Chapter 6:
Strategic planning

6 Strategic planning

Key highlights

- This chapter identifies possible network limitations which may arise between the five and 10-year outlook and provides potential network solutions.
- Long-term planning takes into account uncertainties in load growth and sources of generation, and the condition and performance of existing assets to optimise the network that is best configured to meet current and a range of plausible future capacity needs.
- Plausible new loads within the resource rich areas of Queensland or at the associated coastal port facilities may emerge within the 10-year outlook. These loads may cause limitations on the transmission system in excess of Powerlink's amended planning standard. Possible network options are provided for Bowen Basin coal mining area, Bowen Industrial Estate, Galilee Basin coal mining area, CQ-NQ grid section, Central West to Gladstone and the Surat Basin north west area.
- Assets where reinvestment will need to be made in the next five to 10-year period where there may be opportunities for reconfiguration include Ross, Central West and Gladstone zones and CQ-SQ grid section.

6.1 Background

Powerlink Queensland as a Transmission Network Service Provider (TNSP) in the National Electricity Market (NEM) and as the appointed Jurisdictional Planning Body (JPB) by the Queensland Government is responsible for transmission network planning for the national grid within Queensland. Powerlink's obligation is to plan the transmission system to reliably and economically supply load while managing risks associated with the condition and performance of existing assets in accordance with the requirements of the National Electricity Rules (NER), Queensland's Electricity Act 1994 (the Act) and its Transmission Authority.

A key step in this process is the development of long-term strategic plans for both the main transmission network and supply connections within the zones. These long-term plans take into consideration uncertainties in the future. The uncertain future can impact potential sources of generation and load growth. Uncertain load growth can occur due to different economic outlooks, emergence of new technology and the commitment or retirement of large industrial and mining loads.

The long-term plans also take into consideration the condition and performance of existing assets. As assets reach the end of technical or economic life, reinvestment decisions are required. These decisions are made in the context of the required reliability standards, load forecast and generation outlook. The reinvestment decisions also need to be cognisant of the uncertainties that exist in the generation and load growth outlooks.

As assets reach the end of technical or economic life, opportunities may emerge to retire without replacement, initiate non-network alternatives, extend technical life or replace with assets of a different type, configuration or capacity. The objective is not to automatically make like for like replacements or to make individual asset investment decisions. Rather the objective is to integrate demand based limitations and condition based risks of assets to ensure an optimised network that is best configured to meet current and a range of plausible future capacity needs.

Information in this chapter is organised in two parts. Section 6.2 discusses the possible impact uncertain load growth may have on the performance and adequacy of the transmission system. This discussion is limited to the impact of possible new large loads in Chapter 2 may have on the network. Section 6.3 provides a high-level outline of the possible network development plan for investments required to manage risks related to the condition and performance of existing assets. This high level outline is discussed for parts of the main transmission system and within regional areas where the risks based on the condition and performance of assets may initiate investment decisions in the five to 10-year horizon of this Transmission Annual Planning Report (TAPR). Information on reinvestment decisions within the current five-year outlook of this TAPR is detailed in Chapter 4.

Powerlink considers it important to identify these long-term development options so that analyses using a scenario based approach, such as the Australian Energy Market Operator's (AEMO) National Transmission Network Development Plan (NTNDP), are consistent. In this context the longer-term plans only consider possible network solutions. However, this does not exclude the possibility of non-network solutions or a combination of both. As detailed planning studies are undertaken around the future network need and possible reinvestment options, Powerlink will identify the requirements a non-network solution would need to offer in order for it to be a genuine alternative to network investment. These non-network options will be fully evaluated as part of the Regulatory Investment Test for Transmission (RIT-T) process.

6.2 Possible network options to meet reliability obligations for potential new loads

Chapter 2 provides details of several proposals for large mining, metal processing and other industrial loads whose development status is not yet at the stage that they can be included (either wholly or in part) in the medium economic forecast. These load developments are listed in Table 2.1.

The new large loads in Table 2.1 are within the resource rich areas of Queensland or at the associated coastal port facilities. The relevant resource rich areas include the Bowen Basin, Galilee Basin and Surat Basin. These loads have the potential to significantly impact the performance of the transmission network supplying, and within, these areas. The degree of impact is also dependent on the location of new or withdrawn generation to maintain the supply and demand balance for the Queensland region.

The commitment of some or all of these loads may cause limitations to emerge on the transmission network. These limitations could be due to plant ratings (thermal and fault current ratings), voltage stability and/or transient stability. Options to address these limitations include network solutions, demand side management (DSM) and generation non-network solutions.

As the strategic outlook for non-network options is not able to be clearly determined, this section focuses on strategic network developments only. This should not be interpreted as predicting the outcome of the RIT-T process. The recommended option for development is the credible option that maximises the present value of the net economic benefit to all those who produce, consume and transport electricity in the market.

Information on strategic network developments is limited to those required to address limitations that may emerge if the new large loads in Table 2.1 commit. Feasible network projects can range from incremental developments to large-scale projects capable of delivering significant increases in power transfer capability.

For the transmission grid sections potentially impacted by the possible new large loads in Table 2.1, details of feasible network options are provided in sections 6.2.1 and 6.2.6. Consultation on the options associated with emerging limitations will be subject to commitment of additional demand.

6.2.1 Bowen Basin coal mining area

Based on the medium economic forecast defined in Chapter 2, the committed network and non-network solutions described in Section 3.2 and if the possible retirement of assets described in sections 4.2.2 and 4.2.3 is evaluated, network limitations exceeding the limits established under Powerlink's planning standard may occur. Possible solutions to the limitation could be the installation of a transformer at Strathmore Substation, line reconfiguration works and/or additional voltage support in the Strathmore area.

In addition, there has been a proposal for the development of liquefied natural gas (LNG) processing load in the Bowen Basin. The loads could be up to 80MW (refer to Table 2.1) and cause voltage and thermal limitations impacting network reliability to reoccur on the transmission system upstream of their connection points. These loads have not reached the required development status to be included in the medium economic forecast for this TAPR.

The new load within the Bowen Basin area would result in limitations on the 132kV transmission system. Thermal and voltage limitations may emerge during an outage of the Strathmore 275/132kV transformer, a 132kV circuit between Nebo and Moranbah substations, the 132kV circuit between Strathmore and Collinsville North substations, or the 132kV circuit between Lilyvale and Dysart substations (refer to Figure 4.3).

The impact these loads may have on the Central Queensland to North Queensland (CQ-NQ) grid section and possible network solutions to address these is discussed in Section 6.2.4.

Possible network solutions

Feasible network solutions to address the limitations are dependent on the magnitude and location of load and may include one or more of the following options:

- 132kV capacitor bank at Proserpine Substation
- second 275/132kV transformer at Strathmore Substation
- turn-in to Strathmore Substation the second 132kV circuit between Collinsville North and Clare South substations
- 132kV phase shifting transformers to improve the sharing of power flow in the Bowen Basin within the capability of the existing transmission assets.

Further additional load, depending on location, may require the construction of additional transmission circuits into the Bowen Basin area. Feasible solutions may involve construction of 132kV transmission lines between the Nebo, Broadlea and Peak Downs areas. An additional 132kV transmission line may also be required between Moranbah and a future substation north of Moranbah.

6.2.2 Bowen Industrial Estate

Based on the medium economic forecast defined in Chapter 2, no additional capacity is forecast to be required as a result of network limitations within the five-year outlook period of this TAPR.

However, electricity demand in the Abbot Point State Development Area (SDA) is associated with infrastructure for new and expanded mining export and value adding facilities. Located approximately 20km west of Bowen, Abbot Point forms a key part of the infrastructure that will be necessary to support the development of coal exports from the northern part of the Galilee Basin. The loads in the SDA could be up to 100MW (refer to Table 2.1) but have not reached the required development status to be included in the medium economic forecast for this TAPR.

The Abbot Point area is supplied at 66kV from Bowen North Substation. Bowen North Substation was established in 2010 with a single 132/66kV transformer and supplied from a double circuit 132kV line from Strathmore Substation but with only a single circuit connected. During outages of the single supply to Bowen North the load is supplied via the Ergon Energy 66kV network from Proserpine, some 60km to the south. An outage of this single connection will cause voltage and thermal limitations impacting network reliability.

Possible network solutions

A feasible network solution to address the limitations comprises:

- installation of a second 132/66kV transformer at Bowen North Substation
- connection of the second Strathmore to Bowen North 132kV circuit
- second 275/132kV transformer at Strathmore Substation
- turn-in to Strathmore Substation the second 132kV circuit between Collinsville North and Clare South substations.

6.2.3 Galilee Basin coal mining area

There have been proposals for new coal mining projects in the Galilee Basin. Although these loads could be up to 750MW (refer to Table 2.1) none have reached the required development status to be included in the medium economic forecast for this TAPR. If new coal mining projects eventuate, voltage and thermal limitations on the transmission system upstream of their connection points may occur.

Depending on the number, location and size of coal mines that develop in the Galilee Basin it may not be technically or economically feasible to supply this entire load from a single point of connection to the Powerlink network. New coal mines that develop in the southern part of the Galilee Basin may connect to Lilyvale Substation via approximately 200km transmission line. Whereas coal mines that develop in the northern part of the Galilee Basin may connect via a similar length transmission line to the Strathmore Substation.

Whether these new coal mines connect at Lilyvale and/or Strathmore Substation, the new load will impact the performance and adequacy of the CQ-NQ grid section. Possible network solutions to the resultant CQ-NQ limitations are discussed in Section 6.2.4.

In addition to these limitations on the CQ-NQ transmission system, new coal mine loads that connect to the Lilyvale Substation may cause thermal and voltage limitations to emerge during an outage of a 275kV circuit between Broadsound and Lilyvale substations.

Possible network solutions

For supply to the Galilee Basin from Lilyvale Substation, feasible network solutions to address the limitations are dependent on the magnitude of load and may include one or more of the following options:

- installation of capacitor bank/s at Lilyvale Substation
- third 275kV circuit between Broadsound and Lilyvale substations
- staged construction of a western 275kV transmission corridor as part of a broader development strategy.

6.2.4 Central Queensland to North Queensland grid section transfer limit

Based on the medium economic forecast outlined in Chapter 2, network limitations impacting reliability or the efficient economic operation of the NEM are not forecast to occur within the five-year outlook of this TAPR.

However, as discussed in sections 6.2.1, 6.2.2 and 6.2.3 there have been proposals for large coal mine developments in the Galilee Basin, and development of LNG processing load in the Bowen Basin and associated port expansions. The loads could be up to 900MW (refer to Table 2.1) but have not reached the required development status to be included in the medium economic forecast of this TAPR.

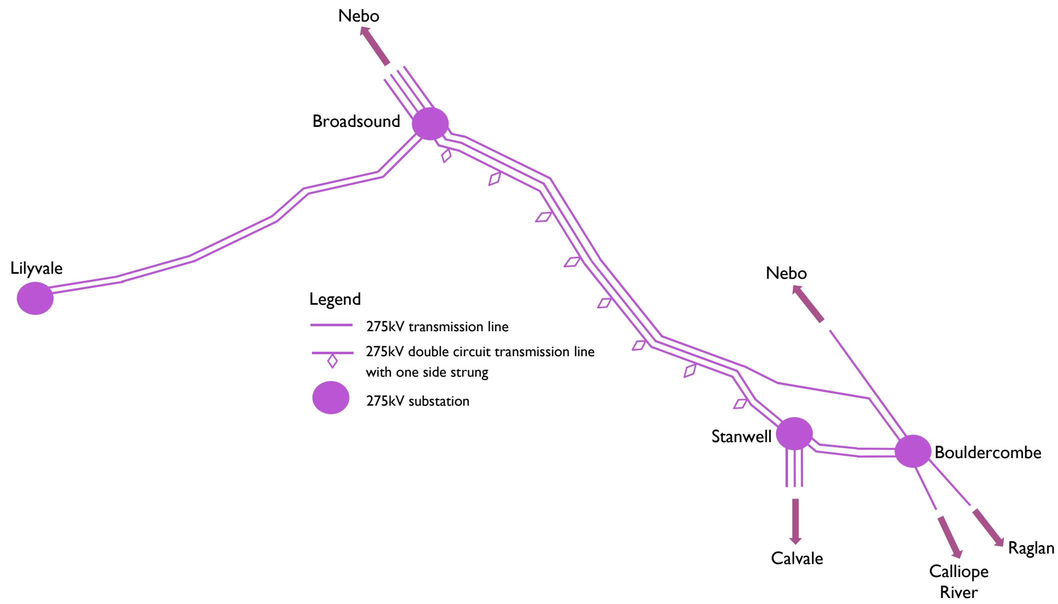
Network limitations on the CQ-NQ grid section may occur if a portion of these new loads commit. Power transfer capability into northern Queensland is limited by thermal ratings or voltage stability limitations. Thermal limitations may occur on the Bouldercombe to Broadsound 275kV line during a critical contingency of a Stanwell to Broadsound 275kV circuit. Voltage stability limitations may occur during the trip of the Townsville gas turbine or 275kV circuit supplying northern Queensland.

As generation costs are higher in northern Queensland due to reliance on liquid fuels, there may be positive net market benefits in augmenting the transmission network.

Possible network solutions

In 2002, Powerlink constructed a 275kV double circuit transmission line from Stanwell to Broadsound with one circuit strung (refer to Figure 6.1). A feasible network solution to increase the power transfer capability to northern Queensland is to string the second circuit.

Figure 6.1 Stanwell/Broadsound area transmission network



Following this augmentation, voltage and thermal limitations may emerge depending on new mining or industrial load developments. Feasible solutions to address the emerging limitations could vary depending on the size and location of load that commits and the size, location and type of generation that may be required to maintain an appropriate supply and demand balance in the Queensland region.

Feasible network solutions to emerging voltage limitations may involve the installation of capacitor banks and/or a static VAr compensator (SVC) at existing central and northern Queensland substations. Depending on the location of the additional loads, capacitor banks may be required at Broadsound, Lilyvale and Nebo substations. If the voltage stability limitations require dynamic reactive compensation, then an SVC may be installed at Broadsound Substation.

For higher levels of load, feasible network solutions may include installation of series capacitors and/or the construction of new transmission lines. The construction of new transmission lines between Stanwell and Broadsound substations and between Broadsound and Nebo substations would also increase the thermal, voltage and transient limits.

An alternative to augmenting the existing transmission corridor north of Stanwell is to establish a western 275kV corridor connecting Calvale and Lilyvale substations, via Blackwater Substation.

6.2.5 Central West to Gladstone area reinforcement

The 275kV network forms a triangle between the generation rich nodes of Calvale, Stanwell and Calliope River substations. This triangle delivers power to the major 275/132kV injection points of Calvale, Bouldercombe (Rockhampton), Calliope River (Gladstone) and Boyne Island Smelter (BSL) substations.

Since there is a surplus of generation within this area, this network is also pivotal to supply power to northern and southern Queensland. As such, the utilisation of this 275kV network depends not only on the generation dispatch and supply and demand balance within the Central West and Gladstone zones, but also in northern and southern Queensland.

Based on the medium economic forecast defined in Chapter 2, network limitations impacting reliability or efficient market outcomes are not forecast to occur within the five-year outlook of this TAPR. This assessment also takes into consideration the possible retirement of the Callide A to Gladstone South 132kV double circuit transmission line within the next five years (refer to Section 4.2.4).

However, there are several developments in the Queensland region that would change not only the power transfer requirements between the Central West and Gladstone zones but also on the intra-connectors to northern and southern Queensland. These may lead to limitations within this 275kV triangle. Network limitations would need to be addressed by dispatching out-of-merit generation and the technical and economic viability of uprating the power transfer capacity would need to be assessed under the requirements of the RIT-T.

Possible network solutions

Depending on the emergence of network limitations within the 275kV network it may become economically viable to uprate its power transfer capacity to alleviate constraints. A feasible network solution to facilitate efficient market operation may include transmission line augmentation between:

- Calvale and Larcom Creek substations and
- Larcom Creek and Calliope River substations.

6.2.6 Surat Basin north west area

Based on the medium economic forecast defined in Chapter 2, network limitations impacting reliability are not forecast to occur within the five-year outlook of this TAPR.

However, there have been several proposals for additional LNG upstream processing facilities and new coal mining load in the Surat Basin north west area. These loads have not reached the required development status to be included in the medium economic forecast for this TAPR. The loads could be up to 350MW (refer to Table 2.1) and cause voltage and/or thermal limitations impacting network reliability on the transmission system upstream of their connection points.

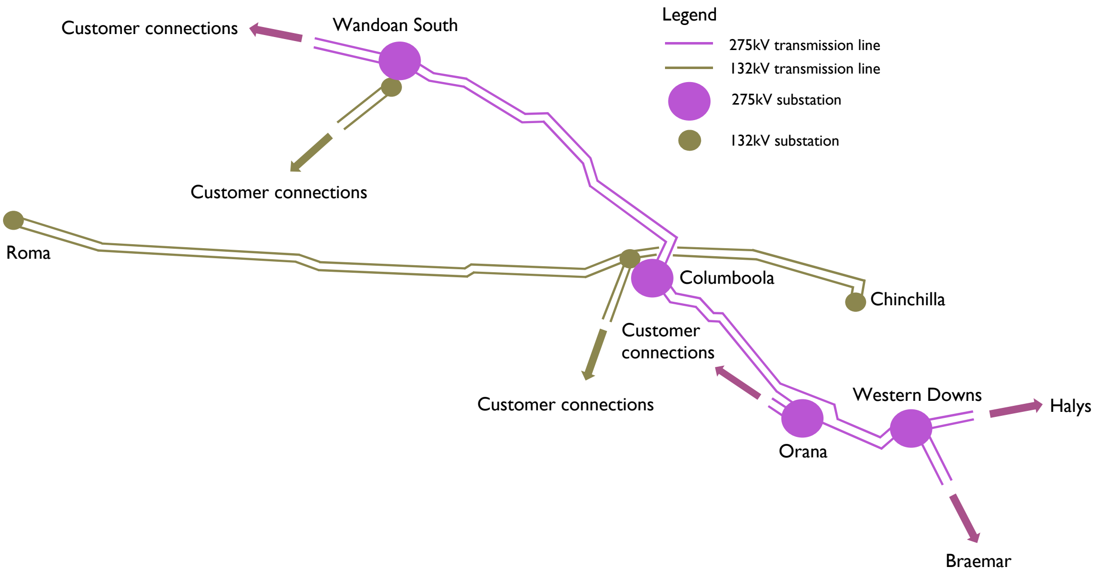
Depending on the location and size of additional load, voltage stability limitations may emerge prior to thermal limitations being reached on the 275kV network supplying the Surat Basin north west area. For voltage stability limitations the critical contingencies are outages of the 275kV circuits between Western Downs and Columboola, and between Columboola and Wandoan South substations. For thermal limitations the critical contingency is an outage between Columboola and Wandoan South substations.

Possible network solutions

Due to the nature of the voltage stability limitation, the size and location of load and the range of contingencies over which the instability may occur, it will not be possible to address this issue by installing a single SVC at a single location. To address the voltage stability limitation the following network options are viable:

- SVCs at both Columboola and Wandoan South substations
- additional circuits between Western Downs, Columboola and Wandoan South substations to increase fault level and transmission strength or
- a combination of the above options.

Figure 6.2 Surat Basin north west area transmission network



6.3 Possible reinvestment options initiated within the five to 10-year outlook

In addition to meeting the forecast demand, Powerlink must maintain existing assets to ensure the risks associated with condition and performance are appropriately managed. To achieve this Powerlink routinely undertakes an assessment of the condition of assets and identifies potential emerging risks related to such factors as reliability, physical condition, safety, performance and functionality, statutory compliance and obsolescence.

Based on these assessments a number of assets have been identified as approaching the end of technical or economic life. This section focuses on those assets where reinvestment will need to be made in the next five to 10-year period of this TAPR and where there may be opportunities for network reconfiguration. Information on reinvestment decisions within the current five-year outlook is detailed in Chapter 4.

The parts of the main transmission system and regional areas for which Powerlink has identified opportunities for reconfiguration in the five to 10-year period of this TAPR include:

- Ross zone
- Central West and Gladstone zones
- Central Queensland to South Queensland grid section.

Powerlink will also continue to investigate opportunities for reconfiguration in other parts of the network where assets are approaching the end of technical or economic life and demand and generation developments evolve.

Reinvestment decisions in these areas aim to optimise the network topology to ensure the network is best configured to meet current and a range of plausible future capacity needs. As assets reach the end of technical life, consideration is given to a range of options to manage these associated risks. These include asset retirement, network reconfiguration, partial or full replacement (possibly with assets of a different type, configuration or capacity), extend technical life, and/or non-network alternatives. Individual asset investment decisions are not determined in isolation. An integrated planning process is applied to take account of both future load and the condition based risks of related assets in the network. The integration of condition and demand based limitations delivers cost effective solutions that manage both reliability of supply obligations and the risks associated in allowing assets to remain inservice.

A high-level outline of the possible network development plan for these identified areas that manage risks related to the condition and performance of the existing assets is given in sections 6.3.1, 6.3.2 and 6.3.3.

6.3.1 Ross zone

The network between Collinsville and Townsville has developed over many years. It comprises a 132kV network and a 275kV network which operate in parallel. The 132kV lines are approaching end of technical life within the next five to 10 years, while the earliest end of life trigger for the 275kV lines is beyond the 10-year outlook of this TAPR.

Powerlink is investigating options to ensure that the condition based risks associated with these 132kV lines are managed. There are a number of technically feasible options for the retirement of certain 132kV transmission line assets within this area. Options include ongoing maintenance, asset retirement, line refit, rebuild and network reconfiguration.

Planning studies have indicated that there is the potential to reconfigure the network by retiring one of the two 132kV transmission lines from Townsville South to Clare South substations. If this retirement were to eventuate, and based on the medium economic forecast defined in Chapter 2, network limitations exceeding the limits under Powerlink's planning standard are forecast to occur. Possible solutions to the limitation are described in Section 4.2.2.

Further condition based risks emerge on the double circuit 132kV lines between Clare South and Collinsville North substations within the five to 10-year period of this TAPR. Powerlink is investigating options to ensure that the associated condition based risks are managed appropriately. The current options being considered include line refit or network reconfiguration.

Reinvestment in the double circuit transmission line may involve structural refit of the towers and tower painting. This line refit is likely to be required within the five to 10-year outlook of this TAPR. However, the reconfiguration options allow the majority of the double circuit transmission line to remain in-service to the predicted end of technical life. Reconfiguration options therefore defer the reinvestment need compared to the line refit option[1].

A potential reconfiguration option consists of:

- a line refit of Collinsville to King Creek circuit section only
- decommission King Creek to Clare South
- install second 275/132kV transformer at Strathmore[2]
- establish 275kV injection into Clare South[3].

As discussed in Section 6.2.1 voltage and thermal limitations may emerge within the 132kV network supplying the Bowen Basin area if additional load commits within the area. Depending on the magnitude and location of this additional load a feasible network solution may involve the installation of a second 275/132kV transformer at Strathmore Substation. Reinvestment decisions will be made cognisant of this potential outcome.

6.3.2 Central West and Gladstone zones

Within the five to 10-year outlook of this TAPR further condition based risks emerge on the double circuit 132kV line between Callide and Gladstone South substations. Powerlink is investigating options to ensure that these condition based risks are managed. The current options consist of refitting these circuits or retirement of this double circuit line with possible network reconfiguration. Section 4.2.4 discusses the condition based risks for the 132kV lines between Callide, Bioela and Moura substations which need to be addressed within the five-year outlook period.

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1 Refit options are performed approximately five years prior to the end of technical life.

2 Required to deliver reliability of supply to the Proserpine and Bowen Basin areas with the loss of voltage support when the 132kV connection to Townsville South is removed.

3 Required to deliver reliability of supply to Clare South Substation following the decommissioning of inland single circuit transmission line.

6.3.3 Central Queensland to South Queensland grid section

Three single circuit 275kV transmission lines operate between Calliope River and South Pine substations and form the coastal corridor of the Central Queensland to South Queensland (CQ-SQ) grid section. These transmission lines were constructed in the 1970s and 1980s. The lines traverse a variety of environmental conditions that have resulted in different rates of corrosion. The risk levels therefore vary across the transmission lines. Updated condition assessments have been completed since the 2015 TAPR, for those sections of the lines where the environmental conditions are more onerous.

Based on these detailed assessments the 275kV single circuit lines in the most northern and southern end will reach end of technical and economic life in the five to 10-year outlook of this TAPR. The remainder of the circuits will be at end of technical and economic life from the next 10 to 30 years.

The 275kV lines at the northern end of this coastal corridor are currently experiencing to a higher rate of corrosion. It is expected that the risks, primarily driven by the 275kV single circuit transmission lines between Calliope River and Wurdong substations, will exceed acceptable corrosion levels by approximately 2021. The higher rate of corrosion is due to the proximity to the coast and exposure to salt laden coastal winds. The Calliope River to Wurdong line also traverses two tidal crossings and operates in a heavy industrial area.

Risks on the section between Calliope River and Wurdong may be managed through maintenance works, with minimal work required over the next five years. This strategy is economic and will allow the technical end of life of the 275kV single circuits between Calliope River to Wurdong to be aligned with those from Wurdong to Gin Gin.

The 275kV transmission lines between South Pine to Woolooga and Palmwoods to South Pine substations are also experiencing a higher rate of corrosion and will exceed acceptable risk levels in the next five years. The higher rate of corrosion is due to a localised wet weather environment in the hinterland regions of Mapleton and Maleny.

Similar to the strategy in the northern section, it is considered economic to align the technical and economic end of life of the South Pine to Woolooga and Palmwoods to Woolooga transmission lines. This will require a moderate amount of maintenance or refurbishment on the South Pine to Woolooga 275kV transmission line in the next five to 10 years. A transmission line refit project will also be required within the next five years to manage the risks of the 275kV single circuit transmission line between Palmwoods and Woolooga substations.

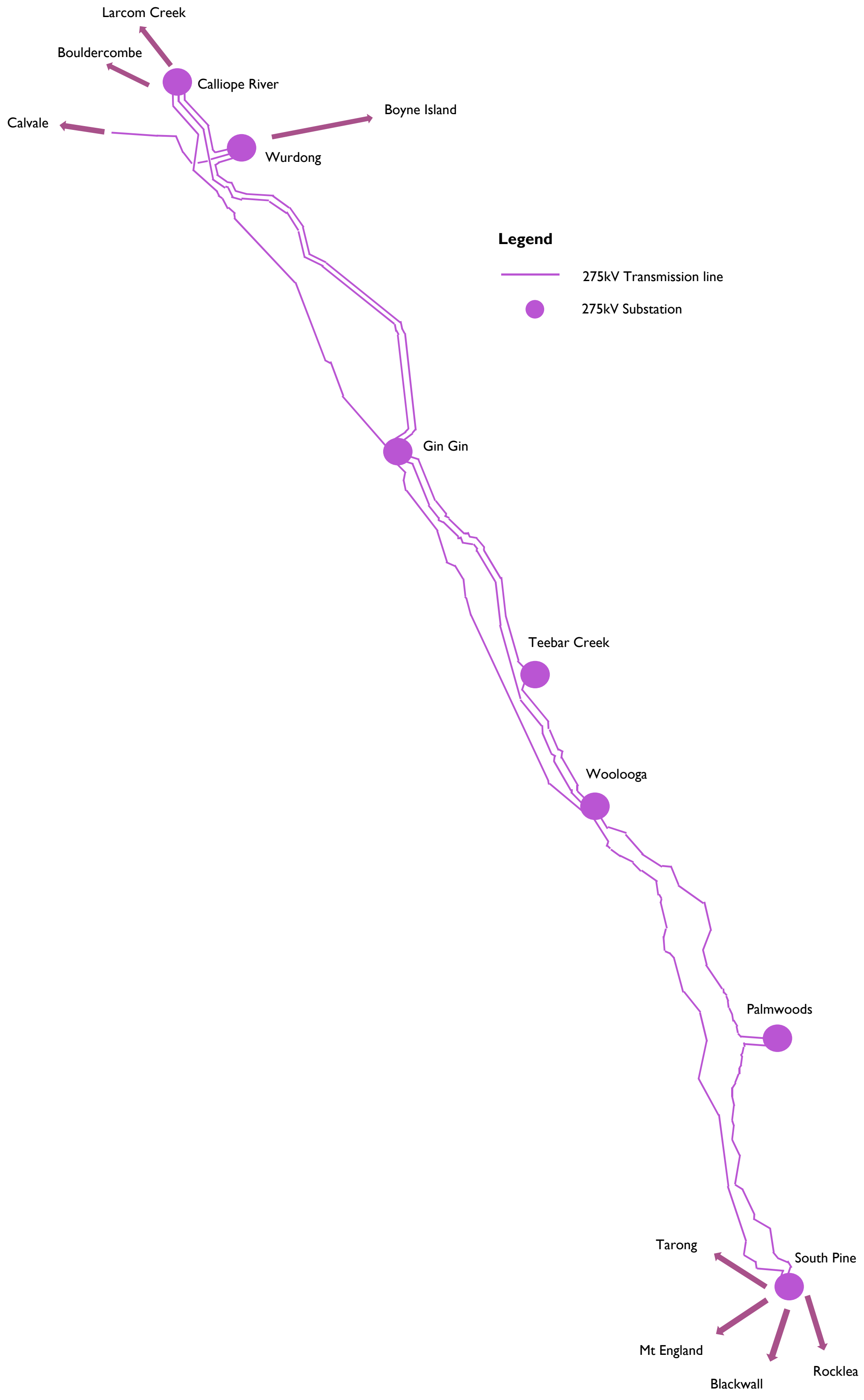
These strategies have the benefit of maintaining the existing topology, transfer capability and operability of the network. The strategies provide for an incremental development approach and defer large capital investment.

The incremental approach to reinvesting in the existing assets is both economic over the 10-year outlook of this TAPR and is fully aligned with providing time to better understand the impact that a lower carbon (higher renewable) generation future may have on the required transfer capability of this grid section.

The CQ-SQ grid section is an important intra-connector for the efficient operation of the NEM. Based on the medium economic forecast defined in Chapter 2 and the existing and committed generation defined in Table 5.1 there may be an opportunity to consolidate assets on the CQ-SQ grid section beyond the 10-year outlook of this TAPR without materially impacting the efficient operation of the NEM. However, potential investment in renewable generation in central and north Queensland, coupled with the possible displacement and/or retirement of existing thermal plant may significantly increase the utilisation of the grid section.

Powerlink will take these developments into account when formulating the strategies to meet the future emerging market requirements.

Figure 6.3 Central Queensland to South Queensland area transmission network



6.4 Supply demand balance

The outlook for the supply demand balance for the Queensland region was published in the AEMO 2015 Electricity Statement of Opportunities (ESOO)[4]. Interested parties who require information regarding future supply demand balance should consult this document.

6.5 Interconnectors

6.5.1 Existing interconnectors

The Queensland transmission network is interconnected to the New South Wales (NSW) transmission system through the Queensland/New South Wales Interconnector (QNI) transmission line and Terranora Interconnector transmission line.

The QNI maximum southerly capability is limited by thermal ratings, transient stability and oscillatory stability (as detailed in Section 5.5.9).

The combined QNI plus Terranora Interconnector maximum northerly capability is limited by thermal ratings, voltage stability, transient stability and oscillatory stability (as detailed in Section 5.5.9).

The capability of these interconnectors can vary significantly depending on the status of plant, network conditions, weather and load levels in both Queensland and NSW. It is for these reasons that interconnector capability is regularly reviewed, particularly when new generation enters the market or transmission projects are commissioned in either region.

6.5.2 Interconnector upgrades

Powerlink and TransGrid have assessed whether an upgrade of QNI could be technically and economically justified on several occasions since the interconnector was commissioned in 2001. Each assessment and consultation was carried out in accordance with the relevant version of the AER's Regulatory Investment Test at the time.

The most recent assessment was carried out as part of the joint Powerlink and TransGrid regulatory consultation process which concluded in December 2014. At that time, in light of uncertainties, Powerlink and TransGrid considered it prudent not to recommend a preferred upgrade option, however continue to monitor market developments to determine if any material changes could warrant reassessment of an upgrade to QNI. Relevant changes may include:

- changes in generation and large-scale load developments in Queensland and the NEM (including LNG, coal developments, renewable generation, retirement of generation); and
- NEM-wide reductions in forecast load and energy consumption.

There is considerable uncertainty in both load and generation development/retirement in the Queensland region. This uncertainty also extends to the southern states; perhaps not to the same extent for new large-scale load developments, but certainly for new generation development and or retirements. The impact this may have on the congestion and incidence of constraints on QNI is complex and varied. Depending on the emergence of these changes, QNI congestion may increase in the northerly or southerly direction. The different investments in load and investments and de-investments in generation across the NEM may also impact on the location and scope of viable network upgrade options.

4 Published by AEMO in August 2015.

Possible network solutions

Due to the nature of the voltage, transient and oscillatory stability limitations (as detailed in Section 5.5.9) a technically viable network option that would increase the QNI power transfer capability would be to establish controllable series compensation. All or part of this series compensation could be installed in the Queensland region.

Depending on the emergence of network limitations across QNI it may become economically viable to uprate its power transfer capacity to alleviate constraints. A feasible network solution to facilitate efficient market operation may include controllable series compensation. To manage the voltage profile a part of this series compensation could be installed in the Queensland region. While there is no current regulatory consultation process underway, Powerlink and TransGrid still encourage expressions of interest for potential non-network solutions which may be capable of increasing the transfer capability across the interconnector and hence deliver market benefits[5]. This is part of a broader strategy Powerlink is implementing to further develop, expand and capture economically and technically feasible non-network solutions. This strategy is based on enhanced collaboration with stakeholders (refer to Section 1.8.2).

[5] Information on non-network solutions maybe found at QNI Upgrade consultation.