Future Network Requirements

Presenters:

- Mahesh Narotam, Manager Portfolio Planning and Optimisation
- Daniel Andersen, Manager Network Strategy
- Roslyn Stewart, Senior Portfolio Planning Engineer

May 2017

Agenda

- Background
- Central Queensland to South Queensland Area
- North Queensland Area
- Gold Coast Area
- Questions

Disclaimer

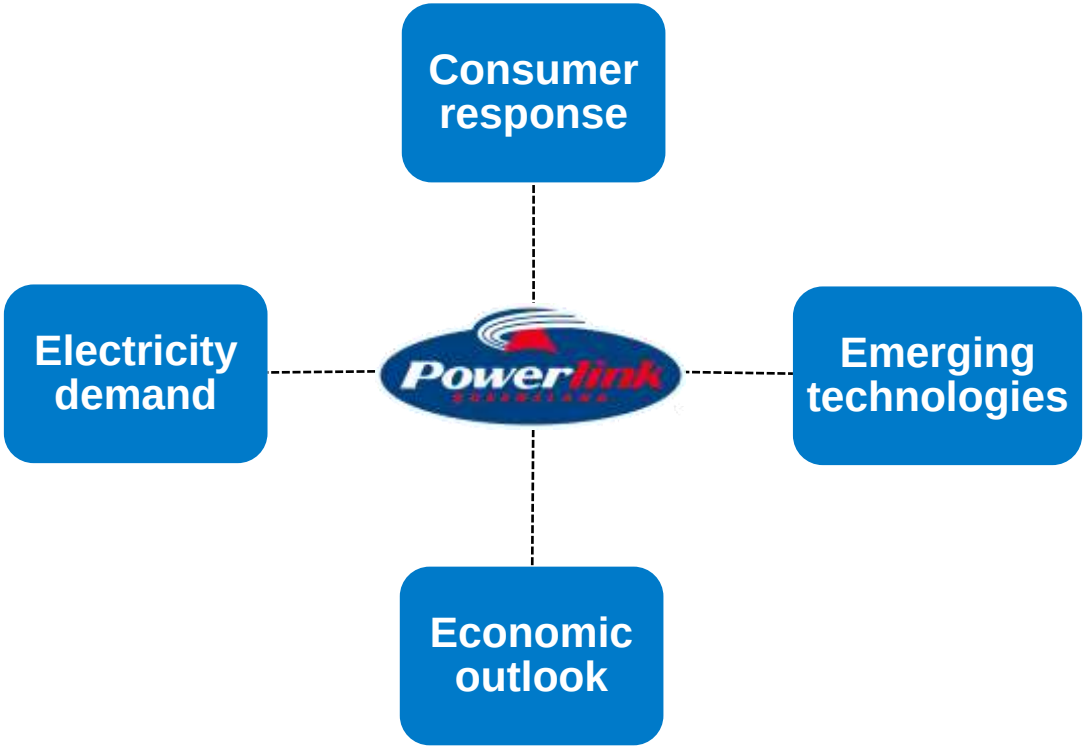
- The views outlined in the presentation are Powerlink's best view at the time of publication and may be subject to change.
- While care has been taken to prepare and provide this information in good faith, Powerlink accepts no responsibility for liability or loss or damage that may be incurred by persons acting in reliance on this information or assumptions drawn from it.

Previous feedback received

Powerlink presented the Non-Network Feasibility Study process at the 2016 Transmission Annual Planning (TAPR) Forum. Feedback was received that non-network providers are keen to:

- Engage and understand Powerlink's future requirements (noting it is an iterative two-way learning process)
- Receive information in a timely manner to assist with the assessment of potential solutions.

Current operating environment



Webinar purpose

- Given these complexities in the external environment, Powerlink acknowledges the importance of engaging early on with our stakeholders
- Non-network solutions are a proven and effective method of managing uncertainty, providing flexibility and improving network utilisation
- Assists with achieving the right balance between reliability and cost.

Avenues for engagement

- Formal consultation as defined under the National Electricity Rules (NER):
  - Transmission Annual Planning Report (TAPR)
  - Regulatory Investment Test for Transmission (RIT-T)
- Powerlink's Non-Network Feasibility Study process
- Forums and webinars
- Non-Network Engagement Stakeholder Register (NNESR)
- Email NetworkAssessments@powerlink.com.au.

Focus areas

- Central Queensland to South Queensland Area (Daniel Anderson)
- North Queensland Area (Roslyn Stewart)
- Gold Coast Area (Roslyn Stewart)

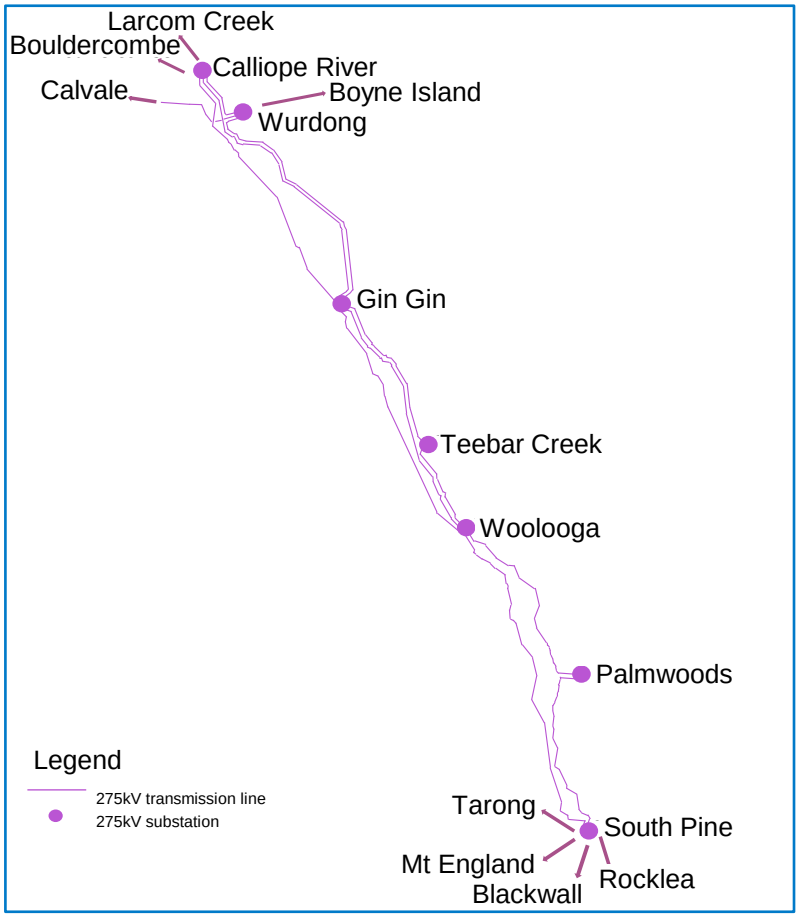
Central Queensland to South Queensland Area

Central Queensland to South Queensland Area

Description and characteristics

- The 275kV corridor between Calliope River (Gladstone) and South Pine (Brisbane) was progressively developed as single circuit feeders in the 1970s and 1980s.

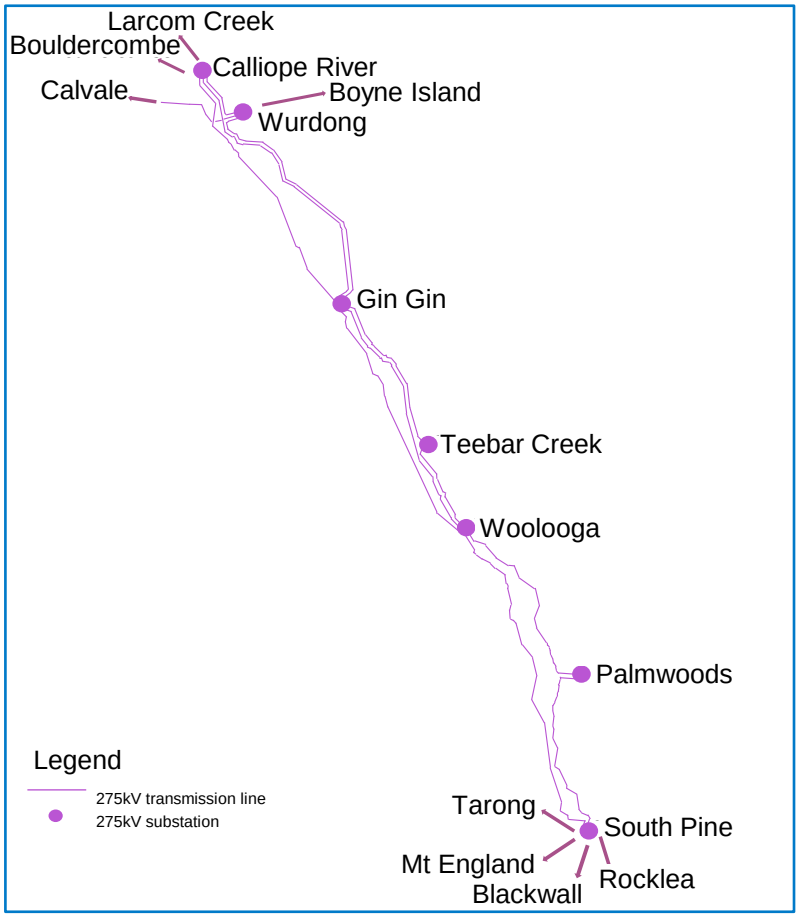
- Provides an important connection between generation in the Gladstone region and the load centres in South Queensland, as well as interconnection to NSW.



Central Queensland to South Queensland Area

Description and characteristics

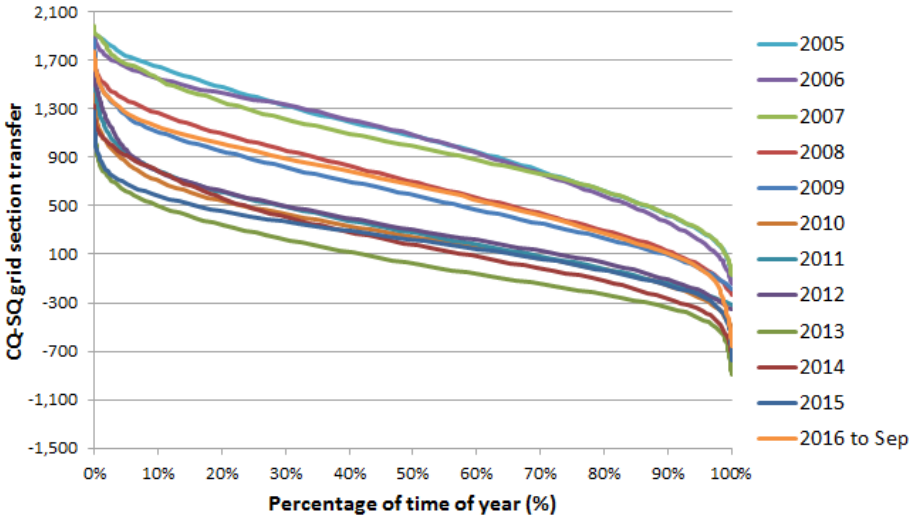
- With varying distances from the ocean, and localised industrial pollution, these transmission lines are subject to different environmental and atmospheric conditions.
- Over time, they have experienced structural degradation at different rates.

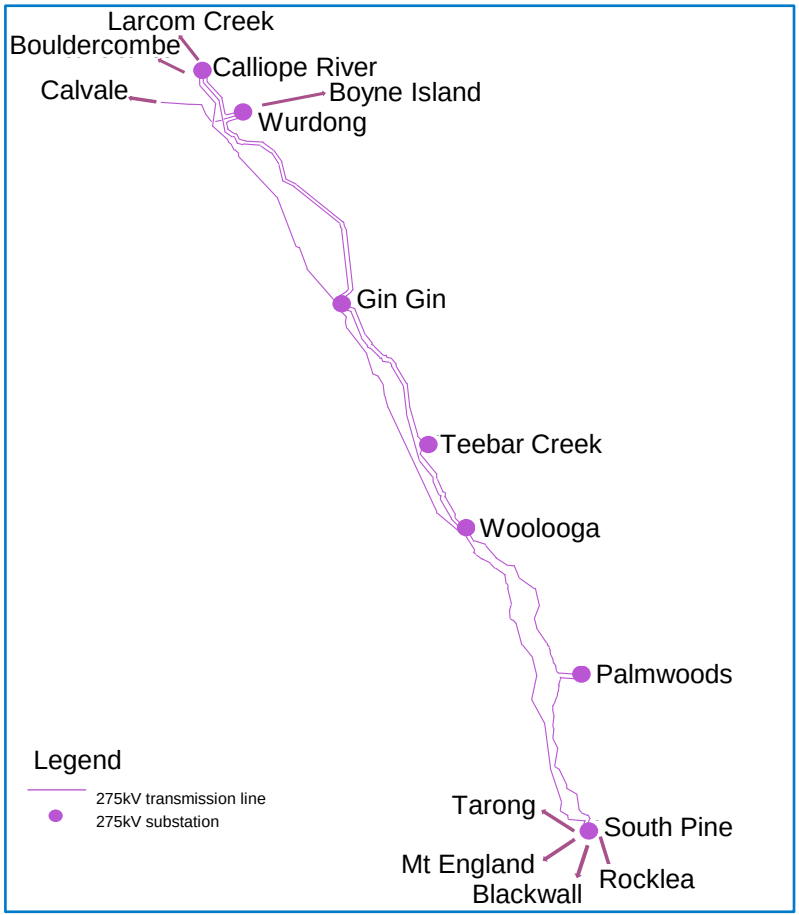


Central Queensland to South Queensland Area

Description and characteristics

- The interconnector's transfer capability is highly dependent on the location of generation.



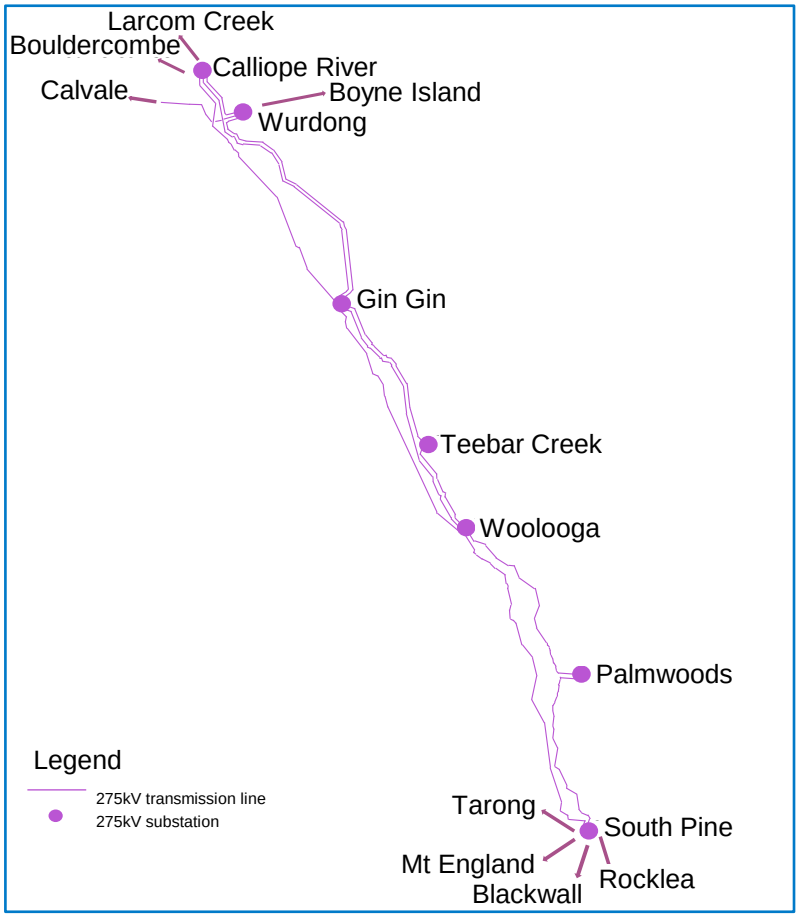


Central Queensland to South Queensland Area

Description and characteristics

- Future changes in generation and load profiles will impact the transfer capability requirements from Central to Southern Queensland.

- In its current form, the intraconnector offers a great deal of flexibility for possible generation dispatches, seldom imposing any constraints to market operation.

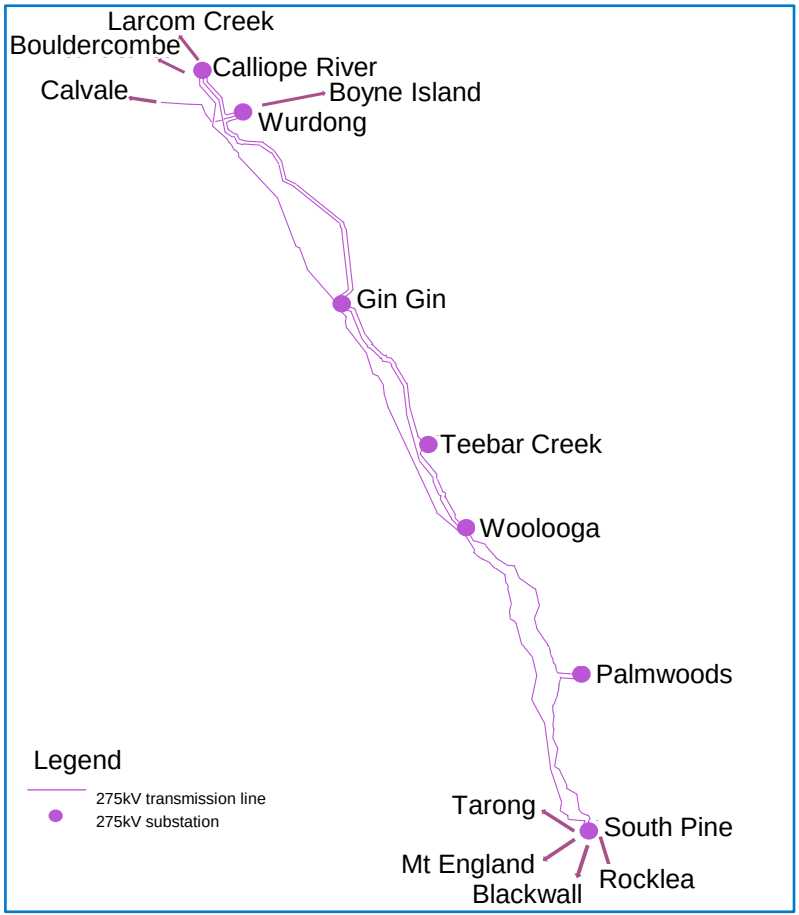


Central Queensland to South Queensland Area

Description and characteristics

- In October 2015, Powerlink engaged with relevant stakeholders to broaden input and gain feedback on future reinvestment of the CQ-SQ intraconnector.

- Feedback indicated that Powerlink adopt an incremental approach to reinvestment such that future alternative options were not eliminated.



Central Queensland to South Queensland Area

Future requirements

- The current reinvestment strategy looks to balance economic cost whilst preserving a transfer capability that delivers appropriate market benefits.
- A number of transmission lines will reach their end of life over the next five to 20 years.

Transmission Line	Estimated Reinvestment Period (years)
Palmwoods to South Pine	5-10
Calliope River to Gin Gin	5-10
Calliope River to Wurdong Tee	10-20
Wurdong Tee to Gin Gin	10-20
Gin Gin to Woolooga	10-20
Gin Gin to Teebar Creek	10-20
Teebar Creek to Woolooga	10-20

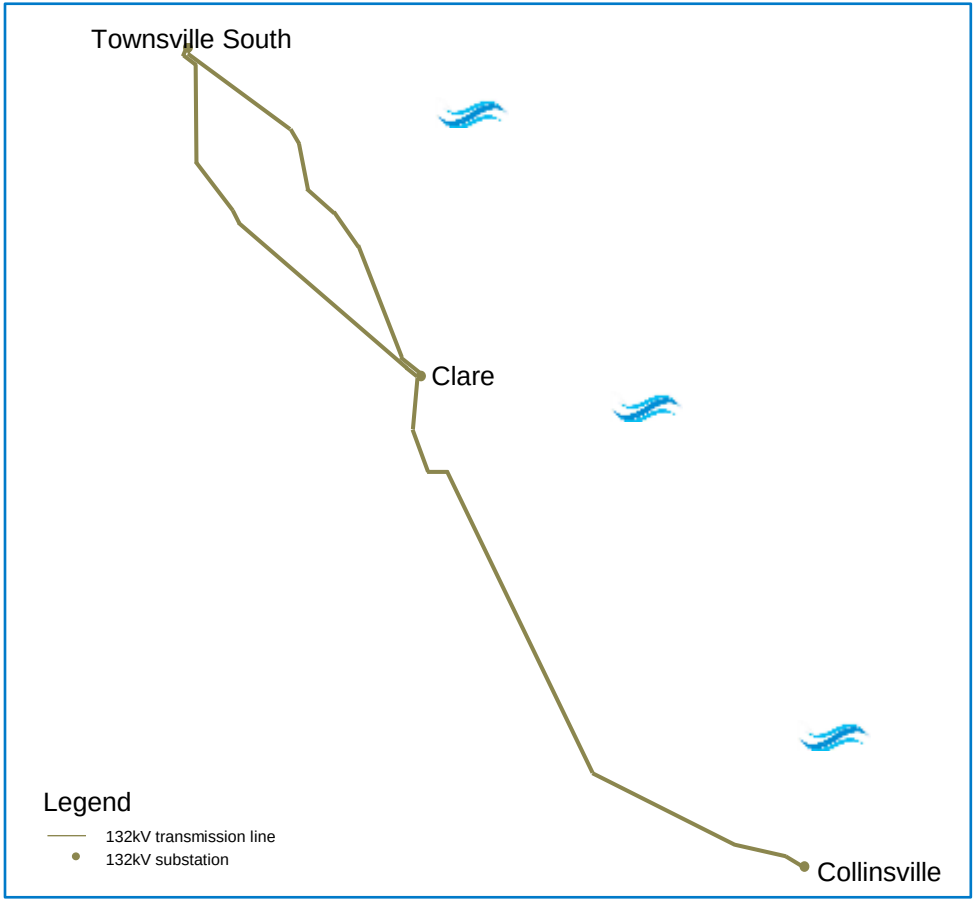
North Queensland Area

275kV & 132kV Transmission Corridor

NQ Transmission Corridor Network Development

1960s

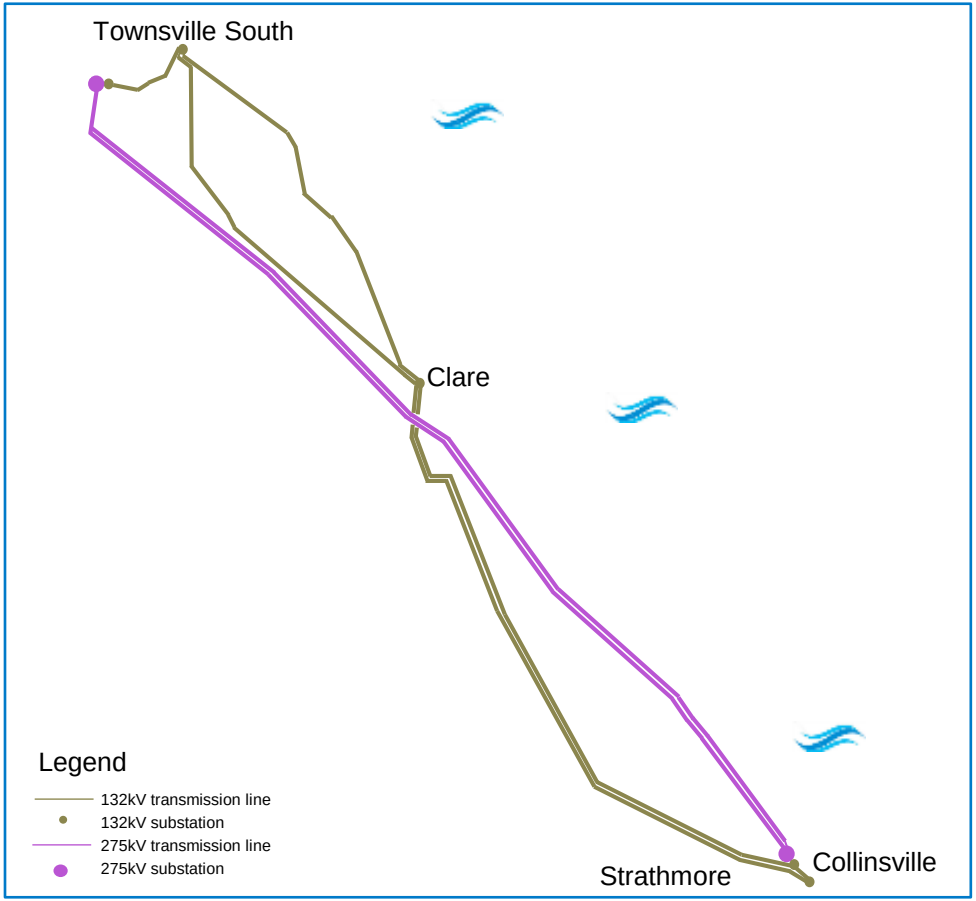
- 132kV circuit
- Collinsville Power Station to Townsville.



NQ Transmission Corridor Network Development

1980s

- 275kV single circuit transmission lines established between Collinsville and Ross
- Ross 275/132kV Substation established with one transformer initially (there are now three).

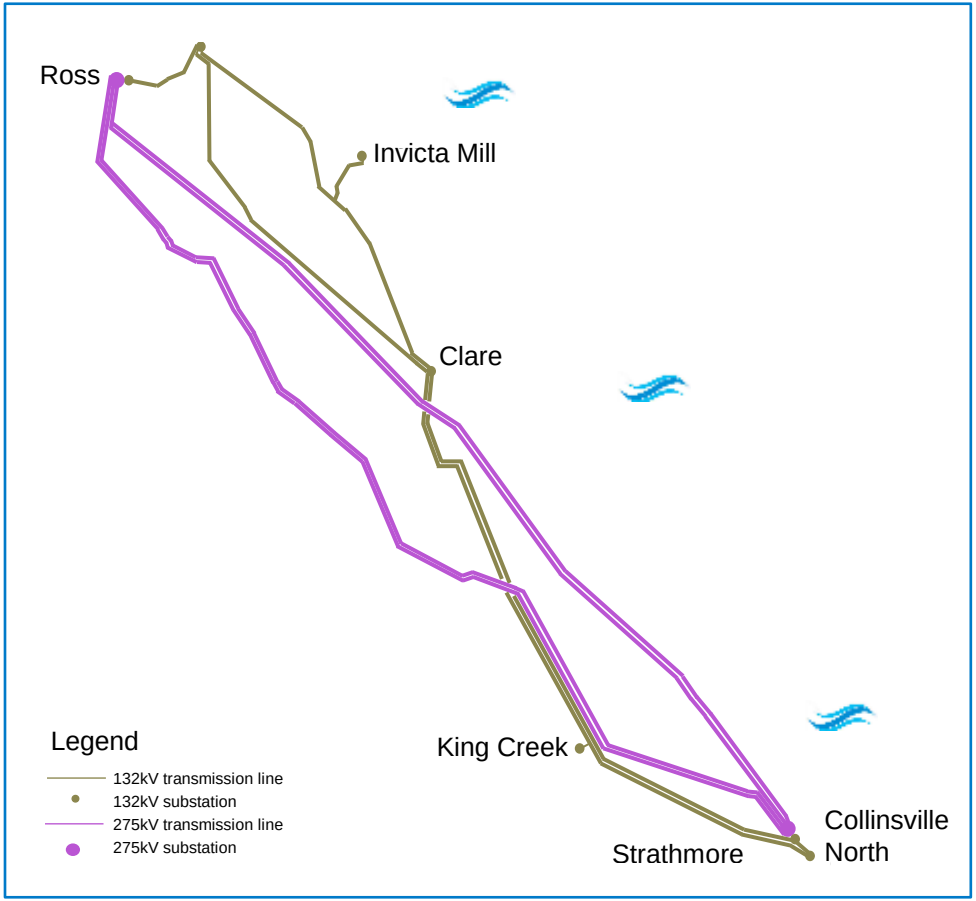


NQ Transmission Corridor Network Development

2000 onwards

275kV supply into NQ upgraded

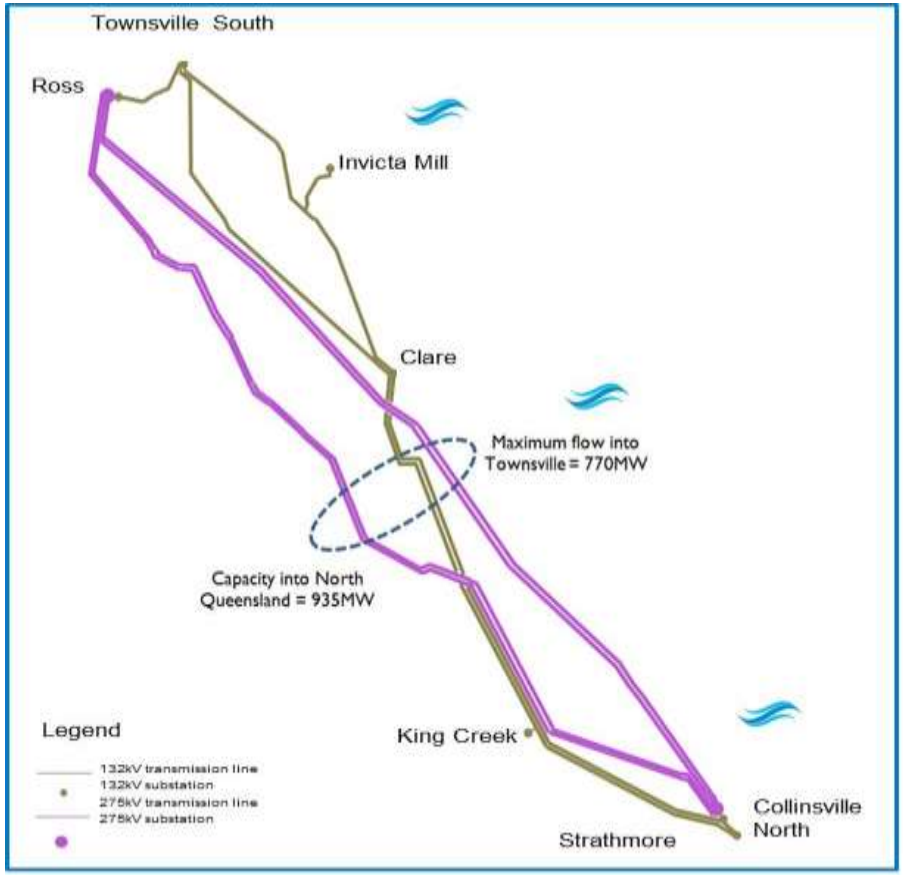
- New double circuit transmission line from Strathmore to Ross
- Two existing single circuit transmission lines from Strathmore to Ross are paralleled for higher capacity
- Strathmore 275/132kV Substation established with one transformer.



NQ Transmission Corridor Network Development

2000 onwards

- Replacement of original substations at Clare and Collinsville at adjacent sites
- Connection of major customers
- Decommissioning of assets:
  - Collinsville Power Station connections
  - Mackay to Proserpine transmission line.



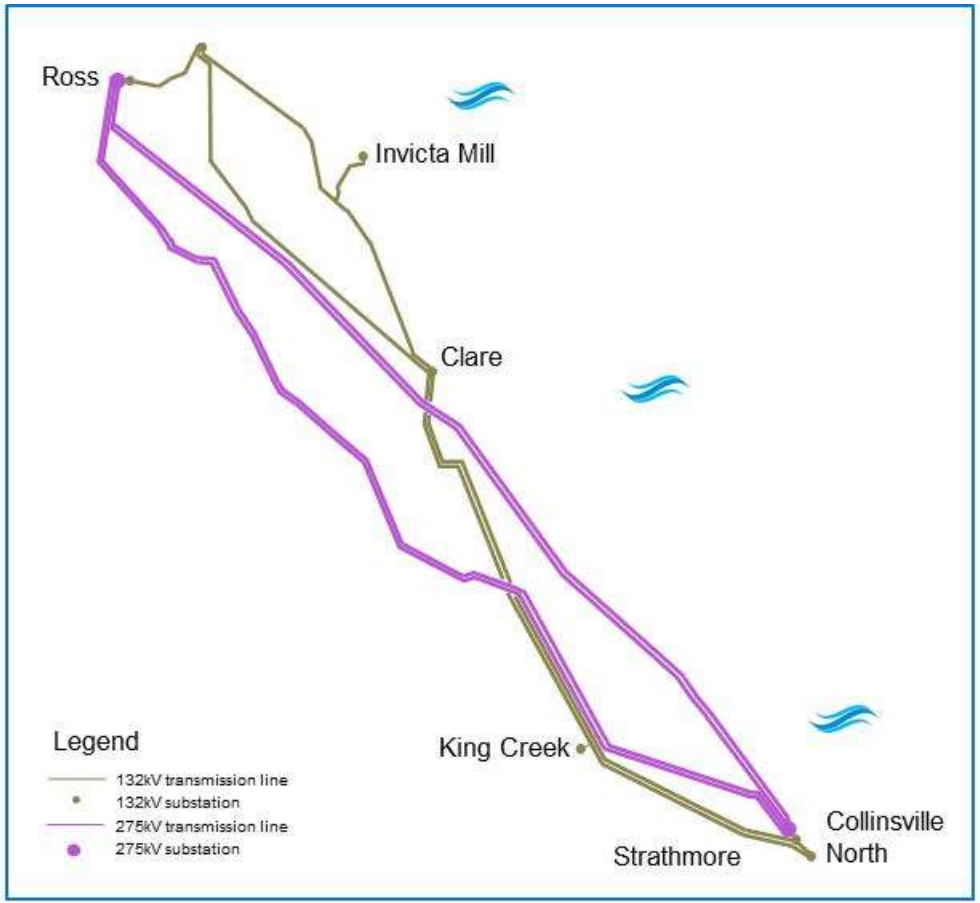
NQ Transmission Corridor Network Development

Characteristics

- 275kV
  - provides intra-regional transfers
- 132kV
  - provides back-up supply to Townsville and voltage support to Strathmore / Northern Bowen Basin
  - provides connections to King Creek, Invicta Mill and Clare South
  - Not much headroom

New generation

- High-level interest renewable generation



NQ Transmission Corridor Network Development

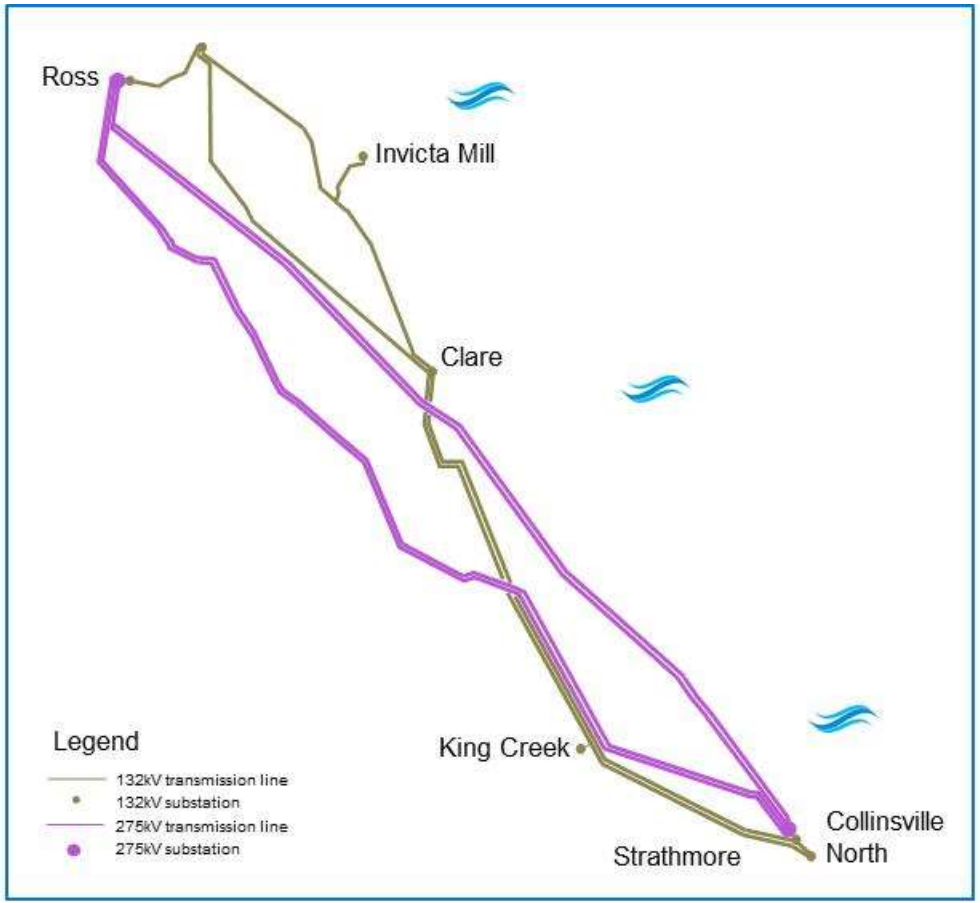
Future network requirements

- Existing transfer capability is sufficient and seldom constrains market operation
- May change with generation mix and types of loads.

Assets reaching end of life

- 132kV network: 5-10 years
- 275kV single circuit lines: 10-20 years
- Near term issue with inland 132kV circuit.

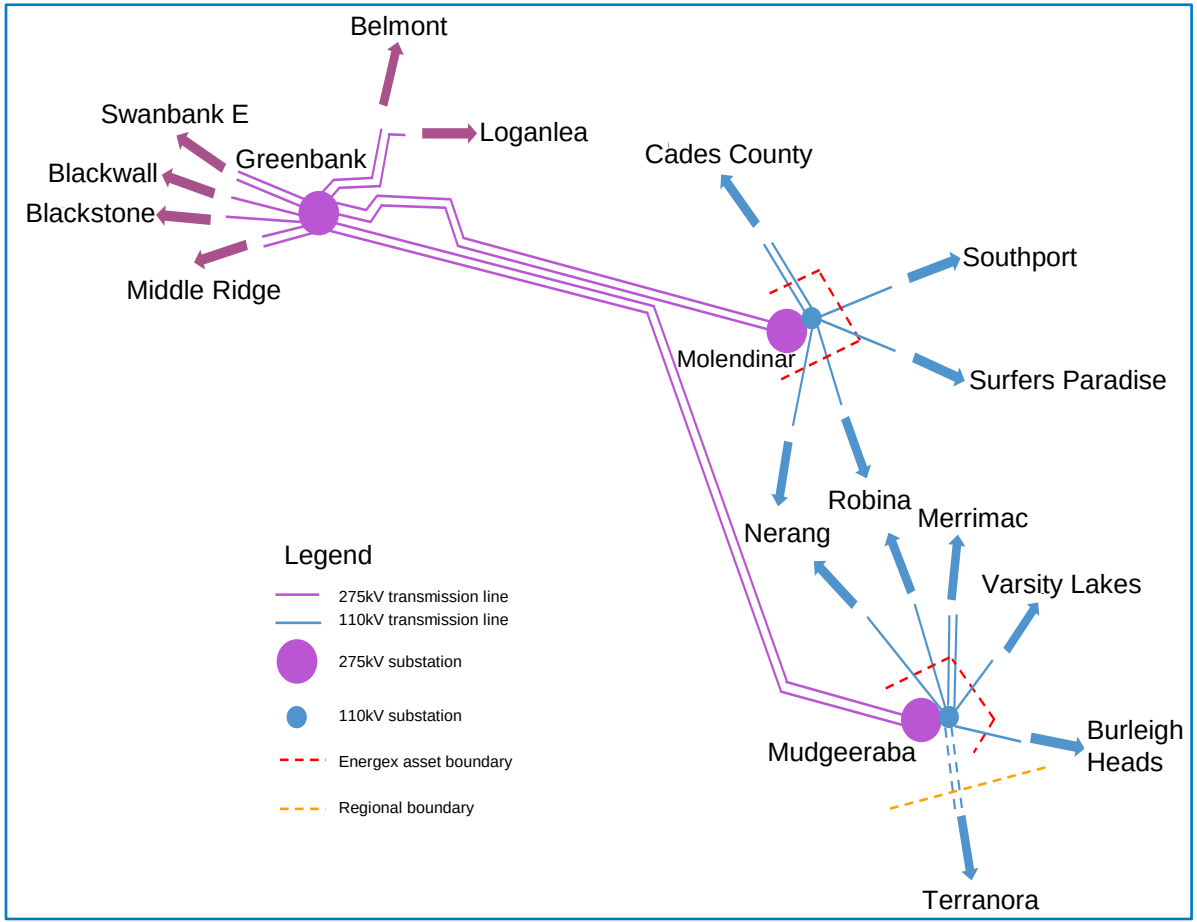
Flexibility to reshape the footprint to respond to evolved requirements



Gold Coast Area

Gold Coast Area

- The main transmission system supporting power transfers to the Gold Coast consists of the Greenbank to Molendinar and Greenbank to Mudgeeraba 275kV transmission lines.
- The Molendinar and Mudgeeraba 275/110kV substations are the major injection points into the area.



Mudgeeraba Third Transformer

- Currently three 275/110kV transformers at Mudgeeraba Substation
- With the existing three transformer configuration, there is no load at risk during the 10 year outlook period
- Replacement or decommissioning needs to be considered for one of the transformers in the next three to five years
- Joint planning would need to be done between Powerlink, Energex, Transgrid, Essential Energy and Directlink.

Greenbank to Mudgeeraba Transmission Lines

- Existing transmission network supplying the Gold Coast has adequate capacity 10 year load outlook and Directlink export capability

- Any major reinvestment or network reconfiguration involving these single circuit transmission lines will include consultation with a large number of stakeholders – complex joint planning, community consultation and RIT-T consultation

- Due to complexity and potential staging requirements, it has been identified that an optimised end of life strategy should be agreed within three to five years.

Gold Coast Area

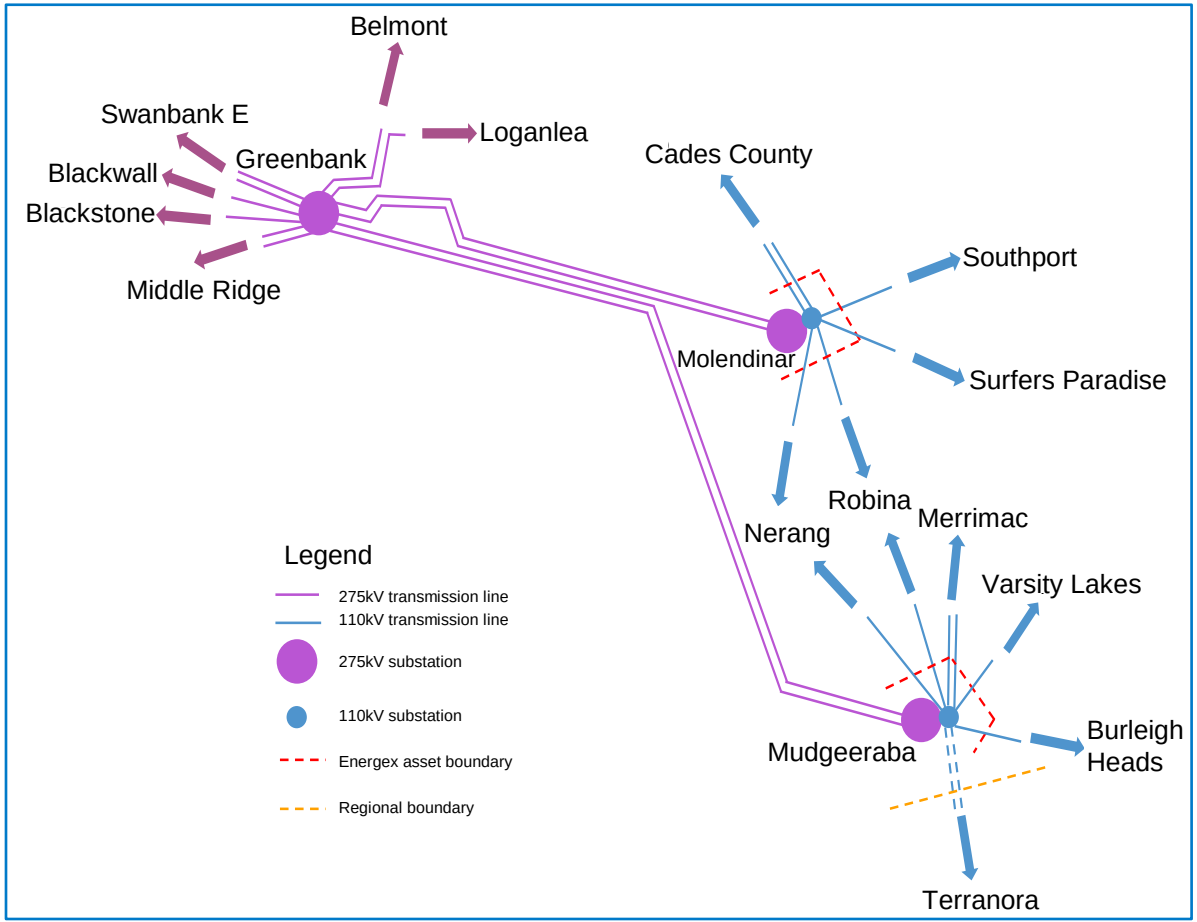
Emerging issues

Three to five years

- Mudgeeraba 275kV secondary systems
- No. 3 275/110kV transformer at Mudgeeraba

Five to 10 years

- 2 x single circuit 275kV Greenbank to Mudgeeraba transmission lines
- Molendinar 275/110kV secondary systems
- Mudgeeraba 110kV Substation
- Greenbank secondary systems and SVC secondary systems
- Mudgeeraba to STR-1731 (NSW Boarder Terranora) 110kV double circuit transmission line



Questions?

Conclusion

- Thank you for attending today's webinar
- We encourage you to contact Powerlink for any more details
- Information on the RIT-T/non-network solutions can be found on our website
- For further questions or to join Powerlink's Non-Network Engagement Stakeholder Register (NNESR) please email networkassessments@powerlink.com.au.

Thank you

www.powerlink.com.au

networkassessments@powerlink.com.au