

# Transgrid HumeLink Project

BANNABY ROUTE REFINEMENT DECISION BY TRANSGRID OF MARCH 2022

BANNABY RESIDENTS ACTION GROUP (BRAG) - CONTINUED PREFERENCE FOR  
OPTION B1C

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## Transgrid HumeLink Project

### Report to Bannaby Residents Action Group (BRAG) – Continued Preference for Option B1C After Transgrid Bannaby Route Refinement March 2022

#### Background

BRAG has engaged Electricity Transmission Assessments and Advice to assist in the investigation and analysis of Transgrid's preferred Option B3 and BRAG's preferred Option B1C outlined in the HumeLink Fact Sheet of March 2022.

The area covered by Transgrid's route refinement process is bounded by the Tarlo River National Park to the west and southwest, Bannaby Substation off Hanworth Road in the east, and to the north of Bannaby and Hanworth Roads.

Three final options were presented by Transgrid as shown below:



Following an assessment, Transgrid decided that the Bannaby 3 Route (B3) is preferred.

However, BRAG strongly prefers its originally proposed Bannaby 1 Route (B1C) option.

This preference is based on the assessment of the route refinement impacts as follows:

- Refinement of B1C route
- Landscape character and visual amenity
- Ecological issues
- Construction and operational access, including erosion susceptibility of the relevant soils

In this regard, BRAG shares Transgrid's guiding principles to route selection including:

- keeping the transmission line as straight as possible;
- selecting the shortest possible route between two substations; and
- where possible paralleling existing transmission easement or using public land.

Given these principles, and the choice of appropriate weightings in the constraints mapping process, BRAG strongly prefers Option B1C for the Bannaby route refinement.

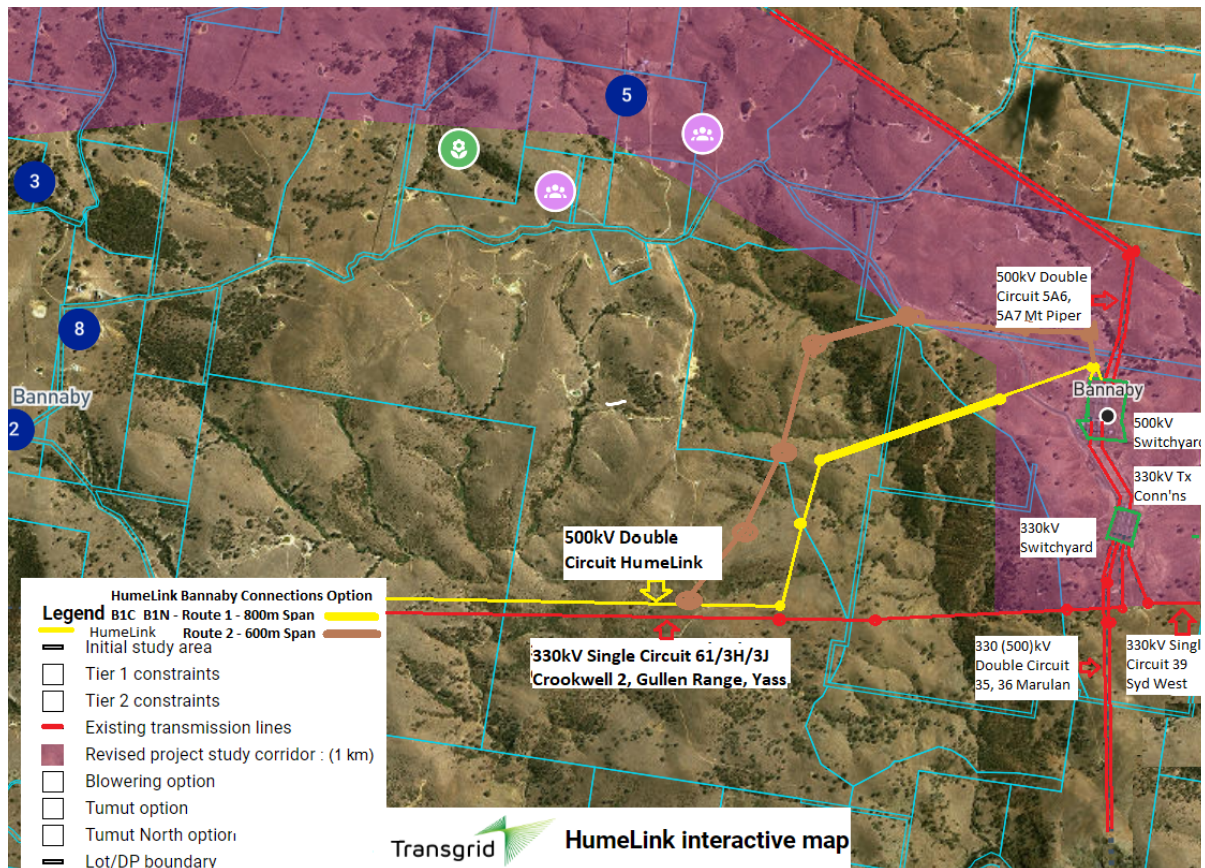
## Refinement of B1C Route Approaching Bannaby Substation

### Route Plan

*The B1C route satisfies all three of the above guiding principles of route selection.*

For visual impact reasons, the B1C route has all of HumeLink south of Hanworth and Bannaby Rds, paralleling the existing 330kV line to the Bannaby Substation approaches.

Where Option B1C approaches the western side of Bannaby Substation, the route has been further refined as shown in the following plan, (a variation based on Transgrid's HumeLink Interactive Map):



### Analysis of the Western Gully Crossing

The HumeLink B1C line approaches the substation from the west. Originally, it would have crossed the western gully with an approximate 1 km span, 2.1km from Hanworth Rd. Whilst technically possible, such a span length is a challenge and considered unnecessary. It is suggested that a better solution would be to locate the crossing further north where the gully narrows. This would result in a more economical and more easily constructable span.

In the above plan, locating the gully crossing further to the north as Option B1C Route 1 has an 800m span, whilst moving further north still provides a 600m span, shown as Option B1C Route 2.

Either option would likely be technically feasible. However, Option B1C Route 2 would be 700m from Hanworth Rd, whereas Option B1C Route 1 would be 1.2km. Therefore, *Option B1C Route 1 would be less visible from the road and therefore preferred by BRAG.*

## Landscape Character and Visual Amenity

### Existing Environment

The land within the route refinement area is generally cleared pastoral land with sheep and cattle dominating. The broader area also contains cattle breeding such as Bannaby Angus.

To the south of Bannaby Rd is the Tarlo River National Park, interspersed with native vegetation and open grazing land. The land slopes steeply away to the south towards the Tarlo and Wollondilly Rivers. To the north is more open grazing land with areas of native vegetation.

Residences associated with the pastoral properties are scattered throughout the area.

The historical nature of the area is apparent through the care that the Bannaby residents have taken to retain and restore pioneer and heritage features. Landmarks include the Bannaby St Matthews Anglican Church and Cemetery, with graves of the pioneering Hillas family. Also included in the area are the Hillas Farm Homestead and Outbuildings, and the sheep shearing sheds and shearers accommodation on Bannaby Station.

**Bannaby Angus – Commercial Undertaking**



**Bannaby St Matthews Church and Cemetery**



**Old Shearing Shed and Shearer Accommodation on Bannaby Station**



**Hillas Family Graves**



The growing tourist trade is evident by the development of a number of B&Bs in the area.

500kV and 330kV transmission lines cross the area, terminating at Bannaby 500/330kV Substation in the east. A 132kV line from the Taralga Wind Farm also crosses the area to the Marulan 330/132kV Substation at Paddy's River.

**Hanworth Rd - 330kV line crossing gully west of substation (500kV Marulan line in background)**



### Project Impacts on Sensitive Viewing Points

It can be seen that the introduction of new permanent elements into the landscape would result in a change to the landscape character and visual setting of the area. For both options, the greatest visual impact would occur in the line route where new structures are erected and requires the clearing of vegetation in proximity to publicly accessible roads and sensitive viewpoints at dwellings.

Detailed information of views from residences is yet to be confirmed. However, it is understood that for the line there may be 2 houses within 300m and 4 houses between 300 to 500m<sup>1</sup>.

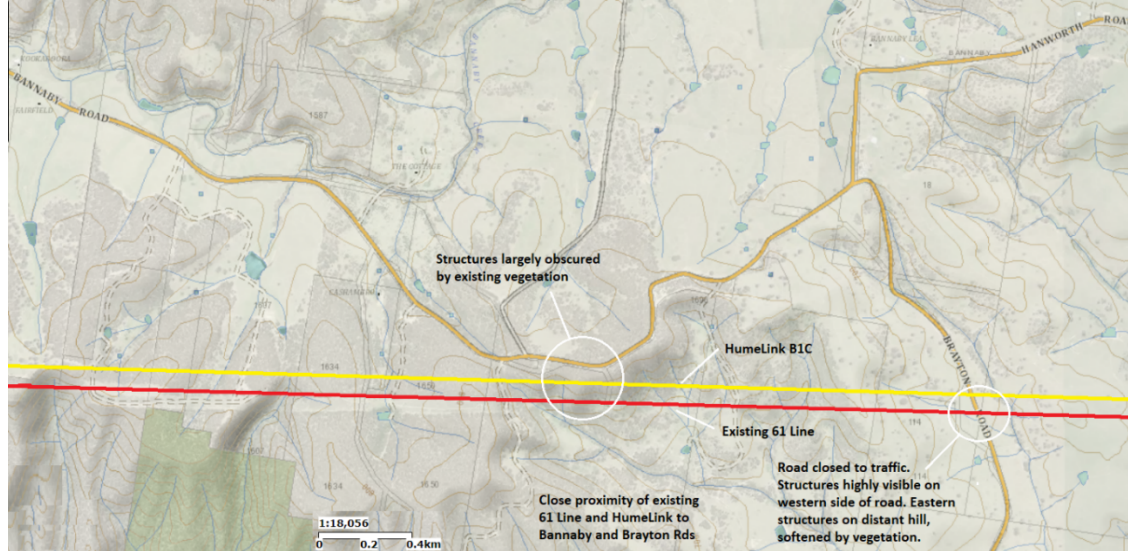
Viewing points of the existing 330kV line from roads have been investigated and a broad assessment made of the likely impact of the 500kV line. The full extent of the combined impacts can only be determined once the line detailed design is completed. However, the existing 330kV line has steel lattice structures up to 35m in height, whilst the HumeLink line structure height would be up to 75m. These would be similar to the Marulan 500kV (operating at 330kV) line above. In both cases, typical structure placement would be from 300 to 600m along the line.

Until completion of the detailed design, the assessment results are as follows:

## Brayton and Bannaby Roads

*Brayton Rd* is in poor condition and is presently closed due to flood damage. There are few viewers since even when the road is open it has little traffic.

### Line Crossing Brayton Rd – Few viewers. Lines adjacent to Bannaby Rd – Vegetation shielded



On the western side of *Brayton Rd*, the 330kV structure is highly visible, with a farm shed in the background. Unless the 500kV structure is designed to be placed further away up the hill, it will also be highly visible

### Western Side Brayton Rd – Structure highly visible at crossing – shed in background



On the eastern side of *Brayton Rd*, the 330kV structure is at some distance and is further softened by foreground vegetation, with the viewer having to look upwards to notice the structure. Two thirds of the 500kV structure will be visible but less prominent due to the bulk of the dense vegetation, the distance and the elevation.

**Eastern Side Brayton Rd – Structure softened by vegetation and distance**



The 330kV structures close to *Bannaby Rd* are largely obscured and softened by native vegetation. The top half of the 500kV structure will be visible but less prominent due to the bulk of the dense vegetation.

**Structures close to south of Bannaby Rd – Largely obscured and softened by native vegetation**



#### Hanworth Road

Highly visible after crossing *Hanworth Rd*, the existing Mt Piper 500kV line approaches Bannaby Substation towards the south. The substation is on the right of the picture. Under Option B3, the HumeLink line will parallel this line at a distance yet to be determined by Transgrid

**Highly visible existing 500kV line. Under Option B3, HumeLink will parallel this line on right.**



Highly visible crossing private land north of *Hanworth Rd*, the existing Mt Piper 500kV line approaches Bannaby Substation. Under Option B3, the HumeLink line will parallel this line at a distance yet to be determined by Transgrid

**Highly visible existing 500kV line. Under Option B3, HumeLink will parallel this line on left.**



### Existing Taralga Wind Farm 132kV Line

The existing 132kV line from Taralga Wind Farm to Marulan 330/132kV Substation crosses the 330kV line in the Bannaby area. However, the route takes advantage of the steep topography and dense native vegetation, and its presence is not apparent in most views.

The following pictures illustrate a typical site location showing that the 132kV line is not of concern. The site is towards the western end of Bannaby Rd, in the vicinity of the Tarlo River National Park.

**Cattle grazing in paddock adjacent to the 132kV line**



**132kV line at bottom of slope and not visible from Bannaby Rd. 330kV line in background.**



## Ecological Issues

### Tarlo River National Park

The Tarlo River National Park has been determined by Transgrid to be a Tier 2 constraint under its constraints mapping process. Areas with Tier 2 constraints have social, environmental, land use and engineering *limitations that should be avoided whenever possible*.

Tarlo River National Park is located about 30 km north-east of Goulburn, towards the western end of the Bannaby Route refinement area<sup>1</sup>. It was declared in 1982, has an area of 8,074 ha and is managed in accordance with the Tarlo River National Park Plan of Management<sup>3</sup>.

Most of the park consists of steep forested country along the northern part of the Cookbundoon Range and rugged land east of the range. The Tarlo River meanders south to north through the park, creating a 40 km long gorge. Several uncommon plant communities and threatened plant and animal species occur, and the park has extensive areas of koala habitat, although the extent and presence of koalas has not been confirmed.

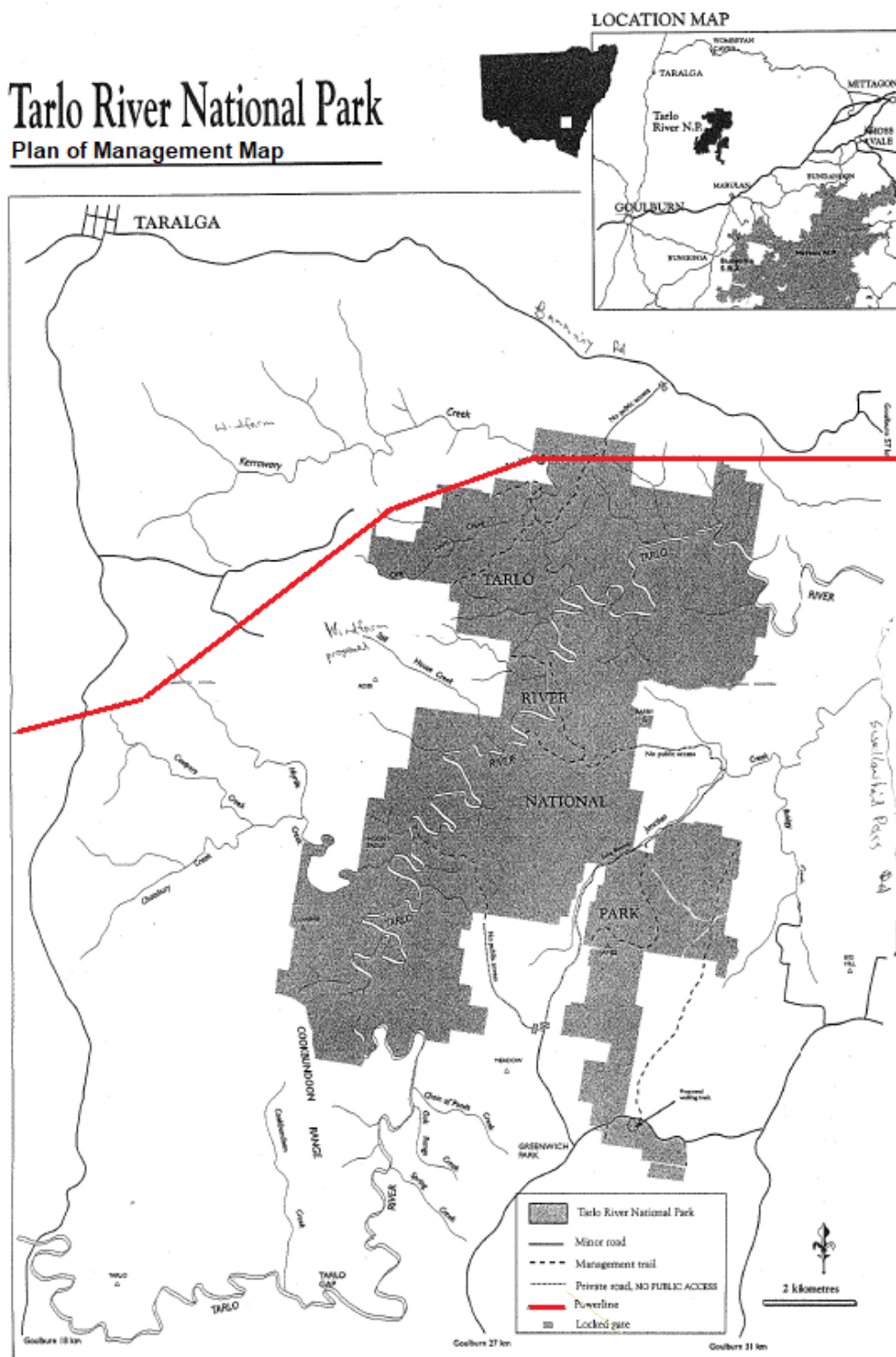
The existing 330kV transmission line, constructed in 1969, crosses the park near the northern boundary and a maintenance agreement is in place to ensure that clearing under the lines is minimised to permit wildlife movement.

Under the plan, new works, facilities or operations proposed by any organisation or individual will not be permitted unless they are consistent with the purposes of reservation of the park and the plan of management.

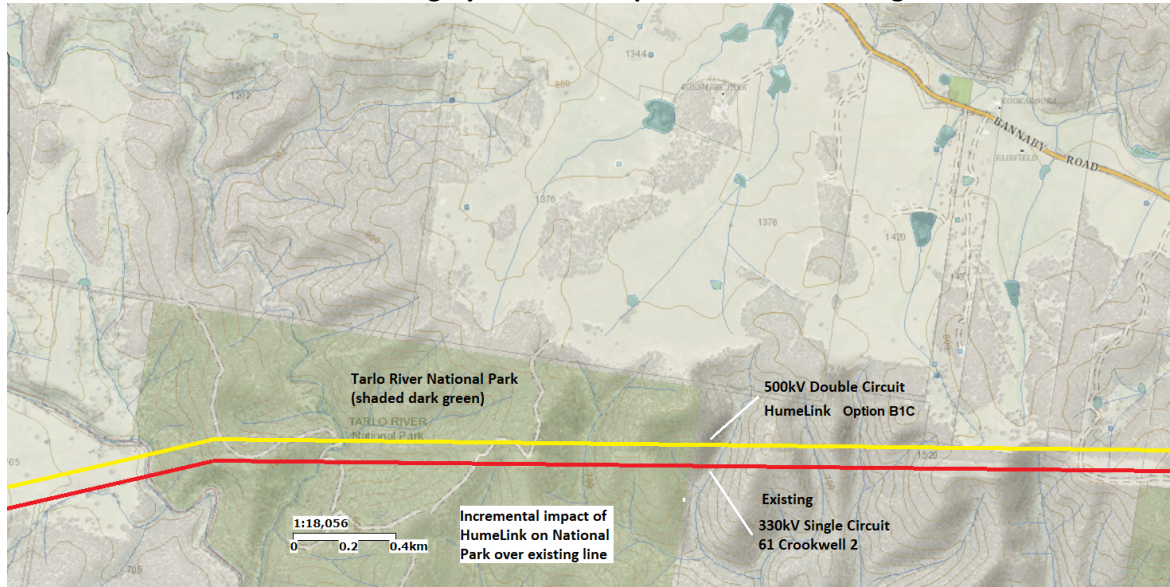
Transgrid has investigated the community's suggestion for the Bannaby Route Refinement assessment identified as Option B1C, which crosses the northwest corner of the Tarlo River National Park, paralleling the existing 330kV line. The assessment identifies the national park as a Tier 2

constraint but makes no direct comment on the national park<sup>1</sup>. The three plans immediately below show the Plan of Management Map, the crossing of the park by HumeLink Option B1C with the existing 330kV line, and the extent of existing vegetation clearing.

### Tarlo River National Park Plan of Management Map

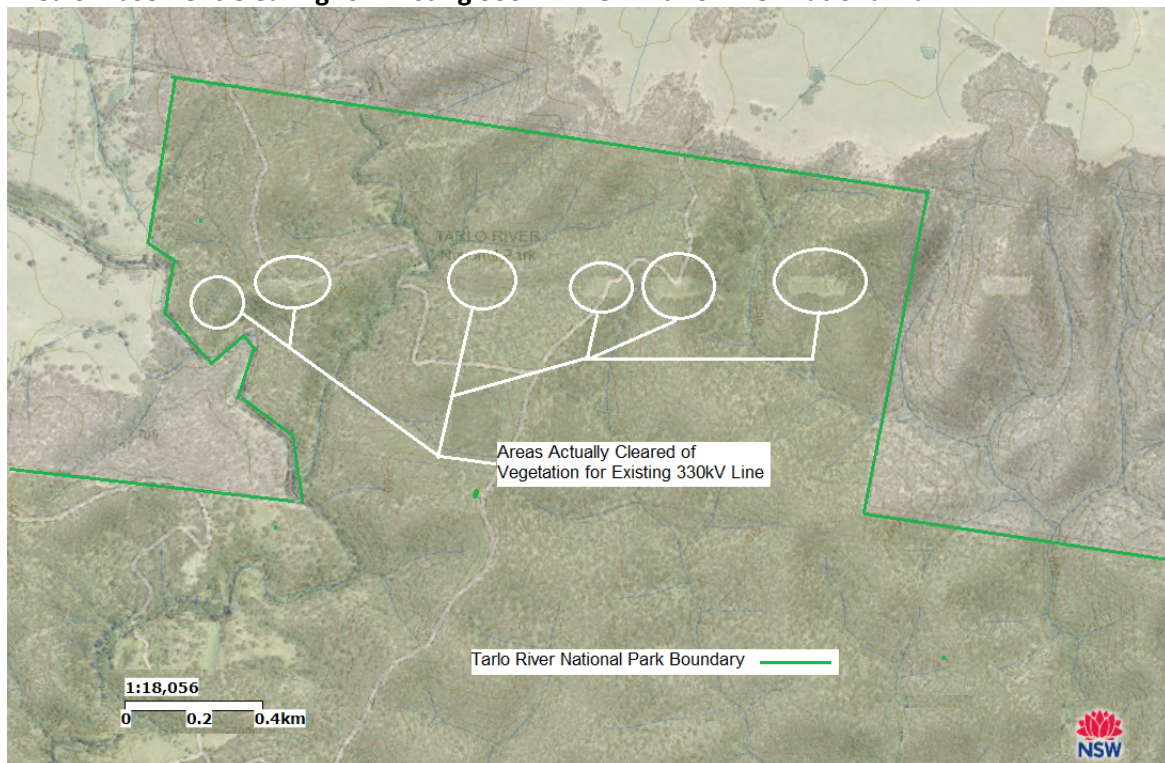


### Tarlo River National Park – Crossing by HumeLink Option B1C and existing 330kV line



The maps show that the existing 330kV line intersects the northwest corner of the park by a small margin<sup>5</sup>. The area isolated to the north of the existing line is 90 ha, approximately 1% of the park area of 8,074 ha<sup>3</sup>. The area actually cleared for the easement is about 3.8 ha due to the topography generally necessitating tower placement on ridgetops. Similarly, for HumeLink Option B1C, about an additional 4.5 ha would be cleared, giving a total cleared area of 8.3 ha. For HumeLink, the additional, newly cleared area represents only 0.06% of the total park area.

### Area of Easement Clearing for Existing 330kV Line in Tarlo River National Park



When the above factors are considered, it is apparent that HumeLink Option B1C has a very small impact on the park. This is also the case for the existing 330kV line that is subject of the maintenance agreement in place between Transgrid and the National Parks and Wildlife Service. This has ensured that clearing under the lines is minimised to permit wildlife movement. It is proposed that the agreement be expanded to accommodate HumeLink Option B1C, both during construction and in operation.

Accordingly, with such management issues in place, it is considered that the HumeLink work would be consistent with the Tarlo River National Park Plan of Management.

In view of the minimal impact on the park and the adoption of appropriate management measures, and because the HumeLink transmission project has been declared by the NSW Government a Critical State Significant Infrastructure (CSSI), it is considered in balance that this aspect of the project could gain ministerial approval when considered as part of the detailed EIS process.

## Construction and operational access, including erosion susceptibility of the relevant soils

### Access

For HumeLink Option B1C, access is largely obtained through tracks already constructed for the operation of the existing 330kV line. Accordingly, the need for new tracks is limited. However, for construction access, existing tracks may need peripheral widening to accommodate construction plant. Structure installation sites would likely need additional clearing for work access. For both construction and operation, disturbed vegetation would be restored in accordance with appropriate mitigation measures. These measures would be adopted into the NPWS maintenance agreement.

In contrast, for Option B3 the provision of new construction and operational tracks will be required.

### Erosion susceptibility

Much of the area is steep, with thin, stony soils which are highly erodible following clearing or disturbance. However, erosion is recognised as a naturally occurring process in the area. Where erosion has been accelerated by human activity or is threatening significant habitats or other values, appropriate control measures have been and will continue to be undertaken.

It is noted that residents of the area recognise this issue as important. They have worked with government agencies to manage erosion occurrence through the introduction of control measures such as dams and extensive berms around site contours, and the planting of appropriate vegetation aimed at managing erosion by intercepting water cross flows.

## Comments on Transgrid Option B3

### BRAG Preference for Bannaby Route Refinement B1C

Given the above impact assessments, it remains the case that BRAG prefers Option B1C over Transgrid's preferred Option B3.

### Guiding Principles

In regard to the assessment process, BRAG shares Transgrid's guiding principles for route selection which include:

- keeping the transmission line as straight as possible;
- selecting the shortest possible route between two substations; and
- where possible paralleling existing transmission easements or using public land.

Option B1C complies with all these guiding principles.

### Constraints Weightings

Although in alignment with Transgrid's guiding principles, BRAG is of the view that the choice of weightings in the constraints mapping process as a whole does not reflect the reality that the perceived, incremental industrialisation of the Bannaby area would significantly affect the lives of the residents and their enjoyment of their rural environment.

The following comments are made on Transgrid's assessment in their constraints matrix<sup>1</sup>:

### Requirement For 200m Corridor Bannaby Route Refinement

Meaningful comments on Option B3 of the Bannaby route refinement are complicated because the 1km wide study corridor is still being used publicly. According to the HumeLink Interactive Map, Transgrid is still working on updating the map with the revised project footprint and the preferred 200m wide corridor in the Bannaby area.

Accordingly, some aspects of the project footprint for the B3 Option cannot be accurately ascertained.

*In contrast, the B1C Option, except for the final Bannaby turn in across land with satisfactory views, is clearly defined.*

These HumeLink footprint aspects are discussed as follows:

### Residence Numbers Within a Set Distance of HumeLink and Private Landowners Affected

This assessment within the social licence consideration provides the number of residences within 300m and 300m to 500m of the line is meaningless because the location of the line is undefined.

The same argument also applies to the number of private landowners affected.

### Electric Fields – Determination of HumeLink Centreline Distance When in Close Parallel to Mt Piper Line and Proximity to Residences

The location of the last portion of HumeLink Option B3, where it parallels the existing Mount Piper to Bannaby 500kV line, will need to be built so that electric field exposure to workers at height does not exceed safe limits for that voltage. *The separation required will determine the line location and therefore its distance from residences.*

Over and above the limits on induced currents in the human body, electric fields can cause unpleasant "nuisance shocks" by sparks jumping from the person in an electric field to earthed objects, such as the tower. The electric field at or near ground level is designed to be compliant with exposure limits for the public, under the conductors and at easement edge.

The main problem in running in close parallel to the existing 500kV line is that construction workers erecting the towers and stringing transmission lines at height would have to work in an excessively high electric field as the fields above easement edge exceed allowable limits for worker exposures.

It cannot be expected that the construction workers bolting the tower together or involved in stringing and fitting spacer-dampers to the conductors of the new line to work in protective Faraday suits, which live line teams would use in live line maintenance.

It is unlikely that the Mount Piper to Bannaby line would be taken out of service for this work other than a weekend outage in mild weather.

The necessary separation for electric fields is complex and needs advanced software to determine exactly; but from experience, it is likely that a 200m centreline separation would be acceptable.

When the Eraring Power Station transmission lines corridor was built by the Electricity Commission of NSW, the parallel circuit for a future connection to Bayswater Power Station was constructed in advance because it could not be safely built later in close parallel.

*Accordingly, the provision of a safe separation of typically 200m will need to be considered when determining safe working conditions, as well as the location of the HumeLink line so that the number of residences within the corridor can be identified.*

#### Parallel 500kV lines separation for electric fields under Option B3



#### National Park Tier 2 Constraint

Although Option B1C crosses by a small margin the Tarlo River National Park and is therefore a Tier 2 constraint, it is considered that the intrusion is minor and that appropriate mitigation measures can be implemented to limit any impacts. These measures can be formulated by amendment of the maintenance agreement between Transgrid and the National Parks and Wildlife Service so that any impacts taken together are of a similar degree to that of the existing 330kV line.

### Bushfire Risk

It is accepted that Option B1C has a greater high to very high bushfire risk than Option B3 (6.9km vs 3.1km). However, when considered as a percentage over the entire 360km length of the HumeLink line, the sections of the line at such risk are only 1.9% and 0.9% of the line respectively. This is quite a different perception than if the options were considered as a percentage of the area of high to very high risk, 16% and 7% respectively. Accordingly, it is considered that Transgrid's assessment of the scale of this consideration is misleading when the options are assessed in proportion.

### Private Land Impacts

BRAG prefers that infrastructure projects should be on public lands where possible.

Option B3 would have a length of 17.3km and be built entirely on private land.

Option B1C would have a length of 16.6km but only 14.3km would be built on private land.

Therefore, Option B3 would be longer, but with 3km less built on private land and so, on the basis of private land impacts, would be inferior to Option B1C.

## Future 500kV Double Circuit Line to Bannaby Substation from South Creek Substation in Sydney

The 2022 Integrated Systems Plan from the Australian Energy Market Operator (AEMO) identifies the Sydney Ring (Reinforcing the Sydney, Newcastle and Wollongong Supply) as an actionable project to be progressed urgently for delivery by 2027.

The Southern part of the project requires the termination of a fourth double circuit 500kV transmission line at Bannaby Substation. This new line would connect from a new 500kV Substation near South Creek in Sydney.

The South Creek project is outside the scope of the HumeLink project but is being progressed urgently for the not-too-distant future. The new 500kV line would likely approach Bannaby Substation from the north, potentially adjacent to the continuation of the existing 330kV 39 Line to Sydney West.

Since the line would be some distance from the nearby landowners, it is understood that this future project is unlikely to be of interest to BRAG.

## References

1. [HumeLink Fact Sheet – Bannaby Route Refinement Decision](#), Transgrid, March 2022
2. [HumeLink Interactive Map](#) Transgrid, 2022
3. [Tarlo River National Park Plan of Management](#), NSW National Parks and Wildlife Service, August 1998
4. [Declaration of SSI and CSSI - State Significant Infrastructure Guide, 29 March 2021](#), NSW Department of Planning, Industry and Environment, 2021
5. [SIX Maps](#), NSW Land and Property Spatial Information Exchange, 2022
6. [Transgrid Bannaby Substation](#), Google Earth, 2022