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Ms Cate Faehrmann MLC
Chair
Select Committee on the Feasibility of Undergrounding the Transmission Infrastructure for Renewable Energy Projects
Via email: undergrounding.infrastructure@parliament.nsw.gov.au

Dear Chair

Thank you for the opportunity to respond to questions taken on notice from the hearing on Feasibility of Undergrounding the Transmission Infrastructure for Renewable Energy Projects on 16 February 2023 and provide further information.

Climate Impact Assessment
Within the Ausgrid network area, our customers have generally experienced the benefits of a highly resilient and secure electricity system. However, over the past decade we have seen the number of escalating extreme weather events causing damage to our network and increasing the risk to the communities we serve. A warming climate will result in more intense extreme weather events which will result in further wide area, prolonged outages for customers.

Ausgrid has undertaken, the first of its kind in Australia, an analysis of future climate change impacts on an electricity distribution business. Using Ausgrid asset data and external climate data sets, we used the modelling to determine the climate change impact on our customers and our business.

Please find attached:
1. Ausgrid Climate Impact Assessment
2. Ausgrid Climate Resilience Framework
3. KPMG Climate Risk Assessment Collaboration
4. Risk Frontiers Letter to the Australian Energy Regulator
5. Ausgrid Climate Resilience Business Case.

Acid Sulphate Soil – Environmental Impacts
Ausgrid pays particular attention to minimising the environmental impact of all projects it undertakes, and rigorously assesses environmental risks in evaluating project options.

Underground construction is often more impactful on the environment and tends to be more so in rural scenarios. The primary considerations include:
1. The width of the transmission corridors
2. Excavation and Soil Management including Acid Sulphate Soils
3. Sensitive Environmental and Cultural Areas
4. Vegetation and Land Usage
5. Lasting Legacy

Transmission Corridors
Routes for cables such as 132kV AC cable circuits require excavation for the full length of the transmission path. Excavation for each circuit can be up to 2.5m in width and where multiple circuits are required a separation distance is required between circuits to avoid derating the cables. For a two circuit arrangement, this would require an excavated and disturbed width of greater than 10m along the full length of the transmission path.

Cable circuits also require cable jointing and cross-bonding pits approximately every 500-1000 metres along the entire route – the interval being defined by the practical maximum cable drum length during installation. These pits are typically 20m long, about 1m deep and of concrete construction to preserve a clean chamber for jointing and cross bonding purposes. AC cable circuits are also highly capacitive in nature and require reactor stations approximately every 25 km to allow efficient power transfer. These stations are substation like structures and would occupy an area of around 50m by 50m each.

Whilst an equivalent overhead transmission corridor is wider, at circa 30m, than the cable corridor, there are distinct differences in the environmental impacts between the two.

Excavation and Soil Management including Acid Sulphate Soils
Excavation and management of spoil and fill is a major component of underground cable projects. Excavation material, particularly where it does not meet minimal thermal requirements, cannot be used for fill immediately around the cables. To improve the current rating of the cables a thermally stabilised cement type slurry called TSB is used for part of the backfill volume. This means that excess excavated spoil that cannot be reused on site must be transported for off-site re-use or disposal. Handling, transport and disposal is costly, particularly if the soil contains natural or manufactured contamination.

Where excavated or disturbed material contains iron sulphides (common in NSW along the coast but also in certain areas within the interior) exposure to oxygen results in acid formation, which can harm and kill animals and plants. Handling of these soils is complex and costly requiring measures to prevent atmospheric exposure of the soils prior to reburying. Often, this is not feasible, and soils must be treated prior to on-site reuse or off-site disposal. The most common method of treatment is to mix an alkaline material such as agricultural lime into the soil. Management of the treatment process is expensive requiring contained storage areas, mechanical mixing equipment and extensive sampling and analysis prior to and after treatment. Landfills that are licensed to accept treated Acid Sulphate Soils are very limited and costs for disposal are in the order of 5 times more expensive compared to clean fill.

Conversely excavation for overhead transmission lines has a much smaller excavation area with small excavation volumes at each tower or pole. This can be also mean that issues such as acid sulphate soils can potentially be avoided through selective siting of such towers or poles and in many cases due to the low volumes involved, effective management on site.

Sensitive Environmental and Cultural Areas
Overhead lines can significantly reduce the environmental impacts of construction as they are able to span over sensitive areas such as valleys, wetlands, waterways, endangered vegetation, and Aboriginal heritage areas. Further, construction and maintenance access ways

for overhead lines are generally only required to the pole locations compared to cable circuits which require access along the whole route. Overhead lines also have greater flexibility in route alignment and provide the ability to alter pole locations to further reduce impacts.
The same flexibility is typically not available for underground cable circuits without significant route deviations. Further, any waterway crossing requires construction of a cable bridge or underground tunnelling which can add significant engineering complexities and environmental risk during construction.

Vegetation and Land Usage
Underground cable circuits require complete vegetation removal for construction within the established corridor. Once the corridor is established it is generally only suitable for pastural type vegetation as any plants and trees with deep roots are unsuitable for placement above cables; both from an access perspective and potential damage to cables.

The extent of vegetation clearing for overhead transmission lines is highly contextual. As an example, a span crossing a valley may require little or no clearing except at the pole or tower locations. For flatter topography rural spans, vegetation clearing is targeted at preventing conductors clashing with tree branches. This can require full tree clearance of the corridor in places but vegetation growth beneath the lines is less restrictive than that for cable circuits so long as it can be trimmed to remain outside of mandated clearances.

For agricultural land, overhead transmission lines generally are not overly restrictive on farming activities except of course at the location of the pole or tower itself. Impacts can be minimised through selective siting and taller poles or towers.

Lasting Legacy
Overhead transmission lines have a smaller environmental footprint and are easier to renew, alter, remove and connect into. In contrast, underground cables are typically left in-situ at the end of life due to the impacts associated with their removal.

For further information please contact Marc Landrigan, Senior Government Relations Lead at

Kind regards

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