

Transmission line construction



Delivered by

AusNet

Purpose

This document provides general information about the overhead transmission line and double circuit lattice tower construction process for the proposed Western Renewables Link.

Further information about transmission towers, including other tower types, is available in the [Transmission Towers and Conductors Fact Sheet](#) on the [project website, resources page](#).

Information about underground construction is available in the [Underground Construction Summary](#) on the [project website, resources page](#).

Further information about the project including information for landholders is available on the [project website](#).

Acknowledgement of Traditional Owners

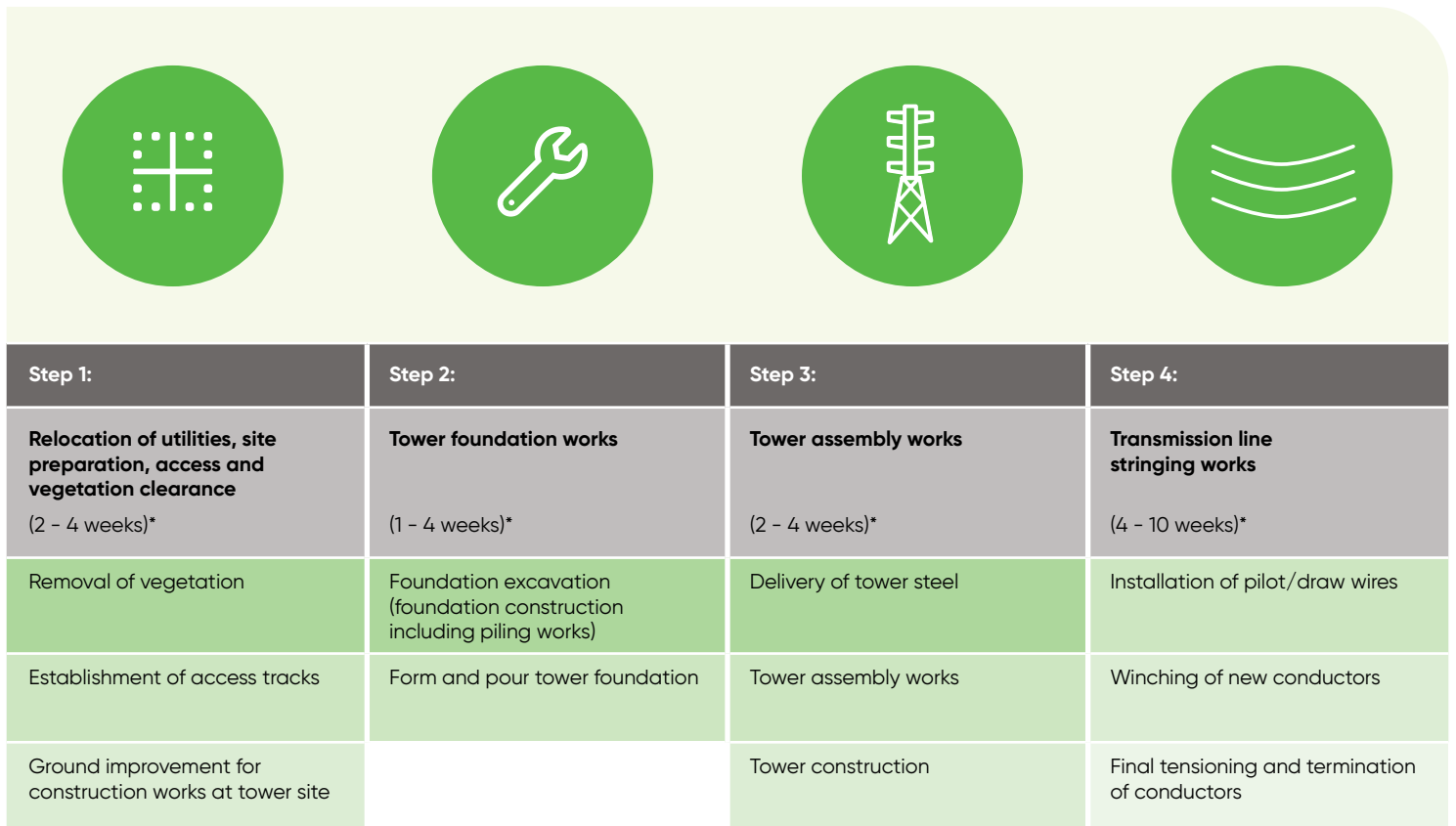
AusNet acknowledges the Traditional Owners of the lands on which the proposed Western Renewables Link will operate, and pays respect to their Elders past, present and emerging. We recognise the role of each Registered Aboriginal Party and Traditional Owners in the management, protection, and promotion of cultural heritage, connection to Country, cultural awareness and land access. We will continue to work in partnership with First Peoples – State Relations Victoria and the recognised Registered Aboriginal Parties of the Barengi Gadjin, Eastern Maar, Djarra (Dja Dja Wurrung), Wadawurrung and Wurundjeri Woi wurrung Traditional Owners Corporations, to deliver the project.

Construction overview

The Western Renewables Link is expected to be constructed in sections, with construction crews focused on one section at a time. Crews will complete a series of construction steps at each tower site (see diagram). The construction process and overall time spent at each tower site will vary depending on the location, conditions, terrain and other environmental considerations, such as steps taken to protect threatened flora and fauna.

Before construction activities start, we will meet with the landholder to discuss and plan the construction activities to ensure any site or property specific requirements are considered, such as biosecurity, the need for fencing or the removal of livestock.

We will also inspect the site to assess the general area and ground conditions and complete any final site investigations for engineering and/or environmental requirements.



Typically a period of 1 week to several months could be expected between these stages

*Timing is indicative and subject to change

Commitment to landholders

Landholders on the proposed route for the Western Renewables Link are key stakeholders in delivering this significant energy transmission project for all Victorians. We are committed to working with landholders in a respectful, open and responsive way, in accordance with our values, the Essential Services Commission's Electricity Transmission Company Land Access Statement of Expectations, and in a manner that reflects landholders as key stakeholders and hosts of the required infrastructure.

We will continue to work closely with landholders throughout project design and planning to refine the tower and access track locations, understand their requirements when accessing properties and plan construction timing and activities together to minimise the impacts of construction on their property and operations.

More information about the statement of expectations is available on the [ESC website](#).



Access tracks may be new or use existing tracks and can be permanent or temporary

Step 1

Site preparation, access and vegetation clearance (2–4 weeks)

Site preparation

To prepare the site, tower locations and work areas will be surveyed and pegged out. Environmental, Aboriginal cultural heritage and historic heritage features and values will be flagged for protection, as appropriate, and on-site workers will be briefed on these areas and protections. Where the project crosses roads, railways, electricity lines or communication lines, protective works such as hurdles, scaffolding and nets will be installed to protect people and existing infrastructure from being damaged if any construction issues occur during the period of the works. Site specific biosecurity measures will also be identified as part of the planning phase and workers will be informed of the requirements. A program will be implemented to monitor compliance with biosecurity measures.

Access tracks

Temporary access tracks are used to transport equipment to the transmission tower sites and temporary construction hardstand areas. Temporary access tracks typically need to be 4 to 6 metres wide depending on the terrain.

We will work with landholders to identify any existing access tracks that can be used or upgraded for this purpose. If there are no suitable existing access tracks, we may need to build a new temporary access track in consultation with the landholder. If ground conditions are good and can support heavy loads, minimal work is generally required to prepare an appropriate access track. Trackway panels may be used to minimise impact on the land.

Where required, construction of a new temporary access track typically involves:

- Removal of the topsoil using graders or tracked bulldozers.
- Stockpiling the topsoil for reuse.
- Surface levelling using a grader and roller.
- Adding locally sourced material / crushed rock and compaction rolling.

We will reinstate the area to original condition after use as required, unless the landholder would prefer the access track to remain permanently.

When a permanent access track is required to remain for maintenance activities, this will be discussed with the landholder before construction.



Vegetation may need to be cleared before construction activities begin

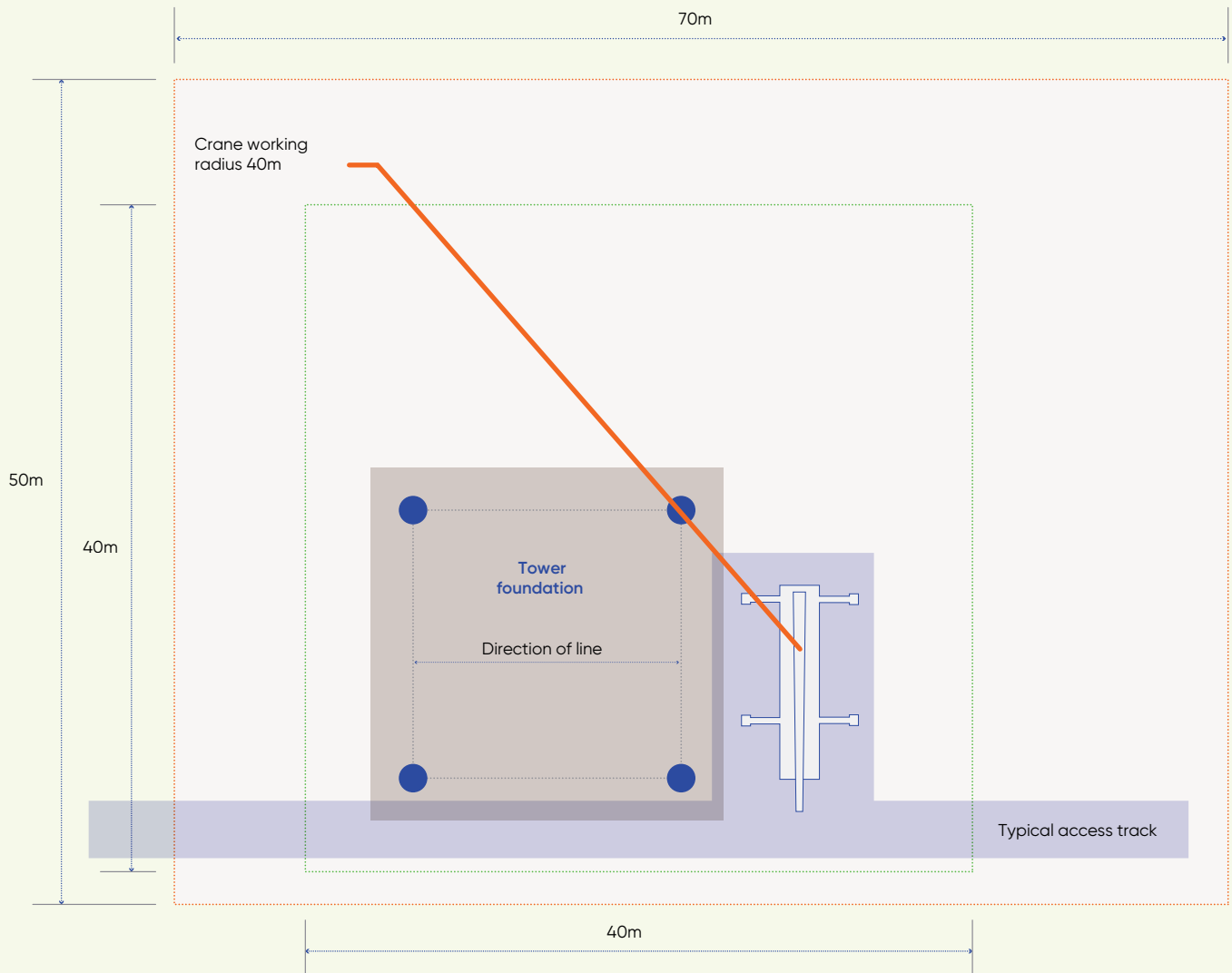
Vegetation clearance

Vegetation may need to be cleared to provide space for construction activities and ensure safe and reliable operation of the transmission line and manage risks associated with bushfire. The approach to clearing vegetation varies depending on the type and amount of vegetation to be removed, the terrain and landholder requirements.

Vegetation clearing during construction will follow the project's approved environmental performance requirements, the planning and regulatory approvals and AusNet's *Vegetation Management Plan* (available at www.ausnetservices.com.au/about/network-regulation/regulatory-publications).

All vegetation clearance within the transmission line easement will also comply with the *Electricity Safety (Electric Line Clearance) Regulations 2020*.

Typical tower assembly site



- ⋯⋯⋯ Typical 220kV tower assembly area (40 x 40m or 160sqm)
- ⋯⋯⋯ Typical 500kV tower assembly area (50 x 70m or 350sqm)
- Typical foundation construction area**
Some levelling or benching of this area may occur with this area
- Crane pad area**
In some areas this may be at a different level to the tower foundations

For illustrative purposes only.
Exact dimensions and layout will vary based on site-specific factors.

Step 2

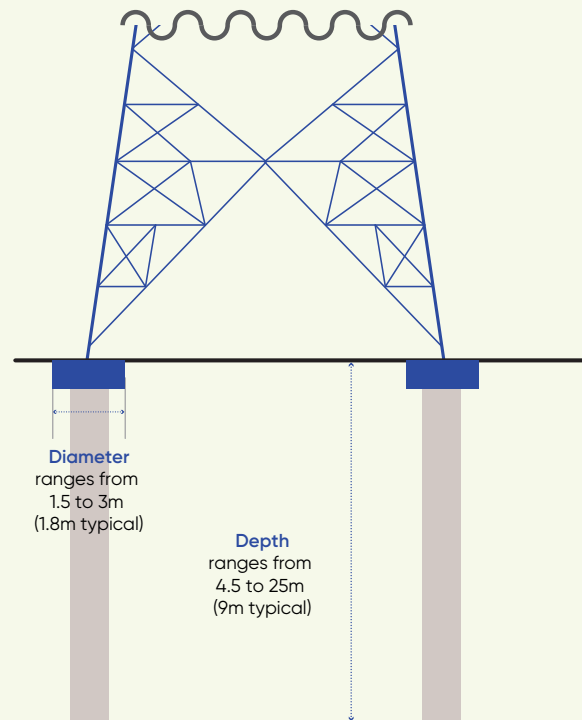
Tower foundation works (1–4 weeks)

Tower assembly sites

At all tower sites, we need to prepare a work area for tower construction works and safe operation of foundation drilling equipment, cranes, elevated work platforms and other vehicles. A suitable area also needs to be prepared for assembly of the tower components and to string the conductors. Typically, work areas are 40 metres by 40 metres, for 220kV structures, and 50 metres by 70 metres, for 500kV structures, but exact dimensions and layout may vary based on site-specific factors.

The location of the work area will be selected based on the site, considering terrain, fences and any other constraints. On sloping sites some levelling works, or benching, may be required to provide safe access for plant or equipment. Depending on the ground conditions, an area of compacted rock may be required to create a work area (hardstand) for the foundation work equipment and cranes used to assemble the tower.

Transmission tower footings



For illustrative purposes only



Foundation drilling



Tower construction

Foundation excavation and pouring

Construction activities will start with temporary pegs being placed on-site to mark out locations for drilling the tower foundations (also known as footings). Each tower typically has four foundations (one per leg), with the depth and type of each tower foundation guided by geotechnical assessments and testing. The typical depth is 9 metres but this can range from 4.5 metres to 25 metres.

Track mounted drill rigs will be used to bore the footing holes. Steel cages are inserted into the holes and then concrete is poured in. The tower pile caps are then formed and poured, and these contain the first part of the tower legs. The concrete will be delivered from off-site concrete batching plants by concrete trucks.



Tower construction

Step 3

Tower assembly works (2–4 weeks)

The transmission towers proposed for the project are double circuit steel lattice towers. They are called 'double circuit' towers because each tower supports two independent electrical circuits, one on each side of the tower. Other tower types including single circuit lattice towers and monopoles are also being investigated for use in some sections of the proposed route.

The materials for each transmission tower will be fabricated, galvanised, and bundled in advance, and will be delivered on semi-trailers (generally in sections) to each tower location. The bundled steel will be laid out and partly assembled using a crane at ground level. A larger crane is then used to connect the bundles together to form the transmission tower, with work crews installing and tightening bolts to secure the structure. Safety signage and anti-climbing cages will then be installed.



Tower construction



Stringing drum

Step 4

Transmission line stringing works (4–10 weeks)

Stringing works is the process of hanging materials and equipment onto the towers and then pulling the conductors (wires) between the transmission towers into final position. Insulators are used to attach the conductors (wires) to the towers. These provide insulation between the high-voltage electricity flowing through the wires and the (earthed) metal towers. Ground (earth) wires running along the top of the towers safely directs electricity to the earth in the event of a fault or lightning strike.

Winching of new conductors

Stringing involves the following steps:

- A winch is set up at the stringing pad, to pull the conductors between the transmission towers.
- Pulleys (also known as stringing sheaves) are fixed to the transmission tower cross-arms, at each location where a conductor will be attached.
- A helicopter, tractor or drone is then used to run out a winch rope (known as a pilot wire). This pilot wire is placed into the pulleys along the stringing section.
- The pilot wire is connected to the conductor and pulled out under tension through the pulleys from the stringing pads.
- The conductor is then attached to the tower via the insulators, in the final fitting arrangement and adjusted to the right tension as per design requirements.



What are stringing pads?

The conductors are pulled into final position from strategically placed temporary work areas (known as stringing pads) between the transmission towers (or behind and in line with the towers in some locations). The specialised equipment needed for stringing, such as winches, tensioners, conductor drums and anchor blocks are placed on the stringing pads. The distance between stringing pads can vary but they are generally located every 1 to 8km along the transmission line. Where there are large angles or changes in direction, two pads may be needed around a single tower.

These areas, which will be returned to their previous state once stringing is finished, are typically up to 50 metres by 50 metres (exact dimensions and layout may vary) and require access tracks. Depending on the ground conditions, compacted rock (hardstands) may be required as a base.



Rehabilitation and remediation

Post-construction

Testing and commissioning

Once construction is complete, there will be inspections and safety tests before the transmission line is commissioned. Final inspections will be conducted along the line in the lead-up to electrical testing to ensure:

- The earthing system is undamaged.
- Anti-climbing measures are in place.
- Signage and labelling are in place.
- Insulation strings are complete and undamaged.
- Temporary safety earths and protective insulator covers are removed.

Tests will then be undertaken on the completed line at low voltages, followed by testing at service-level voltages, to confirm the transmission line meets its design and service parameters. We will work with landholders and all relevant stakeholders, including utilities and regulatory authorities, to plan testing and commissioning activities.

Site rehabilitation

Once the line has been energised all construction areas and access tracks that are not required for ongoing operation of the Western Renewables Link will be reinstated and rehabilitated, including revegetation, unless the landholder has requested that the access track be retained. Temporary gates, fences and other building infrastructure and waste will be removed progressively as construction work is completed. If soil compaction or other disturbance occurs, we will work with landholders to remediate the site.



Activity area reinstated

Frequently asked questions

How will we communicate with landholders and communities?

We will keep landholders and affected communities informed about upcoming construction activities. Our Land Liaison Officers will talk to each landholder with infrastructure planned on their property about planned construction activities, land access arrangements, and our commitment to ensure any potential impact to property, lifestyle, operations, biosecurity and any livestock is kept to a minimum.

If you are a landholder, the project team can provide you with contact details for your Land Liaison Officer. Phone 1800 WRL (975 975) or via email info@westernrenewableslink.com.au.

How long will construction take?

Construction may occur at multiple transmission towers at the same time. There may also be a time lag between each construction step at a tower site when no construction works are being undertaken for a period of time. For example, once foundations are complete, work may stop until crews return to assemble and erect the transmission towers. Work may then stop again until crews return for stringing. The timeframe for construction and each step will vary depending on a range of factors, including weather, geological conditions or the amount of vegetation to be cleared.

We will keep landholders informed of what's happening at different stages of construction, including when we expect to start and finish each step.

Construction of the proposed transmission line is expected to take about two years.

What equipment will be used?

A variety of plant and equipment will be required to construct the overhead transmission line. Heavy vehicles will be used to move cables, plant, equipment, concrete and other materials to and from each site.

The main equipment and plant required is likely to include:

- Mobile cranes.
- Piling rigs.
- Rock drill (as required).
- Skid steer loaders.
- Bulldozers (for access tracks if needed).
- Concrete trucks.
- Semi-trailers (as required).
- Light vehicles.
- Trucks and heavy vehicles.

Typically, small portable generators will be used to power the tower construction sites.

What will the hours of work be?

AusNet will minimise interruption to landholders as far as practicable. Normal working hours for all civil construction, building and demolition activities would be:

- Monday to Friday, 7 am – 6 pm.
- Saturday, 7 am – 1 pm.

Some works may be required outside of normal working hours. Where we need to complete works outside normal working hours, we will consult with landholders about the work activities, duration and times.

How will noise, dust and other impacts be managed?

We will manage impacts such as noise, vibration, dust and air quality in line with EPA requirements and any requirements identified through the Environment Effects Statement and Minister's assessment. We will design mitigations to minimise disruptive impacts from construction.

Where will the workforce come from?

Where possible, we will employ the general construction workforce from within local communities along the transmission line and use regional contractors and suppliers. Specialist work crews will be assigned to construct the tower foundations and steelwork, build the terminal stations and undertake transmission line stringing.

The size of the construction workforce will vary depending on the stage of construction. The crew size at any one tower location is likely to be up to 30 workers.

What other related activities may occur?

Throughout construction, other related activities will be carried out on each property as required and as agreed with the landholder to minimise disturbance to them, their property and their operations. These activities may include:

- Cattle grid installation and removal.
- Temporary fence and gate installation.
- Weed control (in accordance with biosecurity requirements).
- Erosion control works.
- Dust control.
- Security patrolling.

Are other tower types being considered?

Feasible alternative overhead structures are being considered in response to the Environment Effects Statement scoping requirements. Further information about single circuit lattice towers and monopoles is available in the [Transmission towers and conductors fact sheet](#) on the [project website resources page](#).

What are temporary laydown areas?

Temporary laydown areas are used to store and sort equipment and materials and pre-assemble project components during construction. They also provide facilities for construction staff such as portable site offices and car parking.

The project requires temporary laydown areas, two of which will use land associated with the existing terminal stations at Bulgana and Sydenham. Each temporary laydown area for construction will typically be up to 5 hectares, as these areas need to accommodate large quantities of steel members and transmission line materials.

We will work with landholders who live near these laydown areas on local traffic management and other concerns they may have.

Once construction is complete, we will remove all temporary laydown areas used for the project and reinstate any disturbed areas.

How do we manage safety and fire risk during construction?

AusNet's Electricity Safety Management Scheme lays out the way our network and assets, including the Western Renewables Link, should be designed, constructed and maintained for safety; this includes fire safety measures that apply to all projects.

During construction, we will manage safety and fire risk in accordance with all government requirements, total fire ban days and the fire danger period.

All construction activities will be risk-assessed before commencement and on an ongoing basis, with appropriate controls being implemented to manage any hazards or risks identified. Considerations of fire risk include but are not limited to:

- Construction activities.
- Plant failure or incident.
- Electrical incident, inadvertent contact with electrical assets or striking assets such as gas or electrical.
- Bushfire.
- Asset failure.
- Hot works.
- Chemical explosion and storage.




We will always leave the site in a safe condition. During extended breaks, any barricaded area will be reduced in size where possible.

How do we manage biosecurity?

We will implement biosecurity risk control measures in consultation with landholders and in line with industry best practice.



Western Renewables Link

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Information straight to your inbox

Sign up for information straight to your inbox at the project website www.westernrenewableslink.com.au.

Feedback

You can provide feedback on this document via our website www.westernrenewableslink.com.au or by calling 1800 WRL WRL (975 975) or by emailing info@westernrenewableslink.com.au.

Translation and interpretation services






If you need an interpreter, please call 13 14 50.



If you are deaf and/or find hearing or speaking with people on the phone difficult, please contact the National Relay Service on voice relay number 1300 555 727, TTY number 133 677 or SMS relay number 0423 677 767.

Complaints

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

 1800 WRL WRL (975 975)
 info@westernrenewableslink.com.au
 PO Box 638, Ballarat VIC 3353

You can also lodge a complaint or provide feedback directly to your Land Liaison Officer.

Complaint handling steps:

1. You can lodge a complaint with AusNet as outlined above.
2. We will acknowledge receipt of a complaint in writing and will provide a unique complaint reference number within two working days.
3. We aim to resolve the complaint within ten working days.
4. Where we cannot reach a resolution within ten working days, we will keep you informed of the progress being made with handling the complaint by providing regular updates on the investigation and a revised timeframe for resolving the complaint.
5. At any time, you may request to have your complaint escalated to the senior management team by sending an email to GeneralManager@westernrenewableslink.com.au

If your complaint or question relates to the RIT-T process, you can raise it with AEMO by emailing WestVicRITT@aemo.com.au.

If your complaint or question relates to the Environment Effects Statement process, you can raise it with the Department of Transport and Planning by emailing environment.assessment@delwp.vic.gov.au.

If you are not satisfied with the outcome after you have made a complaint to the project team, you may pursue dispute resolution through the Energy and Water Ombudsman Victoria if the complaint relates to access or proposed access to private land under section 93 (1) of the *Electricity Industry Act 2000 (Vic)*, and/or compliance with the Land Access Code of Practice.

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.

Energy and Water Ombudsman Victoria (www.ewov.com.au) including information about complaints and dispute resolution.

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

Environment Effects Statement Process in Victoria (www.planning.vic.gov.au/environmental-assessments/environmental-assessment-guides/environment-effects-statements-in-victoria) including information about the environment assessment process managed by the Department of Transport and Planning.

Essential Services Commission (www.esc.vic.gov.au) including information about the regulation of transmission licenses in Victoria and the Electricity Transmission Company Land Access Code of Practice.




Valuer General of Victoria (www.land.vic.gov.au/valuations/first-time-here/about-valuer-general-victoria) including general information about how land is valued in Victoria.

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More information

Visit the project website westernrenewableslink.com.au for the latest project information.

Contact us

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