associated habitat can be avoided in design. Trees outside the easement are maintained so that they are below the fall zone of the transmission line. Overhead transmission lines can be a hazard to some bird species. The partially cleared overhead transmission line easement can affect some native species by creating a barrier to movement between adjacent native vegetation.	Biodiversity values are not retained on an underground cable easement, except where trenchless construction methods have been used. All vegetation is cleared in the underground construction area along the length of the route, except where trenchless construction methods are used. Less opportunity for trenches to avoid native grasslands and associated habitat. Only grasses or shallow rooted vegetation is permitted to grow on the underground easement. Underground cables pose no risk to bird species. The cleared underground cable easement may affect some native species by creating a barrier to movement between adjacent native vegetation.
Bushfire and other natural disasters	There is no record of a bushfire being started by an overhead transmission line in Victoria. Safe operation near overhead transmission lines is required for firefighting aircraft and ground-based firefighting crews. Overhead transmission lines are exposed to extreme weather events which may exceed the design wind loads potentially resulting in damage.	Underground cables are not exposed to fire. There is no record of a bushfire being started by an underground transmission line in Victoria. Underground cables do not constrain aerial firefighting activities. Ground-based firefighting crews need to be aware of underground cables when bulldozing fire breaks. Storm damage to cables can occur due to soil erosion from flood events, tunnel erosion and landslips due to heavy rainfall.

	Overhead	Underground
Electric and magnetic fields (EMF)	Overhead transmission lines generate electric and magnetic fields. Transmission line ground clearance is designed to ensure electric and magnetic field strengths are below Australian and international EMF guidelines. Magnetic field strengths from overhead transmission lines are lower than from underground cables at an equivalent height above ground.	Underground cables generate electric and magnetic fields. Electric fields are screened by the metallic sheath built into the cable. Underground cable burial depth is designed to ensure magnetic field strengths are below Australian and international EMF guidelines. Magnetic field strengths from underground cables are higher than from overhead transmission lines at an equivalent height above ground.
Historic heritage	Heritage sites and artefacts can be avoided in design by spanning over areas and micro-siting towers. Transmission lines can detract from the context of heritage places and sites.	Less opportunity for trenches to avoid heritage sites and artefacts compared to overhead transmission lines. Above ground infrastructure can detract from the context of heritage places and sites.
Land use – including Agriculture	Height restrictions on machinery and vehicles to provide safe clearance from the line. Overhead transmission lines can be designed to provide greater ground clearance in some situations. Heavy machinery and equipment permitted. Grazing permitted. Cropping permitted. Gun irrigators not permitted. Centre-pivot and lateral irrigators are permitted with AusNet Services' permission and where incorporated in design. Sheds and dwellings not permitted within easement.	No restriction on operation of taller equipment and vehicles. Restrictions on heavy machinery and equipment. Grazing permitted. Cropping not permitted* Gun, centre-pivot and lateral irrigators are permitted. Sheds and dwellings not permitted within easement. *Underground cables can be buried deeper to allow cropping, although deeper burial increases cost due to reduced thermal efficiency.
Landscape and visual	Potential for high visual impact in sensitive areas.	Reduced visual impact except where above ground facilities and easements through vegetation are required. Potential for high visual impact in sensitive areas where the following is required: • transition stations (partial undergrounding). • conversion stations for HVDC/HVAC connections. • reactive compensation stations for HVAC.
Noise	Noise from transmission line conductors (wires) can be discharged under certain atmospheric conditions. Transformers in terminal stations emit noise.	No noise from underground transmission lines except at associated above ground infrastructure. Transformers in converter stations and reactive compensation stations emit noise.

What other similar projects have been put underground?

Historically, electricity transmission infrastructure has been installed overhead with the conductors (wires) elevated above the ground on towers located around 450 to 550m apart. Technological advances in cable design and manufacture have increased the use of underground construction for high voltage transmission lines, however underground construction makes up only a small proportion of transmission line infrastructure internationally. For example, in Germany only 0.4% of transmission infrastructure is underground.

The underground construction investigation identified 43 HVAC underground projects and 18 HVDC underground projects internationally, some of which have overhead components.

While some projects are longer or have similar voltage or power transfer capacity, none of these projects are equivalent to the WVTNP for all parameters.

The world's longest HVAC underground transmission line is the 230kV Malta-Sicily Interconnector at 126km in length, but its power transfer capacity (225MW) is significantly lower than the capacity requirements of WVTNP (5400MW for 500kV).

All existing 500kV HVAC underground cables are less than 40km in length.

There is only one HVDC project of comparable voltage, capacity and distance to WVTNP, SuedLink, however it is yet to be built.

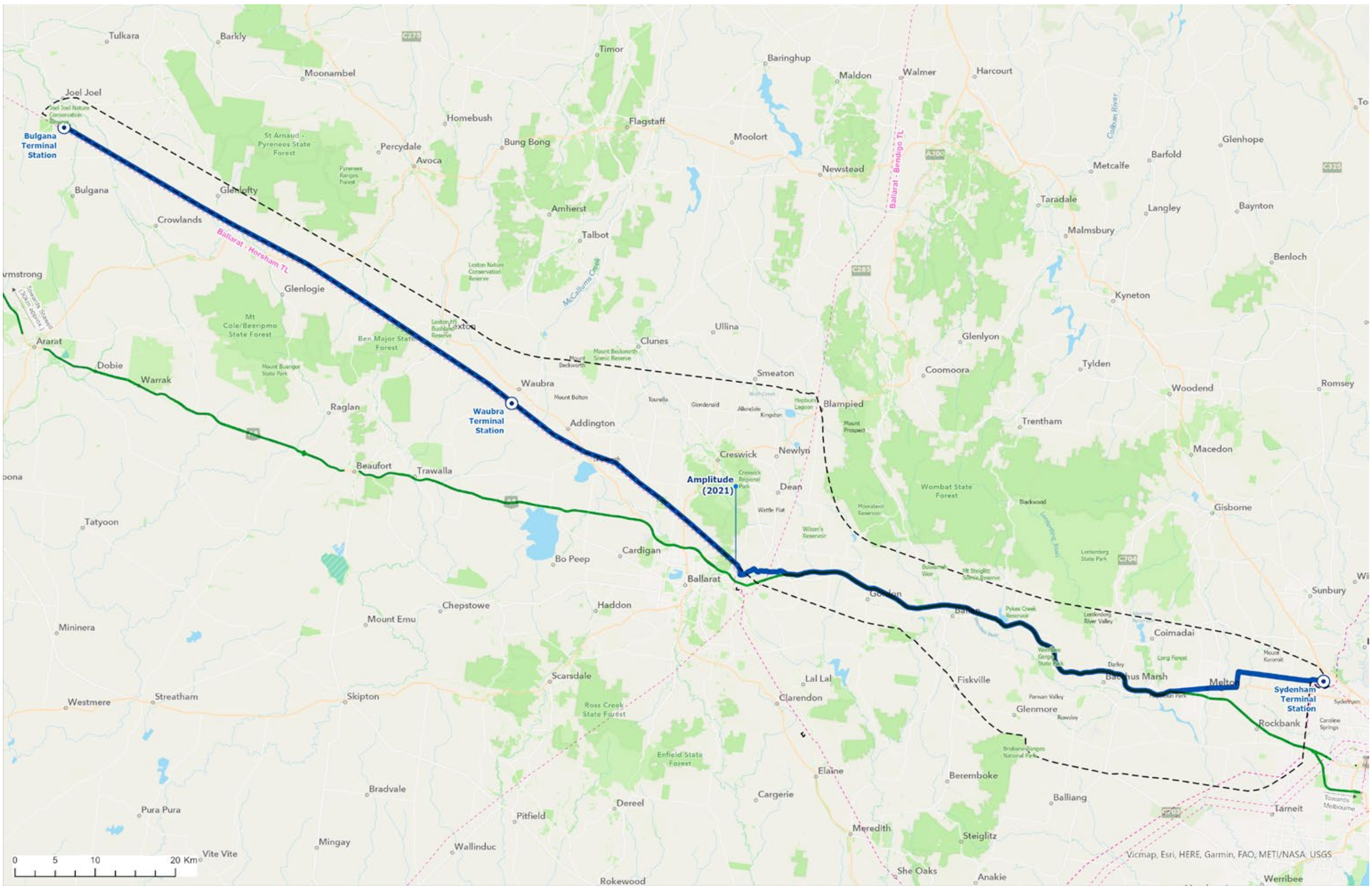
SuedLink is a 750km 525kV HVDC interconnector being constructed to link northern and southern Germany. The planned 4000MW power transfer capacity is less than the 5400MW capacity of the 500kV section of the WVTNP. SuedLink will use HVDC technology, which does not allow for cost-effective connections for generators. It was originally proposed as an overhead project but new legislation introduced by the German government requires all HVDC transmission lines to be underground. The project comprises two 2000MW links, with the cables buried in four parallel trenches up to 10m apart (NS Energy undated).

A comparison of similar projects referred to us by the community and stakeholders and those identified through the underground investigation is included in the following table.

Table 5

Project	Technology/ configuration	Voltage	Capacity	Length	Notes
Proposed Western Victoria Transmission Network Project	HVAC overhead	220kV + 500kV	5400MW for 500 1500MW for 220	190km	Requires cost-effective intermediate connections.
Victorian Desalination Project Entered service in 2012	HVAC underground (XLPE cables)	220kV	220MW	88km	Dedicated supply for desalination plant. Developer chose to underground 220kV power supply to reduce impacts on landowners and communities.
Proposed Marinus Link Tasmania–Victoria interconnector	HVDC underground, and subsea (XLPE cables) - 250km of subsea cables and 90km of underground cables	325kV	1500MW in two 750MW stages	340km	Point to point connection, no intermediate connections.
Murray Link South Australia–Victoria interconnector Entered service in 2002	HVDC underground (XLPE cables)	150kV	220MW	176km	Point to point connection, no intermediate connections. Installed mostly in government road reserves.

Project	Technology/ configuration	Voltage	Capacity	Length	Notes
Basslink Tasmania–Victoria interconnector Entered service in 2006	HVDC overhead, underground and subsea (MIND cables)	400kV	480MW/600MW	385km	Point to point connection, no intermediate connections. Undergrounding required within 6.5km of Victorian coast to protect landscape and visual amenity of coastal plain.
Malta–Sicily Interconnector Entered service in 2015	HVAC subsea and underground	230kV	225MW	126km	Longest HVAC interconnector
Eastern Alberta Transmission Line Entered service in 2014	HVDC **overhead** (bipole)	500kV	1000MW upgradable to 3000MW	485km	-
Western Alberta Transmission Line Entered service in 2015	HVDC **overhead** (bipole)	500kV	1000MW upgradable to 4000MW	350km	-
SuedLink North Germany to South Germany interconnector Under construction	HVDC underground	525kV	4000MW installed in two 2000MW circuits	750km	Initially proposed as an overhead transmission line; underground cables proposed following new legislation introduced by German Government.



What about the Western Freeway and other underground routes?

Communities, local government and other stakeholders in the project area of interest have proposed alternative overhead and underground routes for the WVTNP.

Moorabool Shire Council

Moorabool Shire Council has commissioned reports into underground construction. In one of these reports, Amplitude (2021) identified a conceptual HVDC underground cable route along the Ballarat–Horsham 220kV transmission line from Bulgana to Ballarat and the Western Freeway and local roads from Ballarat to Sydenham.

Amplitude (2021) notes:

> *This is assumed to be practically feasible as a cable trench of approximately three meters wide should be able to fit in the fire break zone of the existing roadways and would not require a significant extension of the transmission line corridors.*

There are several constraints that Amplitude's conceptual route does not account for:

- Construction workspace required to install underground cables, whether HVAC or HVDC, which is approximately 30 to 35m wide to accommodate multiple trenches to provide the required contingency. These additional lines are required to ensure availability and reliability of the system.
- Terrain constraints, particularly where the Ballarat–Horsham 220kV transmission line crosses steep hills and ridges in vicinity of Glenlofty, Mount Lonarch, Lexton and Waubra.
- Limited workspace in the Ballarat–Horsham 220kV transmission line where rural-residential and residential subdivisions in north Ballarat have been built up to the easement.
- Constructability and technical constraints associated with the Western Freeway crossing of Pykes Creek Reservoir, in part on bridges.
- Space constraints in the Western Freeway road reserve where it is in cuttings or on embankments for example at Bacchus Marsh and High Street and Melton Valley Drive road reserves in Melton.
- Use of the Western Freeway road reserve in the Melton and Bacchus Marsh areas would also conflict with plans to add additional lanes and associated road safety furniture to address traffic growth in Melbourne's western growth corridor.
- Cultural heritage values in road reserves.
- Biodiversity values and tree protection zones in and adjacent to road reserves.

Amplitude estimated implementing its proposed HVDC technology solution would cost 5.7 times the cost of the proposed overhead transmission lines.

Preliminary cost estimates based on concept designs commissioned by AusNet Services indicate the cost of underground construction could be at least 16 times the cost of overhead construction for a comparative HVAC solution.

Western Freeway

Using the Western Freeway to co-locate the WVTNP either overhead or underground has been raised by the community and stakeholders.

The investigation into underground construction found that the option to use the Western Freeway road reserve for underground construction of the WVTNP is restricted in several areas due to space constraints where cuttings or embankments have been used to build the road. These pinch points would necessitate the route being moved into adjacent farmland and rural residential areas.

Underground construction of the WVTNP in the Western Freeway road reserve would require lane closures resulting in significant traffic disruption over a long period due to the restricted workspace. Future expansion plans for the road network would also be impacted.

Technical specialists have also considered using the Western Freeway in the WVTNP proposed overhead route. They found there was insufficient space for an overhead transmission line in the road reserves of the Western Freeway. Locating overhead transmission infrastructure in the freeway reserve would constrain future expansion plans for the road that rely on the available space.

What are the next steps?

Based on preliminary findings, overhead construction is considered most appropriate for the full length of the project. A range of options to reduce impacts along the route will continue to be investigated as part of the Environment Effects Statement, including different designs, structures and sections of underground construction. Further work on partial underground options is required to evaluate feasibility and effectiveness to mitigate impacts in areas where the potential for high impact is identified.

In comparison to underground construction, overhead transmission lines result in less ground disturbance and provide more cost-effective connections for renewable energy generators, achieve the electricity system availability and reliability requirements and are a proven solution over the distance and at the capacity of this project. In addition, preliminary estimates undertaken indicate that underground construction of the WVTNP using HVAC technology could cost at least 16 times more than the equivalent overhead transmission line.

An independent peer review will be conducted of the investigation into underground construction done to date. Work is also continuing on a number of technical aspects identified in this investigation, including partial underground construction.

WVTNP information

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Information straight to your inbox

Sign up for information straight to your inbox at the WVTNP website www.westvictnp.com.au.

Complaints

If you have a query, a compliment or a complaint, you can let us know by using the online enquiry form on www.westvictnp.com.au. Or you can let us know by:

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Feedback

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Other sources of information

Australian Energy Infrastructure Commissioner

(www.aeic.gov.au) including information about how to make a complaint, best industry practice and resources for landholders.

Australian Energy Market Operator

(www.aemo.com.au) including information on the Regulatory Investment Test for Transmission (RIT-T) process for this project.

Environment Effects Statement Process in Victoria

(www.planning.vic.gov.au/environment-assessment/what-is-the-ees-process-in-victoria) including information about the environment assessment process managed by DELWP.

Energy Safe Victoria

(www.esv.vic.gov.au) including information about the safe design and operation of high voltage transmission networks in Victoria.

Essential Services Commission

(www.esc.vic.gov.au) including information about the regulation of transmission licenses in Victoria.

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