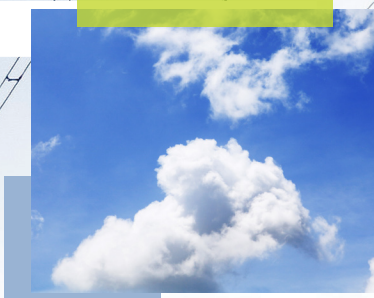
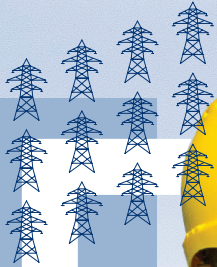


Pathway to 2030 - Tower Crossing Considerations

May 2024



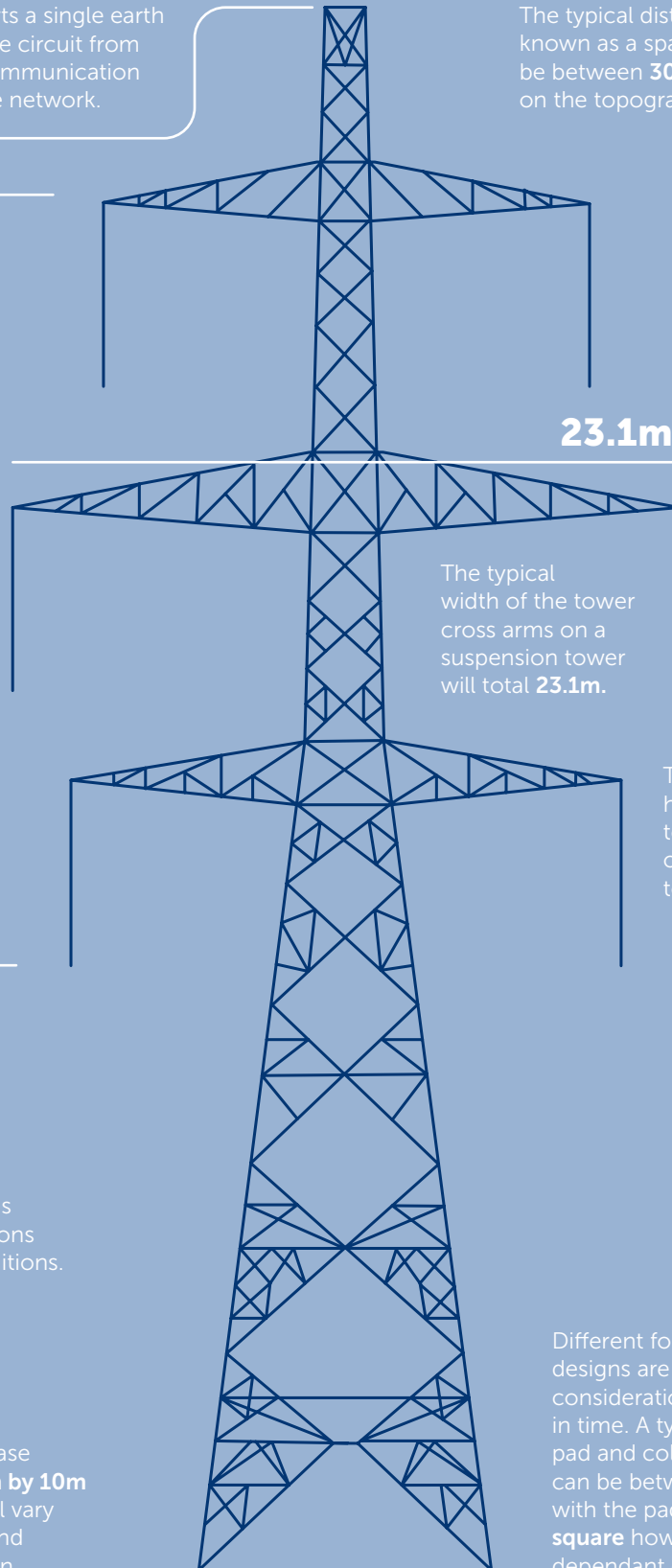
Our 400kV towers

The peak of the tower supports a single earth wire that is used to protect the circuit from lightning but also acts as a communication link to allow us to operate the network.

The typical distance between towers known as a span will most commonly be between **300-350m**. This will vary on the topography being traversed.



The proposed tower will be designed to hold three wires known as conductors under each arm. This allows for increased power transfer whilst also significantly reducing audible noise.



The typical width of the tower cross arms on a suspension tower will total **23.1m**.

The typical tower height is expected to be around **57m** on average, although tower heights will vary.

57m

The design of the towers ensures that the lowest point to ground beneath the wires is at a minimum **9m** in all locations under normal operating conditions.

For a suspension tower the base will typically be between **10m by 10m** and **13m by 13m** however will vary depending on tower height and if the line is changing direction.

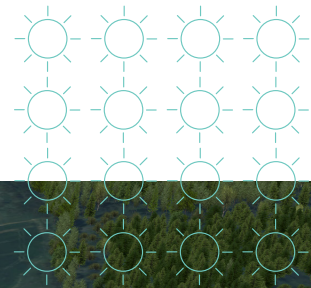
Different foundation designs are currently under consideration at this point in time. A typical conventional pad and column foundation can be between **3-6m deep** with the pad being between **4-8m square** however this is heavily dependant on ground conditions.

How would we cross existing assets?

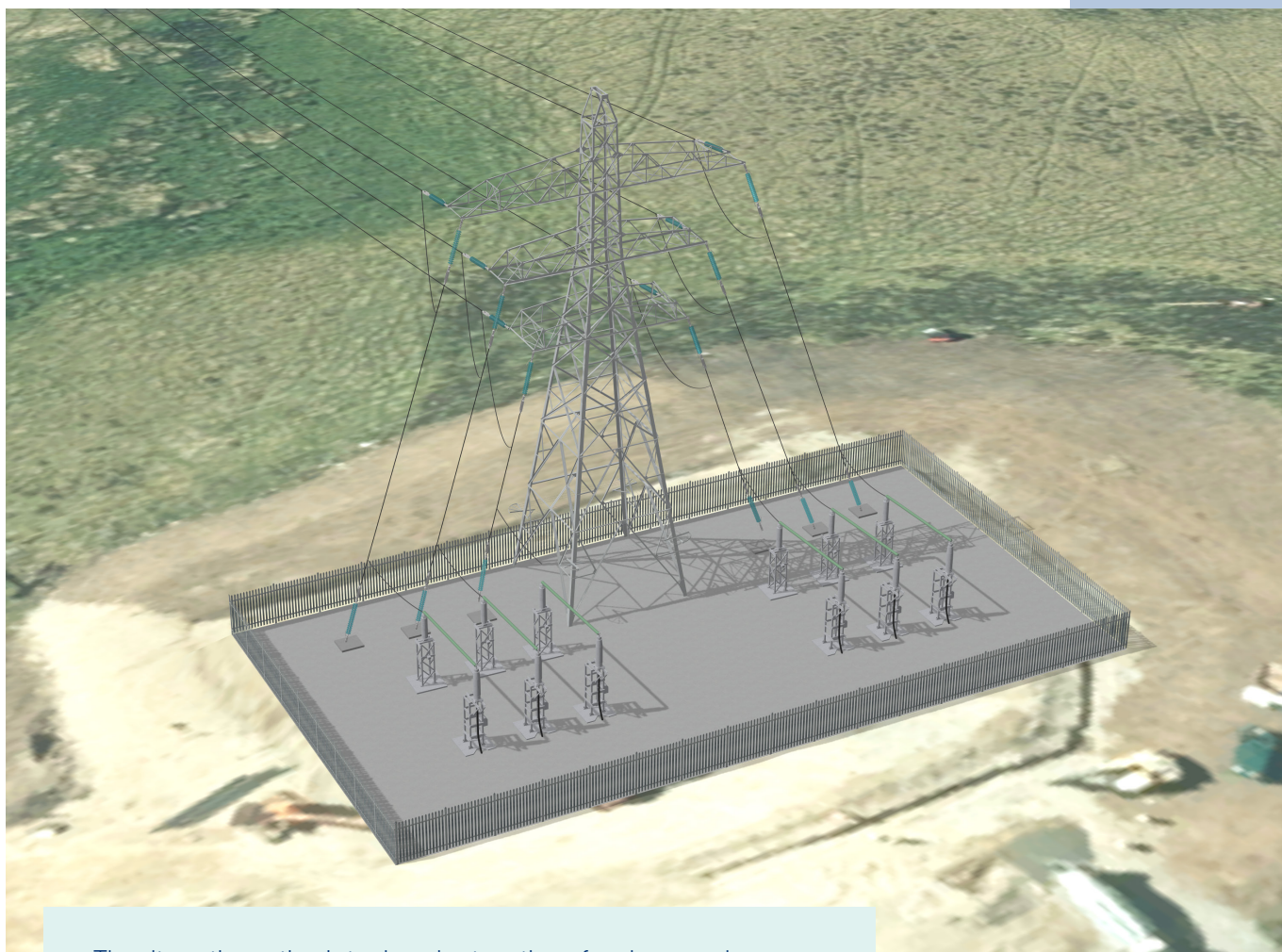
Overhead Lines

Along the route for some projects we will be required to cross several existing overhead lines. Depending on the location where the crossing takes place and the voltage of the existing line several options will be considered. The options discussed below are just indicative at this stage and each specific crossing design will need considered to determine the most suitable option however this cannot be done until the locations are confirmed. Typical arrangements are explained in the following section however alternative arrangements will still be considered.

For distribution lines (wood pole lines that take power to homes and businesses) the preference would be to divert or underground them.



When crossing transmission lines the initial preference is to have the two lines cross over each other in what is called a diamond arrangement. Each design would be specific to the individual crossing however an illustration is provided below of this option. This avoids the use of underground cable and minimises the land sterilisation caused by cable sealing end compounds.



The alternative option is to do a short section of underground cable on the existing circuit between the towers being crossed (which would be smaller towers rated 132kV or 275kV). We would then establish a cable sealing compound at either end. The size of the compound would depend on the voltage and capacity of the circuit so can vary however a typical 132kV compound is shown in the image which is approx. 37m by 25m. A typical 275kV compound could be in the region of 70m by 45m.

Pipelines and Underground cables

Where we cross pipelines and underground cables we look to do so as close to 90 degree angles as possible whilst also placing towers out with the assets safeguarded area to minimise any interaction.

This applies mainly to cables and metallic pipelines and the reason for this is where we run in parallel or cross a metallic pipeline at a shallow angle there is a risk of alternating current (AC) interference. This can have an impact on the safe operation of the pipeline or underground cable and needs to be managed to ensure the health and safety of personnel working on the asset as well as the integrity of the asset itself.

An existing utility search has been carried out for each of the projects identifying any below ground assets. Where crossings or paralleling of these are not avoidable further AC interference studies are carried out and mitigations investigated along with the asset owners where required to ensure both assets can operate together in the area.

