FACT SHEET

HumeLink

Transmission towers

JUNE 2023

What is HumeLink?

HumeLink is a once in a generation investment in Australia's energy capability, increasing the amount of renewable energy that can be delivered to consumers, and helping Australia to move towards a net zero future.

It will be one of the nation's largest energy infrastructure projects, with about 360 kilometres of 500 kV overhead transmission lines connecting Wagga Wagga, Bannaby and Maragle and upgraded substation infrastructure.

HumeLink is critical to bringing more affordable, reliable and renewable energy to the grid and is a priority project for the Australian Energy Market Operator (AEMO) and the Commonwealth and NSW Governments. HumeLink is subject to the approval of the Australian Energy Regulator.

To view HumeLink's interactive route map go to transgrid.com.au/humelink.

HumeLink is proposed to be an overhead transmission line that will comprise approximately 850 steel transmission towers that will be connected by high-tension conductors (also known as cables or wires). These conductors will transport high voltage electricity over long distances, where it will be converted at substations to low voltage electricity for delivery to businesses and consumers through the National Energy Market.

Current fact

The HumeLink project will be made up of approximately 850 transmission towers

What type of transmission towers will HumeLink use?

The HumeLink project will comprise of a series of freestanding steel lattice transmission towers that will support dual circuit 500 kV transmission lines (Figure 1).

Each cross arm of the tower will support three bundles of conductors (also known as cables or wires). The design of the towers will vary depending on the terrain but will typically range from 50–76 metres (maximum) in height. Distance (or span) between the towers will be approximately 300 to 600 metres, dependent on topography and ground conditions.

Figure 1 – Example of a 500 kV transmission tower.

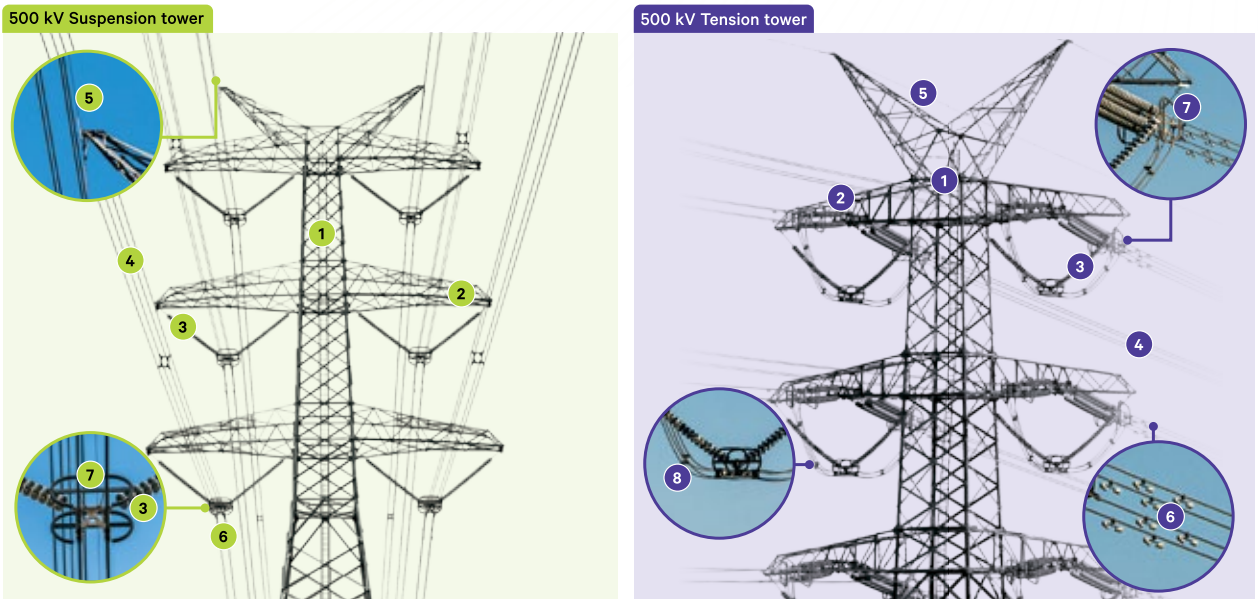
People. Power. Possibilities.

The two most common types of 500 kV transmission towers are:

- **Suspension towers** – used to support the transmission conductors (also known as cables or wires). Their primary function is to keep the wires at a safe height above the ground and to support the weight of the cables across long spans.
- **Tension towers** – used as the anchoring points to connect and apply tension to the conductors. Tension towers are the first and last towers of long sections of conductors. This type of tower is also commonly used at road or railway crossings, and where there is a change in direction.

  Tension towers require thicker steel and more substantial foundations to support the higher horizontal loads they carry, which result from being at the end of sections of conductors. The use of these materials makes their construction more costly compared to suspension towers.

What makes up a transmission tower?



1. **Tower body** is the main central structure that connects to the foundations.
2. **Cross arms** also known as wings, are the sections that extend outward from the main body and hold the conductors.
3. **Insulators** connect the conductors to the cross arms. They stop the electricity from finding a path to ground, and also prevent the conductors from touching the tower body.
4. **Transmission conductors** (also known as cables or wires) provide the path the electricity flows through.
5. **Earth wires** do not transmit electricity, but instead protect the line against lightning and voltage surges.
6. **Vibration dampers** prevent damage to transmission lines and reduce the effects of vibration caused by wind.
7. **Corona rings** also known as 'grading rings' help provide a smooth surface around sharp edges, such as bolts and connection pins, and help reduce noise.
8. **Jumpers** are unique to tension towers and connect one side of the line to the other to maintain electrical continuity.

Figure 2 – 500 kV transmission tower design features.

How are transmission towers constructed?

Surveying

Surveys determine elevation levels, distances and terrain angles. This provides us with valuable information to identify potential construction sites and access points at each tower location.

Access tracks/road clearing and construction

We clear and construct access tracks/roads so vehicles, machinery and equipment can safely get to the construction site. Surveying allows clearing to be kept at a minimum.

Excavations

Piling rigs and excavators remove soil and rocks, clearing the site for the construction of the tower's foundations.

Construction of foundations

Tower legs (the base of the tower) are installed. This includes reinforcement, setting the levels and pouring concrete.

Tower assembly

The tower sections are pre-assembled at ground level using safe heavy lifting methods, such as cranes. HumeLink uses both suspension and tension towers, with tension towers requiring a larger foundation.

Tower construction

The tower is moved in sections onto the concrete foundations using safe lifting methods such as a crane or helicopter.

Stringing

Insulators and pulley blocks are put in place to enable wires to be installed. The conductor cables are winched into position between the towers using equipment such as helicopters and drones. The new cables are pulled through and connected at each end.

The pulley blocks are then removed and the cables are connected to the insulators, known as clipping in.

Restoration

Any disturbed ground or vegetation will be stabilised during construction, and appropriately rehabilitated as soon as feasible and reasonable after construction. We will consult with the landowner to plan this work.

Figure 3 – Transmission line construction process.

Preparation, assembly, erection, stringing and restoration will be done in parts. Each part may take up to a week to build, dependent on the topography and tower type.

Figure 4 – A 500 kV transmission tower being assembled onsite.

Figure 5 – Conductors stored onsite before being winched into position.

Transmission tower construction sites

Transmission tower construction sites will typically consist of:

- a construction bench (assembly area) of approximately 70 metre x 50 metre for each tower. This will depend on ground conditions and the proposed transmission tower type
- a 20 metre radius area around each tower foundation, the largest tower footprint will be 22 metres squared
- an additional preparation area, approximately 50 x 50 metres is required for structure assembly and stringing. This is called a brake and winch site.

Brake and winch site

A brake and winch site is an area used for the preparation, assembly and operation of stringing equipment to connect transmission conductors (also known as cables or wires) to towers.

To connect the transmission conductors, a brake and winch site will be positioned along the alignment roughly every six to eight kilometres and will require a 50 metre x 50 metre flat area. The site may also be required when there is a change in angle or direction in the line.

The majority of the brake and winch sites will be located within the 70 metre easement. Where there is a deviation or angle in the line, the brake and winch PAD site may fall outside of the 200 metre corridor.

As detailed design progresses, indicative brake and winch sites will be determined and landowners will receive maps with indicative locations.

Where will the transmission towers be located?

The final location of each transmission tower will depend on a range of factors such as the distance between each transmission tower, geological conditions and environmental constraints. For example, we will aim to avoid specific areas of biodiversity and heritage.

Positioning of transmission towers will continue to be refined during detailed design, with a view to further minimise environmental, community and landowner impacts within the identified transmission line corridor.

Transmission tower easements and operations

Transmission line easements allow our people access to safely construct, operate and maintain the infrastructure. The land within the easement can still be used for various activities, such as:

- agricultural activities, including cropping and grazing
- operating mobile plant and equipment (height and minimum safe approach distance restrictions apply)
- most domestic recreational activities (excluding kite and drone flying).

Further details about easements can be found in the Transgrid Easement Guidelines, on the Transgrid website.

Figure 6 – 500 kV transmission tower legs and concrete foundations.

Connect with us

Transgrid is committed to working with landowners and communities through the development of HumeLink. Please connect with us for more information.

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