November 2024

Bungaban Wind Farm Connection Project

Corridor Options Report

Table of Contents

Contents

Acknowledgement of Country

Powerlink acknowledges the Traditional Owners and their custodianship of the lands and waters of Queensland and in particular the lands on which we operate. We pay our respect to their Ancestors, Elders and knowledge holders and recognise their deep history and ongoing connection to Country.

How to provide feedback on the corridor options

Feedback is being sought on the corridor options for the proposed Bungaban Wind Farm Connection Project. Feedback can be provided in the following ways:

In-person:	Community information drop-in sessions on 19th and 20th November 2024
Phone:	07 3898 4838
Email:	bungaban@powerlink.com.au
Website:	www.powerlink.com.au/bungaban

Our project webpage has links to an interactive map where you can add your comments on the proposed corridor options. This page also features a feedback survey which we encourage you to complete. You can also sign-up for our regular project-related email updates.

We are inviting feedback on the corridor options until **5pm Sunday 15 December 2024.**

1. Executive Summary

This Corridor Options Report (COR) has been prepared by Queensland Electricity Transmission Corporation Limited, trading as Powerlink Queensland (Powerlink), for the Bungaban Wind Farm Connection Project. Powerlink engaged WSP Australia Pty Ltd (WSP) to undertake technical, spatial data and mapping analysis to support the preparation of this report.

Powerlink is a leading Australian provider of high voltage electricity transmission network services, and owns, develops, operates and maintains the high voltage electricity transmission network in Queensland.

Our purpose is to connect Queenslanders to a world-class energy future, which includes moving to a low carbon future comprising a diverse mix of generation technologies, while maintaining a sharp focus on safety, affordability and reliability of electricity supply to our customers.

The purpose of the COR is to communicate the process used to identify corridor options for a potential transmission line corridor, to connect the Bungaban Wind Farm being developed by Windlab Development Pty Ltd (Windlab), to Powerlink's existing Wandoan South Substation (the project).

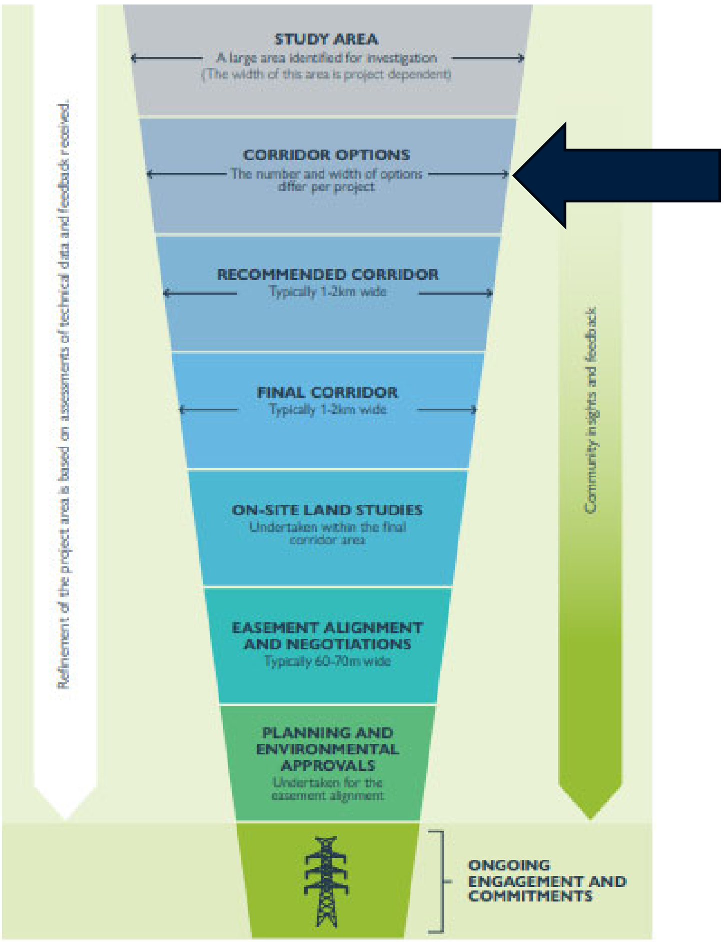
Approach to Corridor Selection

At every step in the development of new transmission infrastructure, Powerlink actively seeks feedback from landholders, Traditional Owner groups, the community and other stakeholders to help inform our project planning and decision making, and how to avoid, minimise and mitigate impacts resulting in the least overall impact on balance.

Feedback, technical and desktop studies are a large part of the foundations that support the corridor selection process.

The corridor selection process uses a Multi-Criteria Analysis (MCA) that supports the project objectives to measure and assess the likely impact of the project. Feedback forms part of the criteria and helps to determine the corridor options, as part of the Transmission Easement Engagement Process (TEEP). This project is at stage two of the TEEP.

Figure 1 - Transmission Easement Engagement Process



Project objectives are the high-level value-based considerations that are used during the corridor selection process. The key objectives informing the approach to corridor selection are:

Social
To consider the use of land and the community livelihood within and adjacent to corridor options.

Environment
To consider a balanced approach to corridor selection with the least practicable impact on environment and heritage values.

Economic
To consider construction and operational factors such as cost at a preliminary level, given the scale of the project.

The methodology for the corridor selection was developed to incorporate:

- the feedback from engagement with landholders, Traditional Owner groups, the local community and other stakeholders
- publicly available spatial data relating to environment, planning and heritage constraints
- technical information provided by Powerlink relevant to the planning and delivery of transmission line infrastructure.

Corridor Options

Following the release of the Study Area in July 2024, community feedback was sought to help inform decisions to refine the Study Area and identify possible corridor options. These options demonstrate the possible pathways transmission infrastructure could be located within, pending further feedback, refinement and technical studies.

Analysis of desktop spatial data, constraints mapping and feedback received to date, has been carried out to identify the possible corridor options for this project. Significant constraints and associated likely property impacts have limited options for the exit from the Wandoan South Substation. Subsequently, two corridor options have been identified though they share a common route for approximately 59kms before separating into north and south options that connect into the proposed Bungaban Wind Farm site.

The common route for both options, begins at the Wandoan South Substation by co-locating the proposed corridor option with existing transmission line infrastructure. This co-location occurs for 11.4km before heading in a north to north-easterly direction. This section of corridor avoids residential dwellings and considerable areas of existing gas infrastructure, to reduce potential impacts.

As this section of the corridor is seeking to co-locate, the corridor width has been narrowed to 100 metres-wide to the north of the current existing easement location for 11.4km. This width is reduced as the proposed new transmission line would be located immediately next to the existing transmission line easements. The corridor then expands to a 1km-wide corridor for the remaining sections of the corridor options.

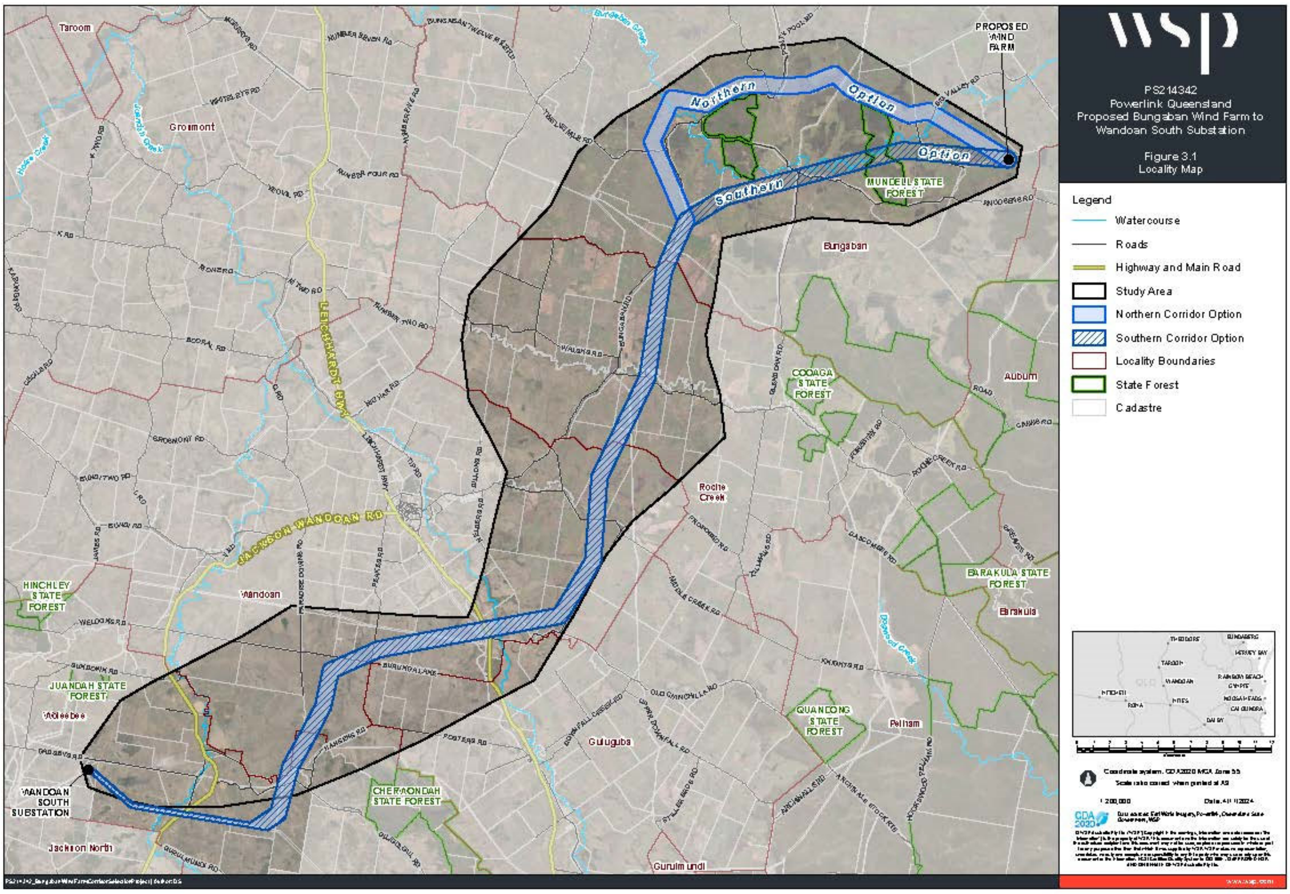
After co-locating with existing transmission line infrastructure, the shared corridor heads north and crosses Giligulgul Road and Conloi Creek before heading north-easterly to cross Burunga Lane, to the west of Frank Creek. The corridor continues north-east crossing Roche Creek Road before the corridor separates in the vicinity of Bungaban Road, south-west of the Mundell State Forest.

Corridor Option 1 (South) is a further 24km in length (total length of 83.7km) and heads in an east to north-easterly direction near Bungaban Creek, intersecting the Mundell State Forest before crossing through a narrow, pre-existing cleared area and connecting into the proposed substation at the Bungaban Wind Farm. This option spans a total of 83.7km, including the common section, from the Wandoan South Substation to the proposed Bungaban Wind Farm site.

Corridor Option 2 (North) is an additional 35km in length and heads in a north easterly direction avoiding the Mundell State Forest, near Bungaban Road, before heading east past the intersection of Big Valley Road and Bocks Roads, connecting into the proposed substation at the Bungaban Wind Farm. This option spans a total of 94km, including the common section, from the Wandoan South Substation to the proposed Bungaban Wind Farm site.

In summary, two corridor options have been developed for further feedback and analysis. Both options include a shared corridor from Wandoan South Substation for approximately 59km north of the substation before splitting into Option 1 (South) and Option 2 (North) as shown in Figure 2. The corridor options have been identified to provide the least overall impact across the objectives.

Figure 2: Bungaban Wind Farm Connection Project Corridor Options



2. Project Background

Bungaban Wind Farm is a proposed 1.4 Gigawatt (GW) wind farm located in the Western Downs and Banana Shire regions of Queensland, about 40km from Wandoan and 60km from Taroom, or 450km north-west of Brisbane. Australian renewable energy company Windlab is developing the proposed Bungaban Wind Farm. Energy generated by the proposed wind farm will provide low-cost clean energy to Queensland households.

To connect the proposed wind farm to the electricity network, the following new transmission infrastructure is proposed under the project:

- a new 275 kilovolt (kV) substation
- up to 100m wide easement to contain a double circuit 275kV transmission line between Powerlink's existing Wandoan South Substation and the proposed Bungaban Wind Farm, and to allow for future network expansion needs.

3. Purpose of this Report

The purpose of this report is to:

- share feedback and insights gathered through community feedback
- describe the process undertaken to identify the corridor options
- provide an overview of the corridor options

- development of the criteria and measures to be used along with project objectives to create the Multi-Criteria Analysis (MCA)
- outline the next steps

4. Study Area Engagement

Following the public release of the Study Area Report in July 2024 (available online at powerlink.com.au/Bungaban transmission) Powerlink has undertaken broad community engagement to inform of the need for the project, and the considerations of the study area.

Input from landholders, Traditional Owner groups and the community are valuable in helping Powerlink to identify corridor options, that seek to balance the impact across the project objectives. Engagement has included:

- community information drop-in sessions
- interactive map of the study area
- phone calls, emails and letters to landholders
- stakeholder briefings
- consultation meetings with representatives of Traditional Owner groups
- newsletters
- podcast

Community engagement sessions will continue to be advertised via social media, the project website, local government channels, various community Facebook groups, newspaper advertisements and posters/flyers on community noticeboards in key townships such as Wandoan and Taroom.

4.1 Traditional Owner Engagement

Powerlink acknowledges and respects the ongoing connection of Traditional Owners to their traditional lands. Whilst Traditional Owner groups and First Nation People are welcome at community engagement sessions, dedicated engagement processes are undertaken with Traditional Owner groups likely to be impacted by the proposed corridor selection. Dedicated engagement has been undertaken with the following Aboriginal party identified under the *Aboriginal Cultural Heritage Act 2003 (Qld) (ACH Act)*:

- The Iman People (QUD413/2017 and QUD6162/1998)

4.2 Engagement Analysis

Since July 2024, Powerlink has shared information and gathered feedback via:

- community information drop-in sessions (6) at Chinchilla, Miles, Wandoan and Taroom - 49 attendees
- interactive mapping - Social Pinpoint (30) individual comments
- landholder letters (56), telephone calls (26) and emails
- elected representative briefings
- consultation meetings with representatives of identified Traditional Owner groups
- distribution of 500 Project Newsletters
- podcast, print, radio and social media advertisements - promoting the project website and information sessions.

Feedback received has been grouped into themes to identify key areas of community interest and concern relating to this project. All feedback has been reviewed and considered to determine the constraint, potential impact and necessary action. The below themes have flowed into the corridor selection process and have been referenced in the Multi-Criteria Analysis (MCA).

Land Use

- considerations of farming operations
- type of activities which can occur within an easement

Property

- distance from residential properties
- landholder compensation

Environment and Heritage

- protecting native flora and fauna
- environment impacts including biosecurity
- compliance with environmental legislation
- avoidance of areas with cultural significance

Additional themes were also noted in relation to:

- Biosecurity – the prevention and rectification of any spread of weeds. Compliance with biosecurity regulations and land access protocols
- The project timeframes and process – lack of awareness of the project requirements and process to be undertaken
- Community – Understanding the communities needs and concerns regarding local services and resources, including the desire to see broader community benefits and local employment opportunities.

Whilst these themes are important factors to consider in relation to the overall project, they are managed in broader terms throughout the Transmission Easement Engagement Process.

5. Corridor Selection Process

Corridor selection is the fundamental process that Powerlink follows to narrow broader areas of investigations and corridor options down to a 1km-wide corridor and then to a final easement alignment, typically about 60 metres wide. It has been identified that through the energy transformation over the coming decade, there may be additional network expansion requirements in this region as we look to connect further renewable energy sources in the Western Downs area. To prepare for this potential future expansion and to minimise further changes to landholders, a final easement alignment of up to 100m will be assessed through the corridor selection processes for this project.
The corridor selection approach seeks to balance the impacts of the project across the three objectives identified (social, environment and economic), ultimately resulting in a recommended corridor with least overall impact on balance.

5.1 Methodology

The methodology for the corridor selection assessment considered a Multi-Criteria Analysis (MCA) framework, involving identification of the project objectives, development of the key criteria for each objective and the measures required to assess each criteria. The methodology incorporates direct feedback from landholders, the local community, Traditional Owner groups and other stakeholders, publicly available spatial data and information provided by Powerlink, relevant to the planning and delivery of transmission line infrastructure.
Project objectives are the high-level value-based considerations that are used during the corridor selection process.

The overarching process of assessment is shown in Figure 3.

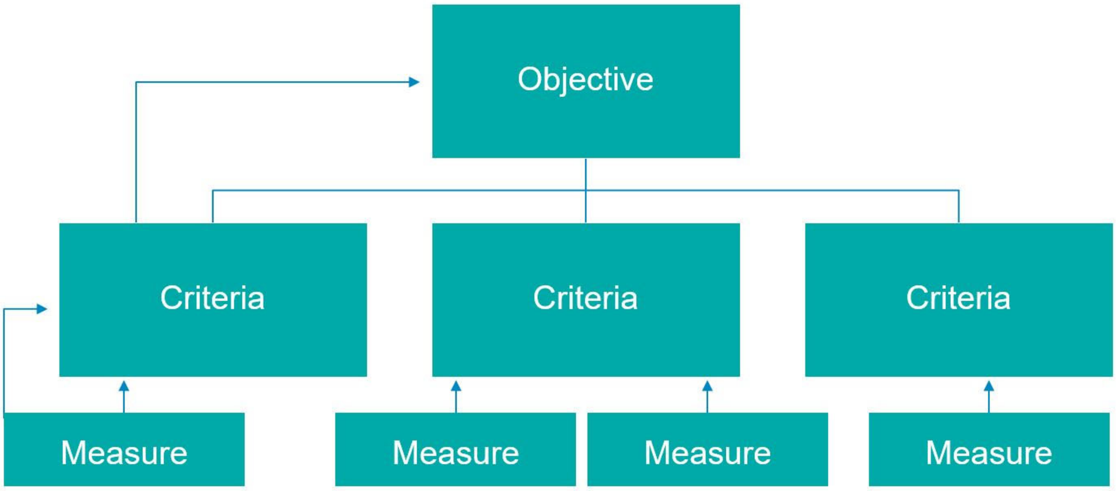


Figure 3 Corridor selection process, adapted from Infrastructure Australia's Multi-Criteria Analysis process

5.2 Objectives

Three project objectives are adopted to inform the approach to the corridor selection process:

Social
To consider the use of land and the community livelihood within and adjacent to corridor options.

Environment
To consider a balanced approach to corridor selection with the least practicable impact on environment and heritage values.

Economic
To consider construction and operational factors such as cost at a preliminary level, given the scale of the project.

Each objective is then refined into measurable criteria to determine the possible impact and how it may be avoided, minimised, mitigated or offset. Feedback from the community helps to identify and refine the criteria that is applicable to the project.

At every phase of the development of the project, Powerlink seeks to:

- provide opportunities for input from landholders, Traditional Owner groups, the community and other stakeholders
- demonstrate a continual approach of seeking to reasonably avoid, minimise and mitigate impacts from the development of the project.

The assessment approach is outlined below.

5.2.1 Corridor Selection Approach

The corridor selection process requires the development of standard criteria and measures, with which to assess and compare the corridor options against the project objectives. The set criteria are then applied to the constraints, objectives, feedback and opportunities within a project area to refine the study area, identifying corridor options (if possible). Assessment and analysis of each corridor option considers the key physical, social, environmental and economic characteristics using a selection of spatial data to support the assessment.

This process seeks to balance the impacts across the project objectives to get the lowest overall impact.

5.3 Criteria

To assess each corridor option against the objectives, criteria were identified through analysis of community and stakeholder feedback and spatial mapping. Table 1 outlines the criteria developed for assessing the corridor option and provides a summary of the rationale for the criteria. The table also sets out the relevant feedback theme and captures the spatial data layers used to support the assessment of criteria against the social, environment and economic objectives.

Table 1: Corridor Criteria

Criteria	Rationale	Relevant feedback theme	Spatial Data
Social			
Number of land parcels	The mapping of properties acts as a guide for the number of landholders within the corridor. The preference is to minimise the total number of properties impacted, where possible.	Property	Information on land parcels was obtained from Queensland Government spatial data.
Residences	Where possible, infrastructure within the corridor should be located away from residential houses to minimise visual impacts.	Property Land Use	Dwelling locations (identified by use of residential land use mapping from Western Downs Regional Council) and identified visually from aerial imagery.
Strategic cropping land (including Agricultural land classes A & B)	Strategic cropping land (SCL) are areas that are, or are likely to be, highly suitable for cropping due to a combination of the land's soil, climate and natural features. Corridor options affecting a smaller extent of SCL were considered more favourable.	Land Use	Areas of SCL have been obtained from Queensland Government spatial data.
Intensive land use	Intensive use includes land used for horticulture (such as production, nurseries and shade houses), intensive animal production (such as feedlots, aquaculture and dairy sheds), manufacturing and industrial (such as grain storage, sawmills and farm	Land Use	Areas of intensive land use have been obtained from Queensland Government spatial data.

	infrastructure) and services (such as wind, solar, gas and water infrastructure).		
Resource interest (coal seam gas wells)	Petroleum leases that impact land use rights will need to be considered when building a transmission line. This land use can present conflicts and safety challenges to high-voltage transmission lines and should be at least 150m from the infrastructure.	Property	Information on resource interests were obtained from Queensland Government spatial data.
Environment			
Regional ecosystems	Regional ecosystems (RE) are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil regulated under the *Vegetation Management Act 1999*. REs typically include a range of endangered, of concern and least concern communities.	Environment and Heritage	Areas of regional ecosystems have been obtained from Queensland Government spatial data.
Threatened ecological communities	Threatened ecological communities (TECs) are ecological communities at risk of extinction and are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).	Environment and Heritage	Queensland Government spatial data and Protected Matters Search Tool (PMST) was used to identify TECs.
Matter of State Environmental Significance (MSES) Category C regulated vegetation management	Category C vegetation encompasses high-value regrowth vegetation in an area that has not been cleared in the last 15 years which is also an endangered, of concern, or least concern regional ecosystem.	Environment and Heritage	Areas of regulated vegetation management have been obtained from Queensland Government spatial data.
MSES Category R regulated vegetation management	Category R vegetation is the native woody vegetation that is located within 50 m of a regrowth watercourse.	Environment and Heritage	Areas of regulated vegetation management have been obtained from Queensland Government spatial data.
Heritage	Heritage includes indigenous, non-indigenous and local registered sites. The preference is to avoid registered areas.	Environment and Heritage	Areas of heritage have been obtained from Queensland Government spatial data.
Economic			
Length of corridor	Longer corridors generally indicate a requirement for more materials, greater areas of disturbance, longer construction times and maintenance over	Property	The length of line was measured using Queensland Government spatial data

	infrastructure life. Corridor length has been used as a proxy to compare for potential upfront and ongoing maintenance costs for the infrastructure.		
Topography (Slope)	Topography is an important consideration as it can constrain the construction of infrastructure and the need to build on steep terrain should consider constructability, cost and time feasibility. Steep terrain may limit vehicle and machinery access and significantly increase the required earthworks at each tower site. Additional easements and access are generally required in steep country and therefore environmental impacts can increase, as additional clearing maybe required resulting also in increased visual disturbance.	Property	Topographical information was obtained from Queensland Government spatial data.
Co-location	Co-location of transmission lines with other linear infrastructure has the potential to minimise impact from projects by making use of existing maintenance points and access tracks. Additionally, there may be fewer impacts to farming land and general disruption to landholders due to access for construction and operationally.	Property	Existing transmission line easements were obtained from Queensland Government spatial data.

5.4 Measures

To assess each corridor option against the criteria, outlined in Table 1, a series of measures were developed. The objectives, criteria and measures adopted for the project are summarised within Table 2.

Table 2: Corridor Selection assessment parameters

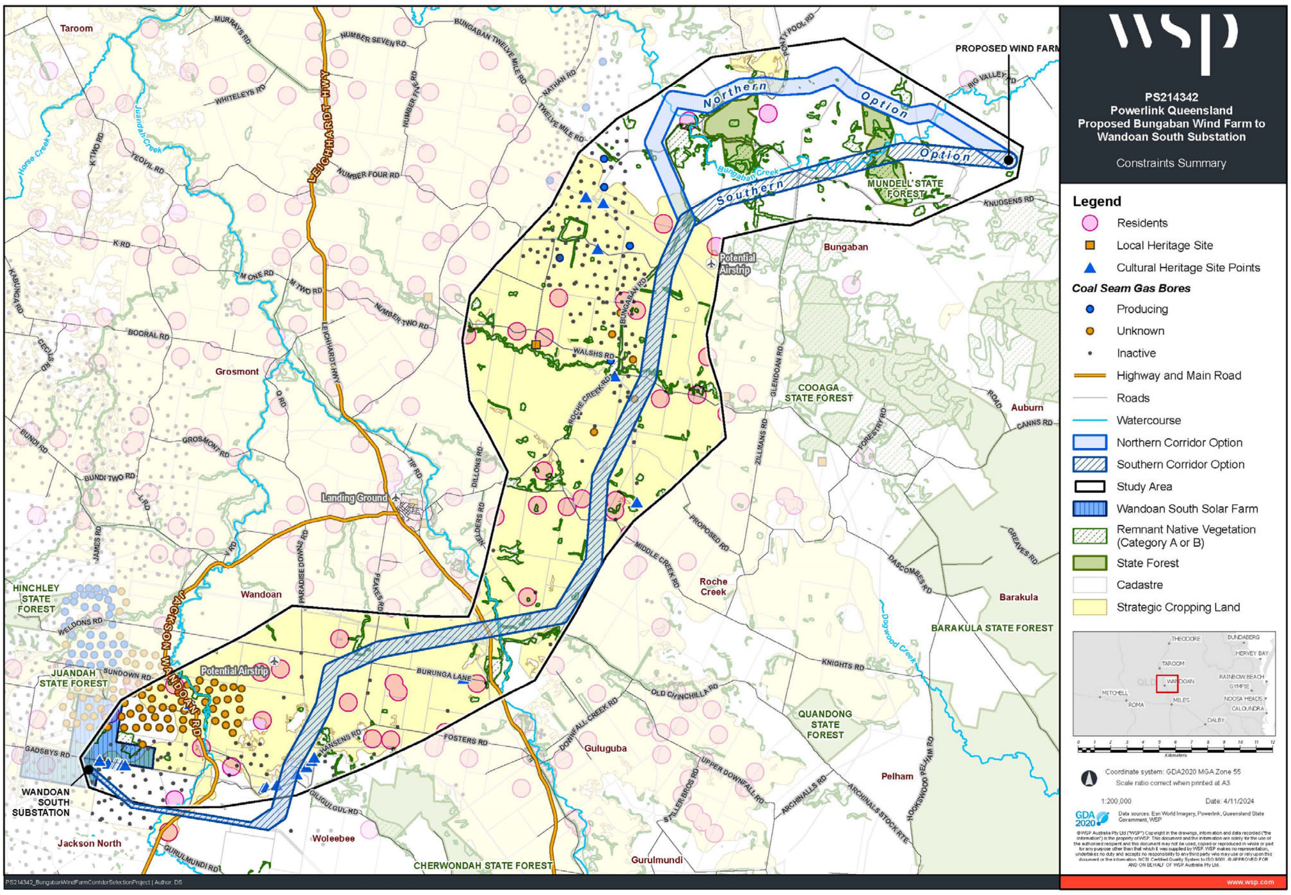
OBJECTIVES	CRITERIA	MEASURES
Social To consider the use of land and the community livelihood within and adjacent to the corridor options.	**Criteria 1:** Land parcels	Number of land parcels within the corridor
	Criteria 2: Residences	Number of residential houses
	Criteria 3: Strategic cropping land	Area of corridor with Strategic Cropping Land (including Agricultural land classes A & B)
	Criteria 4: Intensive land use	Area of corridor with intensive land use
	Criteria 5: Resource interests	Number of coal seam gas wells within proposed corridor

Environment To consider a balanced approach to corridor selection with the least practicable impact on environment and heritage values	**Criteria 1:** Regional ecosystems	Area of corridor with regional ecosystems
	Criteria 2: Threatened ecological communities	Area of corridor with regional ecosystems that are analogous with threatened ecological communities
	Criteria 3: MSES regulated vegetation – Category C and R	Area of Category C and R vegetation
	Criteria 4: Heritage	Number of registered Heritage Sites
Economic To consider construction and operational factors such as cost at a preliminary level, given the scale of the Project.	**Criteria 1:** Length of corridor	Length of corridor
	Criteria 2: Slope	Percentage of slopes >20% within the corridor
	Criteria 3: Co-location	Percentage of corridor option able to be co-located with existing infrastructure

6. Corridor Options

The corridor options were developed based on community feedback, and understanding opportunities and constraints within the Study Area.

Figure 4: Corridor options



6.1 Corridor Option Overview

Following detailed assessment of the Study Area, along with feedback received, two corridors have been developed for further feedback and analysis. Both options include a shared corridor for approximately 59km between the Wandoan South Substation to the vicinity of the intersection of Roche Creek Road and Bungaban Roads (Roche Creek locality), before splitting into Option 1 (South) and Option 2 (North).

The shared corridor has been narrowed to be 100 metres-wide from Wandoan South for approximately 11.4km heading east. This width is reduced as the corridor is seeking to co-locate with existing transmission line easements, as the proposed new transmission line would be located immediately next to the existing easements. The remainder of both corridor options are identified as 1km-wide.

After co-locating with existing transmission line infrastructure, the shared corridor heads north and crosses Giligulgul Road and Conloi Creek before heading north-easterly to cross Burunga Lane, to the west of Frank Creek. The corridor continues north-east crossing Roche Creek Road before the corridor separates in the vicinity of Bungaban Road to the south-west of the Mundell State Forest.

Corridor Option 1 (South) is 83.7kms long, including the shared corridor. This continues in a more east to north-east direction towards Bungaban Creek, intersecting a portion of Mundell State Forest (located in between Bocks Roads) before traversing through a narrow, cleared strip of land and connecting into the proposed substation at the Bungaban Wind Farm.

Corridor Option 2 (North) is 94.0kms long, including the shared corridor, and continues in a more northerly direction towards the Mundell State Forest and broader Bungaban locality. This option avoids a portion of Mundell State Forest before heading east past the intersection of Big Valley Road and Bocks Roads connecting into the proposed substation at the Bungaban Wind Farm.

7. Corridor Options Analysis

7.1 Social

The social criteria were assessed with consideration of the social values and feedback relating to the use of land and livelihood for the community within and adjacent to the corridor options.

7.1.1 Land parcels

A count of individual properties was used to compare corridor options. The number of properties in each corridor is shown in Table 3.

Table 3: Number of land parcels

Criteria	Option 1 (South)	Option 2 (North)
Freehold land parcels intersected (No.)	44	49
Land Lease (No.)	5	3
Profit à Prendre (No.)	3	2
Protected areas (State Forest) (No.)	1	0
Total land parcels impacted (No.)	**53**	**54**

Option 1 (South) intersects with the fewest number of properties.

7.1.2 Residences

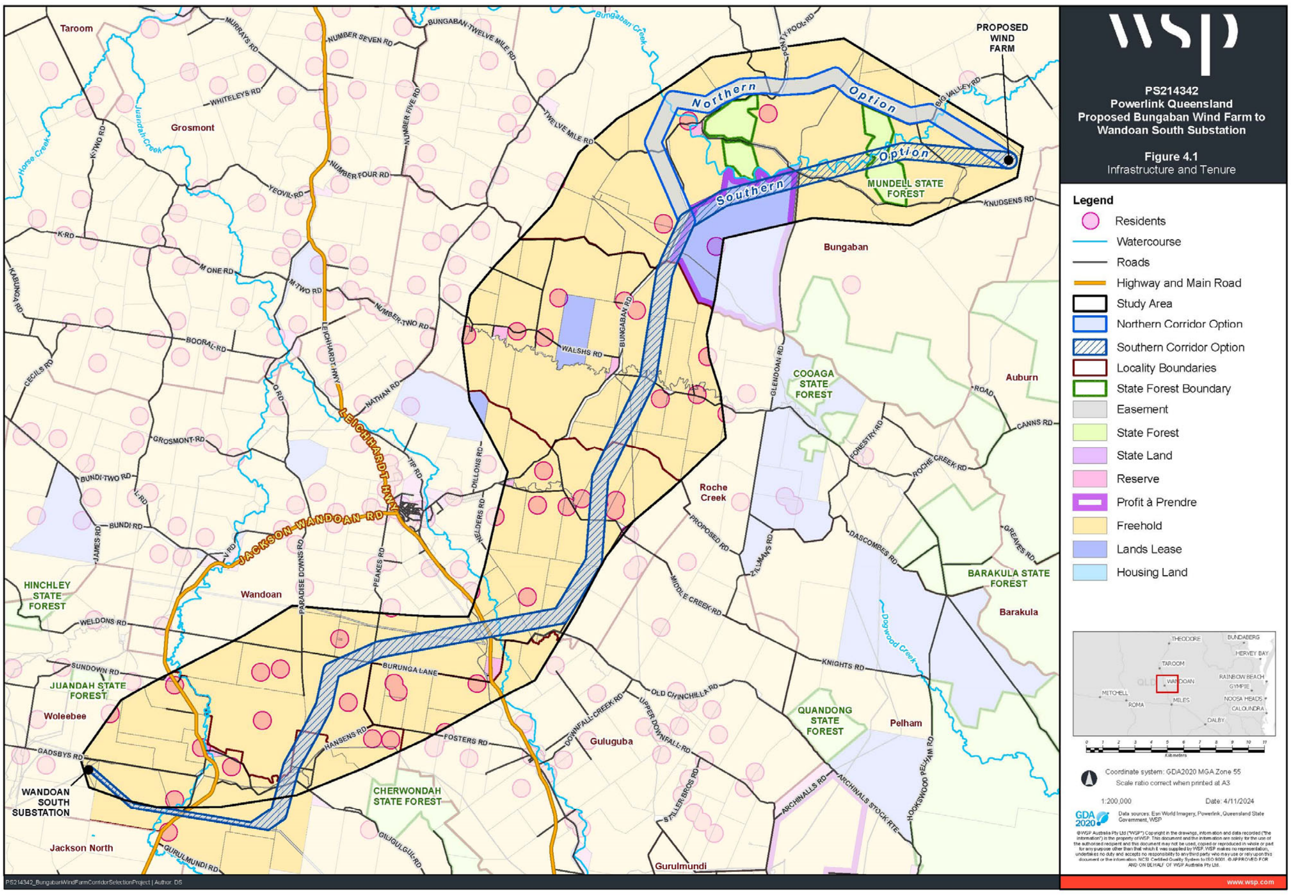
Residential dwellings are scattered and the avoidance of close proximity to residences is a key consideration. The number of residences in each corridor is shown in Table 4.

Table 4: Number of residences

Criteria	Option 1 (South)	Option 2 (North)
Number of residences within the corridor	0	0

There are no residences within either corridor option.

Figure 5: Infrastructure and tenure



7.1.3 Strategic Cropping Land

Strategic cropping land is associated with extensive low-lying land currently used for agricultural production. Strategic cropping land are areas that are, or are likely to be, highly suitable for cropping due to a combination of the land's soil, climate and natural features. This land also includes lands identified as classes A & B as classified in the agricultural land classification scheme.

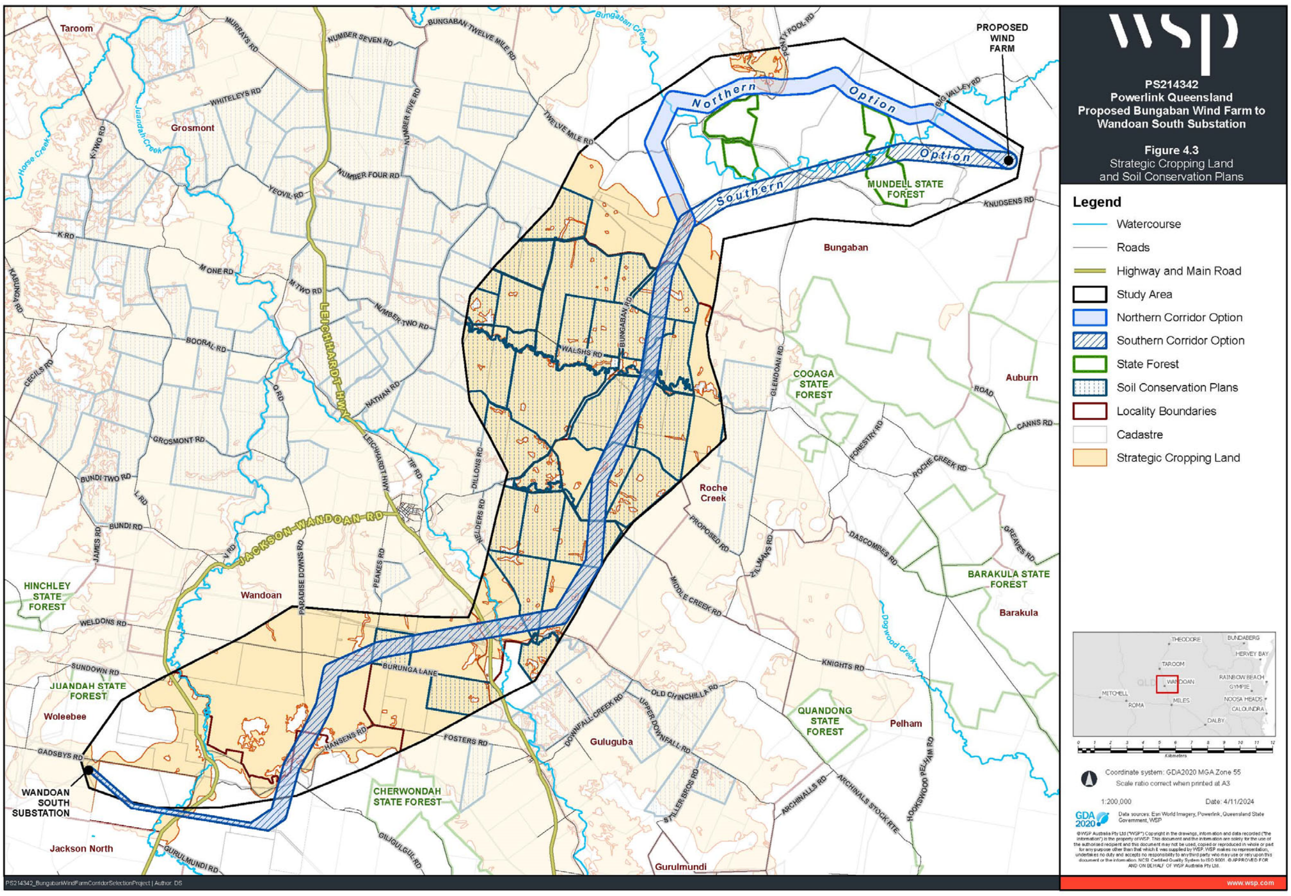
The area of each corridor overlaying these areas are shown in Table 5.

Table 5: Strategic cropping land

Criteria	Option 1 (South)	Option 2 (North)
SCL intersected (ha)	4,929.7	5,208.7

Option 1 (South) has the lowest potential to impact Strategic Cropping Lands.

Figure 6: Strategic cropping land



7.1.4 Intensive Land Use

Land use types identified grazing native vegetation, grazing modified pastures, and strategic/cropping land. Additional areas of intensive animal husbandry and production forestry (associated with Mundrell State Forest) are noted.

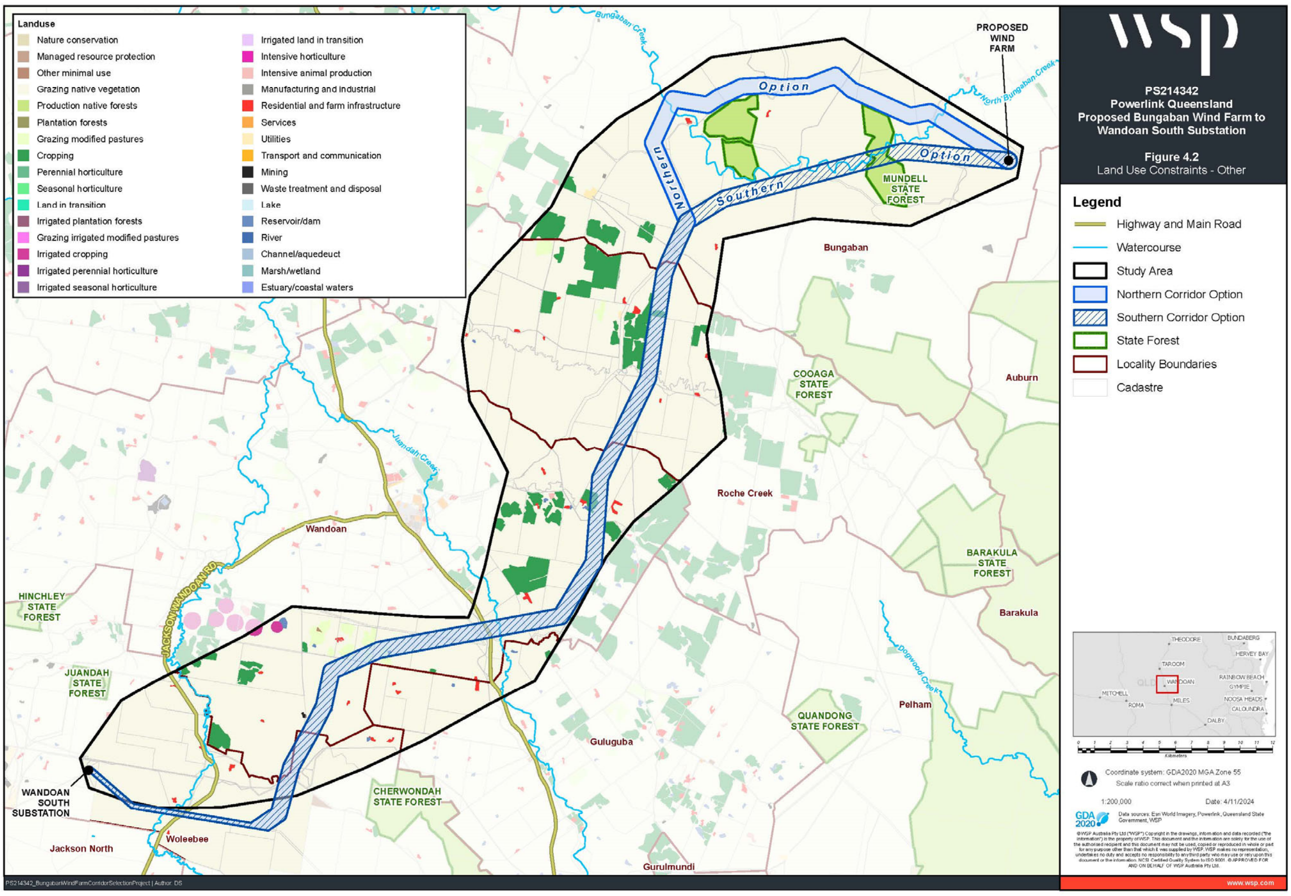
The area of each corridor overlaying these areas are shown in Table 6.

Table 6: Intensive land use

Criteria	Option 1 (South)	Option 2 (North)
Intensive land use (ha)	20.8	20.8

There is no differentiating factor between both corridor options.

Figure 7: Land use constraints



7.1.5 Resource Interests

Petroleum leases (including wells) are registered throughout the region with potentially five high-pressure pipelines (PPL74, PPL153, PPL163, PPL193 & PPL2075) are noted as intersecting the corridor options. A transport corridor (ML55010) and associated transport route are likely to be impacted. No Mining Leases are identified.

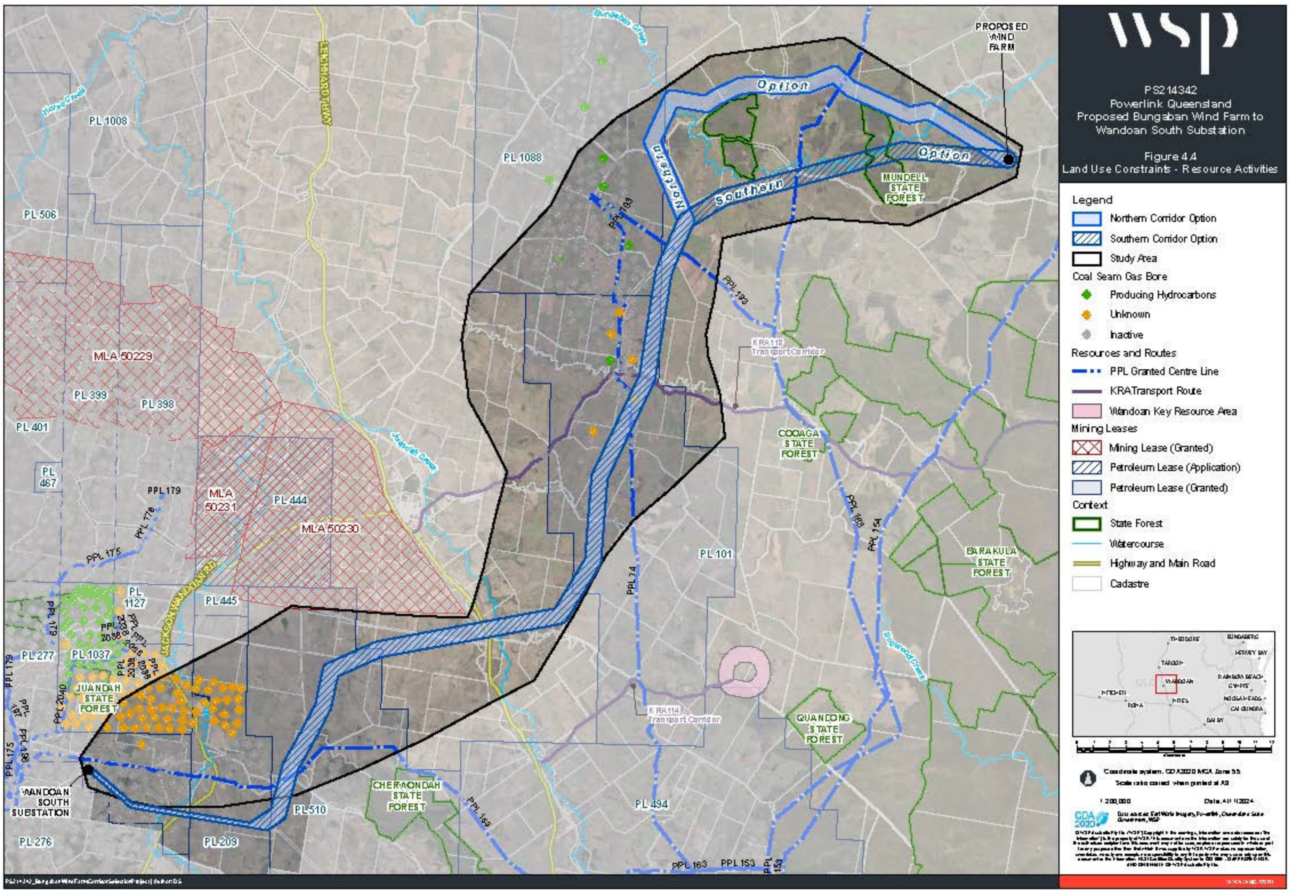
Resource interests (coal seam gas wells) are shown in Table 7.

Table 7: Resource interest (coal seam gas wells)

Criteria	Option 1 (South)	Option 2 (North)
Coal seam gas wells	9	9

There is no differentiating factor between both corridor options.

Figure 8: Resource Interests



7.2 Environment

7.2.1 Regional Ecosystems

The environment criteria were assessed incorporating feedback to ensure a balanced approach to corridor selection.

Environmental criteria were developed based on feedback and accepted importance of vegetation and essential habitat within the corridor such as categories under the *Queensland Vegetation Management Act 1994 (Qld)* and the preference to avoid protected areas managed under the *Queensland Nature Conservation Act 1992 (Qld).* It is noted that while not all environmental values available in spatial format were considered in the first phase of corridor selection, the general presence of vegetation was considered as a proxy to habitat values.

Both corridor options impact regional ecosystems.

The area of each corridor overlaying these areas are shown in Table 8.

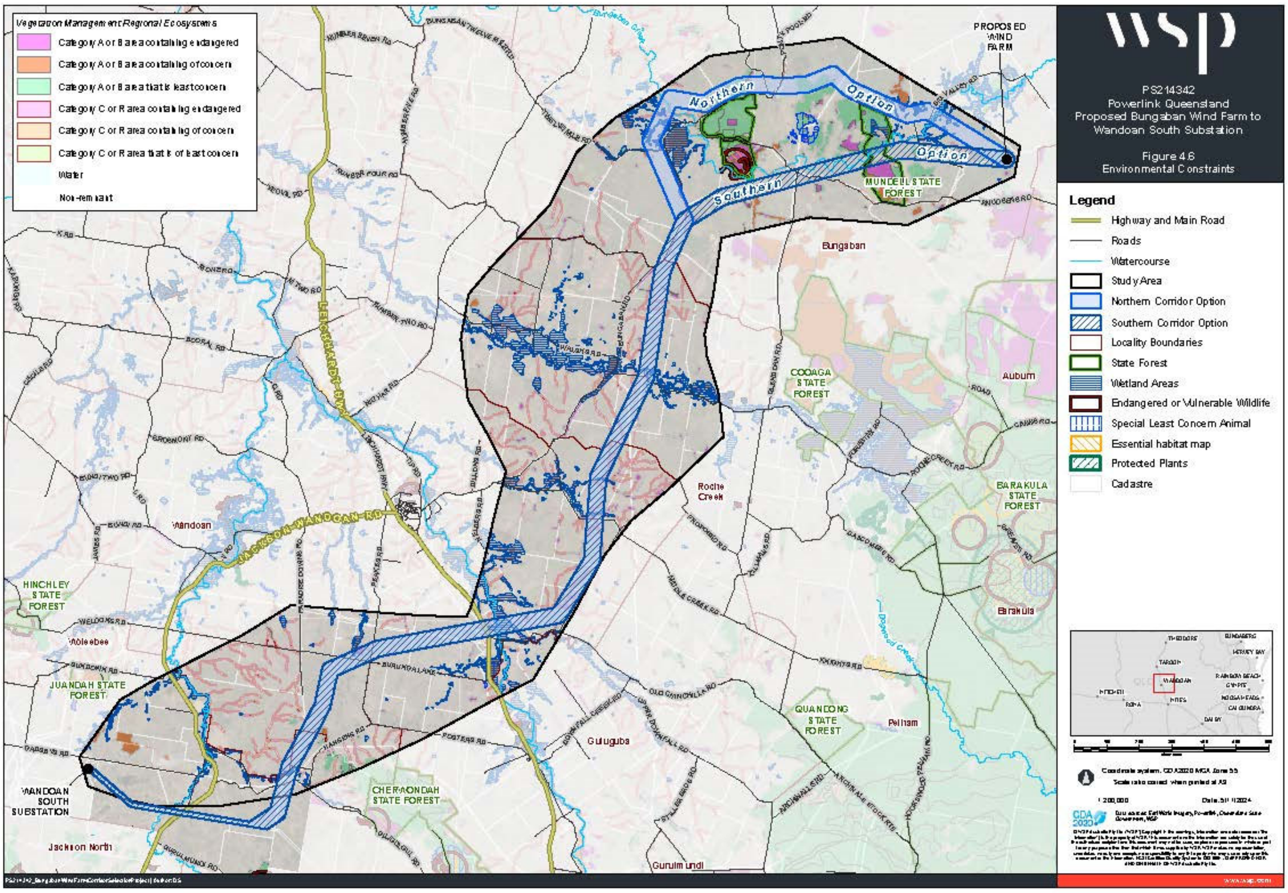
Table 8: Protected vegetation comparison

Criteria	Option 1 (South)	Option 2 (North)
Endangered (ha)	110.5	107.9
Of Concern (ha)	51.9	62.4
Least concern (ha)	96.9	375.9
Total area of Regional Ecosystems (ha)	**259.3**	**546.2**

Based on the total area of regional ecosystem intersected by the proposed corridor options, Option 1 intersects a smaller area being almost half that of Option 2.

Option 1 (South) has the lowest overall areas of protected vegetation; however, the difference is not material across the two options at under 6% of each corridor option.

Figure 9: Environmental constraints and opportunities



7.2.2 Threatened Ecological Communities

Threatened ecological communities is present across all corridor options. Please refer to Annexure for full details of TECs.

Table 9: Threatened ecological comparison

Criteria	Option 1 (South)	Option 2 (North)
Total area of TECs (ha)	149.9	168.5

Based on the total area of threatened ecological communities intersected by the proposed corridor options,

Option 1 (South) has the least area of threatened ecological communities, however the difference is not material across the two options at approximately 2% of each corridor option.

7.2.3 MSES Regulated Vegetation

MSES are significant environmental values that are identified by the Queensland Government to aid in the protection of biodiversity through the planning system and environmental offset framework.

Table 10: Regulated vegetation communities' comparison

Criteria	Option 1 (South)	Option 2 (North)
Category C – high-value regrowth vegetation (ha)	34.8	104.6
Category R – reef regrowth watercourse vegetation (ha)	273.1	256.5
Total area of Regional Ecosystems (ha)	**307.9**	**361.1**

Based on the total area of MSES regulated vegetation intersected by the proposed corridor options, Option 1 has the least potential to impact MSES regulated vegetation communities compared to Option 2.

The South corridor option has the lowest areas of MSES regulated vegetation, however the difference is not material across the two options at approximately 4% of each corridor option.

7.2.4 Heritage

No world, national, or state heritage sites were identified in the area. One known area of “artefact scatter“ of Aboriginal Cultural Heritage have been identified in the corridor options. It is likely that areas near waterways and or with remnant vegetation will be associated with cultural heritage values. Further assessment will be undertaken to determine any further heritage values within the corridor options.

Table 11: Registered Heritage

Criteria	Option 1 (South)	Option 2 (North)
Heritage (count)	1	1

Both corridor options have one identified Cultural Heritage site.

7.3 Economic

Constructability values were generally based on impacts to design or construction and items that were assessed to significantly increase cost to projects. Economic considerations of the corridor options are based on corridor length, difficult terrain and opportunities to co-locate with existing infrastructure.

7.3.1 Length of Corridor

Longer corridors generally indicate a requirement for more materials, greater areas of disturbance, longer construction times and maintenance over infrastructure life. Corridor length has been used as a proxy to compare potential upfront and ongoing maintenance costs for the infrastructure.

The area of each corridor overlaying these areas are shown in Table 12.

Table 12: Economic constraints comparison

Criteria	Option 1 (South)	Option 2 (North)
Length of corridor (km)	83.7	94.0

The South corridor option has the shortest length.

7.3.2 Slope

Steep topography limits vehicle and machinery access and significantly increases the required earthworks at each tower site. Additional easements and access are often required in steep country and therefore environmental impacts can be increased in these areas, for example, as additional clearing for access tracks is required. Land in this category poses a significant constraint to construction and needs to be considered in the context of constructability, cost and time. Due to these constraints, the corridor options analysis aims to minimise impact to this land category as far as practicable.

Despite the slight differences in slope for the two proposed corridor options, both alignments are relatively balanced and so there is no clear differentiator with respect to slope.

Table 13: Gradient of slope

Criteria	Option 1 (South)	Option 2 (North)
Total Slope >20% (%)	0.25%	0.18%

The North corridor option has a lower overall percentage of slope greater than 20%, however the difference is not material across the two options.

7.3.3 Co-location

Where communities or landholders are already impacted by existing infrastructure, co-location may be preferential over creating new impacts in other areas. Powerlink has an existing easement for the Columboola to Wandoan South 275kV transmission line which provides an opportunity for the proposed corridors to co-locate immediately next to the existing transmission line with appropriate offset distances applied.

Table 14: Co-location

Criteria	Option 1 (South)	Option 2 (North)
Length of co-location (km)	11.4	11.4

Both corridor options have the same opportunity to co-locate.

7.4 Summary of Corridor Options

The overarching Multi-Criteria Analysis for both corridor options are:

Table 15: Multi-Criteria Analysis

CRITERIA	Unit	Option 1 (South)	Option 2 (North)
Social			
Land parcels	Count	53	54
Residences	Count	0	0
Strategic cropping land	ha	4,929.7	5,208.7
Resource Interests	Count	9	9
Intensive land use	ha	20.8	20.8
Environment			
Regional ecosystems	ha	259.3	546.2
Threatened ecological communities	ha	149.9	168.5
MSES regulated vegetation – Category C and R	ha	307.9	361.1
Heritage	Count	1	1
Economic			
Length of corridor	km	83.7	94.0
Area with a slope greater than 20%	%	0.25	0.18
Co-location	km	11.4	11.4

8. Next steps

Engagement will now take place in relation to the corridor options to help inform the refinement of the options to one recommended corridor. A Recommended Corridor Report will be published in early 2025.

Community information drop-in sessions are being held to gather further information from the community regarding land use, land practices, known areas of likely constraints and sharing local values to gather feedback on the corridor options.

Feedback can be provided in various ways:

- Face-to-face: Community information drop-in sessions 19th & 20th November 2024
- Phone: 07 3898 4838
- Email: bungaban@powerlink.com.au
- Website: www.powerlink.com.au/bungaban

Our project webpage has links to an interactive map where you can add comments on the proposed corridor options. This page features a feedback survey which we encourage you to complete. You can also sign up for regular project-related email updates.

We are inviting feedback on the corridor options until **5pm Sunday 15 December 2024.**

Further desktop assessment and analysis as part of the corridor selection in line with the project objectives will need to be carried out, to identify a recommended corridor that is typically 1km-wide. These investigations will build understanding of the project constraints, opportunities and required approvals for the recommended corridor. As the recommended corridor is further refined, the project will continue to seek to avoid and/or minimise impacts to landholders and community areas as well as environment, cultural values, agriculture and cropping land values through siting and design.

APPENDIX A

Environment and Heritage analysis

Regional ecosystems

The proposed corridors intersect small, scattered areas of mapped regrowth, 'of concern' and 'endangered' vegetation (regional ecosystems). As these areas are small in nature, they may be able to be spanned by the transmission line, with no or limited clearing required.

All four corridors intersect the following listed 'endangered', 'of concern' or 'least concern' regional ecosystems, under the *Vegetation Management Act 1999* (VM Act), which are shown on Figure 4.6:

- Endangered:
  - RE 11.9.1: *Acacia harpophylla-Eucalyptus cambageana* woodland to open forest on fine-grained sedimentary rocks
  - RE 11.9.5 (including 11.9.5a): *Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on fine-grained sedimentary rocks
  - RE 11.9.6: *Acacia melvillei* and/or *A. harpophylla* open forest on fine-grained sedimentary rocks
- Of concern:
  - RE 11.3.2: *Eucalyptus populnea* woodland on alluvial plains
  - RE 11.3.4: *Eucalyptus tereticornis* and/or *Eucalyptus spp.* woodland on alluvial plains
  - RE 11.9.7: *Eucalyptus populnea*, *Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks
  - RE 11.9.10: *Eucalyptus populnea* open forest with a secondary tree layer of *Acacia harpophylla* and sometimes *Casuarina cristata* on fine-grained sedimentary rocks
- Least concern:
  - RE 11.3.19: *Callitris glaucophylla, Corymbia spp.* and/or *Eucalyptus melanophloia* woodland on Cainozoic alluvial plains
  - RE 11.3.25: *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.

Additional regional ecosystems traversed by the various segments of the corridor options are:

- Least concern:
  - — RE 11.10.9: *Callitris glaucophylla* woodland on coarse-grained sedimentary rocks
  - — RE 11.9.2: *Eucalyptus melanophloia +/- E. orgadophila* woodland to open woodland on fine-grained sedimentary rocks
- Of concern:
  - — RE 11.9.4a: Semi-evergreen vine thicket or *Acacia harpophylla* with a semi-evergreen vine thicket understorey on fine-grained sedimentary rocks

Regulated vegetation

Native woody vegetation traversed by the corridors is identified under the regulated vegetation management map as being comprised of several regulated vegetation categories defined by the VM Act including:

- Category A: vegetation that is subject to compliance notices, offsets and voluntary declarations
- Category B: remnant vegetation shown on a regional ecosystem or remnant map as an endangered regional ecosystem, an of concern regional ecosystem or a least concern regional ecosystem
- Category C: Contains high value regrowth vegetation or the chief executive decides to show on the regulated vegetation management map as a category C area.

- Category R: An area that is a regrowth watercourse and drainage feature area (reef regrowth watercourse vegetation)
- Category X: An area that has been cleared of vegetation and does not correspond with Categories B, C or R.

The corridor options generally pass through areas of non-remnant (Category X) vegetation, which reflects the current and historical agricultural practices of the area, however, waterways, Mundell State Forest and various other elevated areas scattered throughout the landscape contain Category B, C and R vegetation.

Despite Mundell State Forest being mapped as Category B vegetation, corridor option 1 (South) passes through a narrow section of Mundell State Forest which allows the corridor to pass through a cleared area mapped as Category X vegetation. While corridor option 1 (south) mainly passes through areas mapped as Category X, the segment also passes through minor areas of Category B, C and R regulated vegetation.

- Corridor option 2 (north) passes through additional areas mapped as Category B, C and R regulated vegetation. This is pertinent in the most northern extent of the segment which passes through two large areas of Category B and C vegetation.
- The shared corridor intersects further areas mapped as Category C and R regulated vegetation, mainly in the northeastern aspect of this segment.

There is overlap between areas mapped within the study area as containing Category A and Category B regulated vegetation and regional ecosystems. As a result, areas of regional ecosystems within the corridor options have been included in the calculations in place of Category A and B regulated vegetation to prevent amplification of results. However, Category C and Category R vegetation is not captured by the regional ecosystem mapping and so will be included in the calculations.

Threatened flora and fauna species

The EPBC Protected Matters Search Report for the study area identified a number of threatened wildlife species as being known/likely to be present or having habitat within the area. Threatened fauna species could be potentially impacted through the loss of habitat. Given that fauna species are mobile and move throughout their habitat, the potential extent of impact to fauna species cannot be accurately determined by desktop searches alone.

Terrestrial ecological assessments have been undertaken for Bungaban Wind Farm to assess potential habitat for threatened EPBC Act listed flora and fauna species. Based on the mapped REs present within the corridor options, as mentioned above, the following potential habitat for threatened species may be present (Table 4.1). Areas of REs are mapped on Figure 4.6.

Table 4.1 Threatened species habitat as identified in terrestrial ecological assessment completed for Bungaban Wind Farm

Status	Regional Ecosystem	Potential habitat for threatened flora and fauna species
Endangered	11.9.1	*Xerothamnella herbacea*
	11.9.4	Ooline (*Cadellia pentastylis*) Small-leaved Denhamia (*Denhamia pavifolia*) Dulacca Woodland Snail
	11.9.5 (including 11.9.5a)	Ooline (*Cadellia pentastylis*) Small-leaved Denhamia (*Denhamia pavifolia*) *Xerothamnella herbacea* South Eastern Glossy-black Cockatoo (foraging only) Painted Honeyeater Dulacca Woodland Snail

		South-eastern Long-eared Bat Dunmalls' Snake
	11.9.10	Belson's Panic (*Homopholis belsonii*) South Eastern Glossy-black Cockatoo (foraging only) Painted Honeyeater South-eastern Long-eared Bat Koala Yakka Skink Dunmalls' Snake
	11.10.9	Belson's Panic (*Homopholis belsonii*) South Eastern Glossy-black Cockatoo Large-eared Pied Bat (Foraging) South-eastern Long-eared Bat
Of concern	11.3.2	South Eastern Glossy-black Cockatoo (nesting only) Diamond Firetail Brigalow Woodland Snail South-eastern Long-eared Bat Koala Yakka Skink Dunmalls' Snake
	11.3.4	South Eastern Glossy-black Cockatoo (nesting only) Brigalow Woodland Snail Large-eared Pied Bat (Foraging) South-eastern Long-eared Bat Greater Glider Koala Yakka Skink
	11.3.25	South Eastern Glossy-black Cockatoo (nesting only) Diamond Firetail Painted Honeyeater Brigalow Woodland Snail Large-eared Pied Bat (Foraging) South-eastern Long-eared Bat Greater Glider Koala
	11.9.2	*Xerothamnella herbacea* Diamond Firetail South-eastern Long-eared Bat Greater Glider Koala Yakka Skink
	11.9.7	South Eastern Glossy-black Cockatoo (nesting only) Diamond Firetail

		Large-eared Pied Bat (Foraging) South-eastern Long-eared Bat Koala Yakka Skink Dunmalls' Snake

Presence of protected flora and fauna species within clearing sites will need to be investigated in future ecological investigations. There are no high-risk areas of protected plants within the proposed corridors.

To avoid duplication of results, areas of regional ecosystems within the corridor options have been included in the calculations to determine potential habitat for threatened EPBC Act listed species.

Other matters of national environmental significance

The Protected Matters Search Tool report identified five Threatened Ecological Communities (TEC) listed as endangered under the EPBC Act as being present within the study area, which include:

— Brigalow (*Acacia harpophylla* dominant and co-dominant) (endangered).
— Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions (endangered)
— Poplar Box Grassy Woodland on Alluvial Plains (endangered)
— Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (endangered)
— Weeping Myall Woodlands (endangered).

The REs mapped within the corridors and their respective TECs have been summarised in Table 4.2 and are mapped on Figure 4.6.

Table 4.2 Threatened ecological communities and mapped analogous regional ecosystem traversed by the corridor options

Threatened ecological communities	Mapped analogous regional ecosystems traversed by the corridor options
Brigalow (*Acacia harpophylla* dominant and codominant)	11.9.1 (Endangered)
	11.9.5 (Endangered)
	11.9.6 (Endangered)
Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	-
Poplar Box Grassy Woodland on Alluvial Plains	11.3.2 (Of concern)
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	11.9.4a (Of concern) (regrowth)
Weeping Myall Woodlands	11.3.2 (Of concern)

Of the REs mapped as occurring within the corridors, five are analogous with at least one of the identified TECs except for Coolibah-Black Box Woodlands, which did not have any associated REs.

Ecological field surveys would be required to verify the presence of the above-listed TECs in the corridor.

Significant residual impacts to these TEC's would trigger referral of the Project to the DCCEEW under the EPBC Act.

Since areas of RE 11.3.2, 11.9.1, 11.9.4a, 11.9.5 and 11.9.6 are analogous to at least one TEC and are within the corridors, they have been selected as a differentiator between corridor options and were used as a criterion in the comparative assessment. Corridor segments traverse through the following areas of REs which are analogous to TECs:

- Corridor Option 1 (South):

  - RE 11.9.1 and RE 11.9.5: Brigalow (*Acacia harpophylla* dominant and codominant)
- Corridor Option 2 (North):
  - RE 11.9.5: Brigalow (*Acacia harpophylla* dominant and codominant)
  - RE 11.3.2: Weeping Myall Woodlands and Poplar Box Grassy Woodland on Alluvial Plains
- Shared Corridor:
  - RE 11.3.2: Weeping Myall Woodlands and Poplar Box Grassy Woodland on Alluvial Plains
  - RE 11.9.4a: Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions
  - RE 11.9.5: Brigalow (*Acacia harpophylla* dominant and codominant).

Protected areas

No protected areas under the NC Act are traversed by the proposed corridors.

Corridor option 1 (South) intersects Mundell State Forest, however it runs through a cleared area approximately 300 – 400m wide. An area mapped as essential habitat for the koala (*Phascolarctos cinereus* (endangered under the NC Act and EPBC Act) is located within 1 km of this option.

Physical environment

Topography

The topography of the investigation area is relatively consistent with slightly undulating hills and valleys, with the average topography around 340m AHD. The Bungaban Wind Farm is located at an approximate elevation of 400m AHD while the Wandoan South Substation is positioned at an approximate elevation of 300m AHD.

Geology and soils

Geological conditions vary throughout the study area and predominantly include a mix of sandstone, siltstone, mudstone and conglomerate, with smaller areas of sand, silt, gravel, and clay mainly associated with land around watercourses.

The proposed corridors are subject to several soil types including:

— Vertosols - clay-rich soils, high soil fertility, large water holding capacity, potential for strong cracking and salinity
— Chromosols - moderate agricultural potential, susceptible to soil acidification and soil structure decline
— Kandosols - highly weathered soils with low fertility
— Dermosols - well-structured clay to clay loam soils, generally suitable for earthworks, non-dispersive, prone to compaction.
— Sodosols - texture contrast soils with impenetrable subsoils, low agricultural potential commonly used for grazing, vulnerable to erosion and dryland salinity when vegetation removed.

Although transmission towers can be constructed on any ground, geology and soil conditions can lead to constructability issues due to erosion, dispersion and acidity which may affect the structural integrity of the transmission line infrastructure as well as rocky underlying soils and geological units which may cause constructability complexities. The ground conditions will need to be studied in future geotechnical investigations to establish the appropriate design strategies.

Potential corridor options cross the same broad geological and soil units. Consequently, geology and soils were not considered to differentiate between the corridor options.

Both corridor options intersect a significant portion of land parcels subject to soil conservation plans within the centre of the alignment. Soil conservation plans are a legislative tool used to coordinate runoff flow between adjoining properties and may impose specifications for soil conservation structures and practices necessary to control erosion. All present and future owners of these properties are to abide by these plans. While soil conservation plans would be an important consideration for construction, they were not considered a significant differentiator between options. Soil conservation plans are generally associated with areas of strategic cropping land and therefore not used as an assessment criterion.

Hydrology

The main waterways crossed by the corridor options include Frank Creek, Two Mile Creek, Six Mile Creek, Weringa Creek, Juandah Creek, Roche Creek and Downfall Creek.

The proposed corridor segments also cross the following creeks and tributaries:

- Corridor Option 1 (South) - Sugarbag Creek, North Bungaban Creek, Juandah Gully (Main Branch), Juandah Gully, Bungaban Creek, Bottletree Creek, Bungaban Creek South Branch.
- Corridor Option 2 (North) - Bungaban Gully, Pontypool Creek and North Bungaban Creek.

A potential flood hazard area is intersected by the shared corridor, to the east of the Leichardt Highway associated with Jundah Creek.

The transmission line may be sited to span across the width of these waterways; however, most are subject to floodplains. Therefore, waterway crossings may require a tailored design response to ensure minimal damage to riparian vegetation and mitigate risks of erosion to tower structures.

As multiple waterways are found within the study area, this presents challenges to the design and construction of the Project such as limiting the potential location of transmission structures or requiring deeper structure footings to address risks associated with erosion and storm surge. Corridor selection attempted to minimise the crossing of other waterways within the study area. However, waterways can be spanned by the placement of transmission towers and as such consideration of waterways will be addressed during the design phase of the project.

Contact us

Registered office	33 Harold St Virginia Queensland 4014 ABN 82 078 849 233
Postal address	PO Box 1193 Virginia Queensland 4014
Telephone	+61 7 3860 2111 (during business hours)
Email	pqenquiries@powerlink.com.au
Website	powerlink.com.au
Social	