Executive Summary
System Planning Capacity Project
Aurora Energy

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Contents

Executive summary

The purpose of this document is to outline the overall network development strategy for the Aurora Energy (Aurora) subtransmission and distribution networks. This document is not seeking financial approval for individual projects but rather approval for the overall strategies to be considered throughout the planning process.

The major strategies for each of the eleven planning areas are outlined in the table below and are further discussed in Section 4 and in the detailed strategic area plans produced by Aurecon.

The timing of the development is subject to detailed evaluation closer to the proposed time and evaluation of the demand side management strategies.

Area	Strategies
Central area	• Two alternative development paths for the New Norfolk area requiring further investigation - conversion of the 11 kV network to 22 kV and upgrade of the 110/22 kV substation or the retention of the 11 kV network and establishment of a new 110/11 kV terminal substation • No new zone substations in the long term plan period
East Coast	• Establishment of a 66 kV network and 66/22 kV zone substations (further investigation required with comparison to the extension of the 110 kV network and 110/22 kV substations) • New zone substations at Swansea (2035) and Ross (2045). Note that the substations are required for either development path.
Hobart East	• Continuation of the existing zone substation strategy • New zone substations Sandford (2017) and Risdon Vale (2045) • Conversion of the 11 kV and 22 kV distribution feeder networks in the Richmond and Coal River Valley areas to establish a definitive boundary between the 11 and 22 kV networks. • Review of the ratings of 33 kV cables and 33/11 kV transformers with a view to implementing cyclic, emergency and short-time ratings • Where appropriate, utilise 11 kV capacitor banks at zone substations to defer transformer upgrades and reduce losses
Hobart West	• Continuation of the existing zone substation strategy, with the exception that 33 kV switchgear be planned for certain substations to minimise the future 33 kV cable requirements in the city • New 33 kV injection points at Bridgewater (2016) and McRobies Gully (2034), a new 110/11 kV substation at Creek Road (2026) and new zone substations at Austin's Ferry (2016), Brighton (2025), Mt Nelson (2036), Hobart CBD (2042) and West Moonah (2046) • Review of the ratings of 33 kV cables and 33/11 kV transformers with a view to implementing cyclic, emergency and short-time ratings • Where appropriate, utilise 11 kV capacitor banks at zone substations to defer transformer upgrades and reduce losses
North East	• Extension of the 110 kV network from Derby to St Marys to complete the 110 kV ring • No new zone substations in the long term plan period
North Coast	• Continuation of the existing philosophy of 110 kV transmission network with 110/22 kV terminal stations • Conversion of Wesley Vale 110/11 kV to a 110/22 kV terminal substation (2012), new terminal substation at Westbury (Tamar area - 2017)

Area	Strategies
North West	• Continuation of the existing philosophy of 110 kV transmission network with 110/22 kV terminal stations • Staged conversion of the Emu Bay 11 kV CBD network to 22 kV including conversion of Emu Bay 110/11 kV to a 110/22 kV terminal substation. Initial stage of alternate CBD backup supplies from the Burnie 22 kV network and Emu Bay split bus to supply at 22 kV. • New terminal substation at Wynyard (2014) and Penguin (2046)
Sorell/Peninsula	• Establishment of a 66 kV network and 66/22 kV zone substations (further investigation required with comparison to the extension of the 110 kV network and 110/22 kV substations) • New zone substations at Dunalley (2035) and Dodges Ferry (2045). Note that the substations are required for either development path.
South	• Continuation of the existing zone substation strategy with establishment of new 33 kV injection point at Kingston prior to 2012 • New zone substations at Blackman's Bay (2017) and Margate (2034)
Tamar	• Continuation of the existing philosophy of 110 kV transmission network with 110/22 kV terminal stations. Existing 110 kV ring around Launceston be maintained with a CBD substation to supply the large load centre inside the ring and additional terminal substations to be placed around the outside of the ring to support the load centres developing to the north, south and west of the city. • New terminal substations at Westbury (2017), Longford (2021), Launceston CBD (2027) and Exeter (2030)
West Coast	• Maintaining the existing 110 kV transmission network and converting the existing 44 kV subtransmission network out of Rosebery substation to 66 kV • No new zone substations in the long term plan period

A map of the Aurora planning areas is attached in Appendix A.

1. Introduction

1.1 Historical development of the distribution network

The distribution network, as we now know it, came into being in the period 1910 to 1930. Prior to this there were scattered distribution systems installed and operated by a number of private companies and local government agencies. The development of distribution systems was in its infancy.

The incorporation of the Hydro Electric Commission (HEC) occurred in 1914. Under this governance occurred the integration of many local government assets. These integrations continued well into the 1930s. Further, a number of private owned electrical assets, e.g. Hobart Gas and Launceston Gas Companies, were purchased and these assets were also amalgamated into an increasing distribution system.

The "hydro industrialisation" following World War Two set the backbone of what we now know as the generation, transmission and distribution systems. Of particular importance was that part of this expansion included the establishment of major substations primarily for industry. Some examples of these substations are Railton, Risdon, Emu Bay and Trevallyn. The connection of the distributed customer base feeders were almost an add-on to these substations. This characteristic had a large bearing on the nature and topography of the current distribution network and why Aurora has a number of very extensive rural feeder networks.

Prior to 1950, Hobart was supplied from Risdon and Creek Rd Substations at 11 kV. The Hobart plan from the mid 1950s saw the development of the then 22 kV and now 33 kV subtransmission systems. The provision of 11 kV was mainly confined to the southern network and some other locations. Elsewhere, the supply philosophy was to have a distribution network of 110/22 kV systems.

The 1970s saw an increasing system and infill 110/22 kV and 11 kV substations were being established. At this time the strategy was to have 110 kV rings around Hobart and Launceston with interspersed substations and distribution networks driving into the central commercial areas. Of note is that the 110 kV cable from Creek Rd to North Hobart Substations was oversized to become the initial stage of one of these 110 kV rings. In other areas infill substations continued to be built, as load densities did not require any shift from the prevailing strategy.

These supply strategies continued until the late 1990s with the planning for McRobies Gully, a Hobart 110/11 kV substation. Public pressure saw the abandonment of the overhead 110 kV line to supply this station. With the need to provide the upgrade to West Hobart this resulted in a change of strategy and the reinforcement of the subtransmission network was instigated. This program came to be known as the Hobart Area Supply Upgrade (HASU).

HASU saw the major redevelopment of East Hobart and West Hobart Zone Substations and medium redevelopment of the Sandy Bay, Claremont, Newtown, and Derwent Park zone substations. The associated redevelopment of Creek Rd and Risdon substations was pivotal to upgrading the subtransmission system from 22 kV to 33 kV and consolidating the subtransmission system in the Hobart area.

From the HASU strategy were derived the Hobart Eastern Shore upgrade with two new zone substations and the Kingston Area upgrade with initially one new zone substation to be built.

1.2 Changes post disaggregation

Aurora Energy was formed in July 1998 and is a Tasmanian Government-owned electricity distributor. Tasmania has recently entered the National Electricity Market (NEM) which operates under the direction of the Australian Energy Market Operator (AEMO). The Tasmanian Government has also passed legislation to operate under the National Electricity Rules (NER) from the Australian Energy Market Commission (AEMC), subject to the jurisdictional derogations applicable for Tasmania. Further to the NER, the Tasmanian Economic Regulator publishes and maintains the Tasmanian Electricity Code. Under the NER and the code, distribution is mainly a jurisdictional responsibility. The regulator has a high expectation of reliability and security in the transmission and distribution networks operated by Aurora.

The distribution network is a core component of Aurora's network. The increase in the widespread use of electronic based technology is driving customer expectations in regards to both quality of supply and the reliability of the distribution network.

These changes in the regulatory environment and customer expectations have driven the move from shorter term reactive planning to longer term strategic planning.

1.3 Future directions

There are a number of known advances that will impact on the future development of the distribution network including:

- Dispersed connection of generation to the distribution network
- Increased requirement for electricity to be generated from renewable energy resources
- Management of peak demand at the customer installation
- Mobile generation/storage

These developments will need to be allowed for within the long term strategy. The strategy also needs to be flexible to accommodate the following:

- Changes to the load forecast (may defer or bring forward a substation project)
- Changes in the mix of load and generation proposed to be connected to the distribution network (generation may defer a substation firm capacity limitation)
- Changes in the load profile, for example, summer to winter peak or day to night profile (a change to a winter peak may bring forward a substation capacity limitation due to reduced transfer capability)
- Operational flexibility
- Reliability, combined with the development of a smart network, the system has to have the capability to transfer load to meet reliability requirements during fault conditions

The network development strategy will need to be reviewed regularly so that future unknown developments and the changes mentioned above can be incorporated into the evolving strategy. This is further discussed in Section 3.3.

1.4 Purpose of network development strategy

The main purpose of a network development strategy is to align the short term planning projects with the long term plan for the area. This will allow unnecessary expenditure to be avoided and increase the efficiency of the planning process. The network development strategy will also assist in providing justification for the short term projects to both the project approver and the regulator.

2. Network planning philosophy

A network planning philosophy for the transmission network connection points and distribution network has been developed to provide a guide for network system planners throughout the planning process.

Aurora's planning philosophy includes the following:

- Placement of transmission network connection points, subtransmission and zone substations at load centres to address load density and to reduce distribution feeder lengths
- Placement of 33 kV switchgear at appropriate zone substations to allow switching and load transfers between bulk supplies
- Provide transfer capability between substations (both Transend and Aurora) to maximise utilisation of the existing substation transformers
- Provide transfer capability between distribution feeders by limiting the load per feeder and constructing tie points
- Provide redundant supply to critical loads, such as hospitals

3. Review of network planning

3.1 Report methodology

The methodology used to carry out the Aurecon strategic planning study is outlined below.

Initially, a range of data was reviewed for each of the eleven planning areas including:

- Annual planning reports from Transend and Aurora
- Known developments and constraints
- The existing network configuration (using Webmap)
- Load models and load transfer capacity
- Transformer refurbishment program (Aurora)
- Schematics of Aurora and Transend substations

- Joint planning studies and regulatory test reports
- Council plans and residential strategies for all of the Tasmanian councils (where available)

The load model provided by Aurora for each planning area was then refined into smaller growth areas, with each area allocated medium or high growth based on land availability, council plans for the area and information from Aurora on growth hot spots and point loads. This process resulted in a load forecast for each planning area which fell between the medium and high growth forecasts provided by Aurora, with load growth biased towards those areas (and hence substations) where high growth is expected. This forecast was considered the high growth forecast for this study, with the medium and low forecasts being those provided by Aurora.

For the purposes of the long term strategic plan and ten year plan it was decided to use the high growth forecast across the majority of the network to determine the timing of limitations. For areas with very low historical growth, the medium growth forecast was used. This conservative approach was taken to ensure that Aurora are prepared should a higher than expected forecast eventuate, with a side benefit that a greater number of projects fall within the respective planning periods. The five year plan is intended to be used by Aurora for their short-term planning, including regulatory submission for relevant projects, and therefore needed to be as accurate as possible. As a result, the five year plan used the medium growth forecast to determine the timing of limitations.

The long term strategic plan was produced by projecting the high growth load forecast out to the year 2050 and performing a high level review of the resulting limitations. Substation capacity and condition were the primary limitations considered at this stage, as distribution network limitations are difficult to forecast and can largely be addressed independently of major substation projects. The introduction of new voltage levels and phasing out of non-standard voltage levels were examined at this time. The recommendations considered to address the resulting limitations included load transfers, transformer refurbishment or replacement to increase capacity, installation of additional transformers and switchgear and the establishment of new substations.

The recommended projects which fell within the period from 2012 to 2022 were then examined in greater detail in the ten year plan. An options analysis was undertaken by comparing the technical and financial implications of the recommended option against several other feasible options. The project drivers were also examined in greater detail, with distribution network limitations such as feeder loading and reliability considered at this stage.

The five year plan focused on the distribution works required within the period from 2012 to 2017. An analysis of each of the existing and new substations was completed to determine feeder limitations in the five year period. The medium growth substation forecast provided by Aurora was combined with historical feeder loading data from 2009 to produce a five year forecast for all distribution feeders in the Aurora network. A number of projects were proposed which included works as part of the substation projects identified in the ten year plan and new projects based on the analysis of feeder loading. DINIS system model studies were completed as applicable.

For each area, a report was compiled including the long term strategic plan, ten year plan and five year plan.

3.1.1 Assumptions

A list of some of the general assumptions made for the study is outlined below.

- Direct connected customers were not included in the original load models. However, where the direct connected load affects the substation, an estimated block load has been incorporated into the substation load to determine the capacity limitation.
- The UES 2008 forecast has been used for all load models. The high and medium growth rates for smaller areas in the substation supply areas have been assumed based on existing feeder configuration, land availability, council plans for the area and information from Aurora on growth hot spots and point loads.

- Draft historical feeder loadings were used for the long term strategic and ten year plans. Revised feeder loadings were provided prior to the commencement of the five year plan and the new figures were incorporated to ensure feeder limitations were accurately determined.
- All committed proposed projects up to 2012 are assumed to be completed for this study
- The assumed substation limitation is load above firm capacity
- Transformer asset life as advised by Aurora is 40 years for zone substations and 45 years for terminal substations. For the purpose of this report, it is assumed that actual transformer life is extended by approximately five years due to the regular condition assessments and transformer loading under normal conditions.
- The four-hour emergency ratings for transformers is based on 1.2 x normal capacity. It has been assumed that remote switching can be completed within four hours.
- Substation general arrangements were not available during the study and it has been assumed that there is space for the proposed upgrades outlined in the long term strategic plan
- The long term strategy does not take into account individual distribution feeder capacity or voltage drop. This has been further reviewed in the five year plan.
- Planning ratings of 5 MVA and 10 MVA for the 11 kV and 22 kV feeders respectively have been used in place of the full thermal ratings of the feeders when considering individual feeder overloads
- ESI regulations have been taken into consideration where applicable
- Basic costing was provided by Aurora and Transend
- An NPV analysis has been completed for each of the ten year proposed projects. It should be noted that a cost benefit analysis has not been undertaken.
- Demand side initiatives have not been considered in this study. Any feasible demand side initiatives that are identified as part of a separate review will in some cases defer or alleviate identified capital expenditure. The focus of this review is to identify network constraints and determine appropriate network solutions. Information on the demand side management solutions can be found in Section 3.2.

The Aurecon report was prepared for Aurora and its intent was to review Aurora's short and long term network requirements, however it was understood that Transend may be impacted by the recommendations contained within. Therefore all efforts were made to perform the study in consultation with Transend, and consideration was given to Transend's future vision and network security standards.

3.2 Review to identify DSM opportunities

A further study is being undertaken by a Demand Side Management Consultancy to identify demand side management (DSM) and/or embedded generation (EG) opportunities to alleviate or defer capital expenditure associated with the network augmentation solutions identified by Aurecon.

Initial outcomes of that study indicate the following opportunities to defer capital expenditure related to distribution and transmission network augmentations are as follows:

Hobart East

Deferral of the proposed Sandford zone substation.

Hobart West

Deferral of the proposed 110/33 kV connection point at Bridgewater Terminal substation, 33 kV subtransmission works and proposed zone substation at Austin's Ferry.

North West

Deferral of the proposed 110/22 kV connection point at Wynyard and associated distribution feeder works.

South

Deferral of the proposed Blackmans Bay zone substation.

Tamar

Deferral of the proposed 110/22 kV connection point at Westbury and associated distribution feeder works.

Indicative deferral periods are between one and three years, but are still subject to a detailed analysis of DSM opportunities.

3.3 Planning reviews

A major planning review will be undertaken every five years or two years prior to a new pricing period. A minor review will be completed bi-annually to ensure the network development strategy is still current. The strategy will be adjusted on an 'as required' basis, for example, to address a major point load requirement or connection of a large generation unit.

4. Strategies and identified major projects

4.1 General strategies

The planning philosophy recommends that Aurora review the ratings of 33 kV cables and 33/11 kV transformers with a view to implementing cyclic, emergency and short-time ratings. This would result in higher capacity from existing and future plant, increase the flexibility of the system and defer system limitations.

The planning philosophy also recommends that Aurora investigate the use of 11 kV capacitor banks at zone substations, and where appropriate, establish new capacitor banks to defer transformer upgrades and reduce system losses.

4.2 Area specific strategies and identified major projects

Central

The long term plan for Central discusses two alternative development paths for the New Norfolk area, with the conversion of the 11 kV network to 22 kV and upgrade of the 110/22 kV substation compared with the retention of the 11 kV network and establishment of a new 110/11 kV terminal substation. The long term plan also recommends the installation of a second transformer at Meadowbank substation and load transfers from New Norfolk to Meadowbank to defer capacity limitations at New Norfolk terminal substation.

The ten year plan for Central recommends the replacement of the transformers (that are in poor condition) at Arthur's Lake and Tod's Corner substations.

The five year plan for Central examines the distribution networks of the eight Central area substations. No significant distribution feeder works have been identified in the five year plan for Central. The plan also recommends that Aurora undertake a study to determine the costs involved in converting the 11 kV network in New Norfolk to 22 kV, so that a long term development path may be chosen.

East Coast

The long term plan for East Coast recommends the establishment of substations at Swansea and Ross. Two alternative development paths are discussed in the plan, with the extension of the 110 kV network and 110/22 kV substations compared with the establishment of a 66 kV subtransmission network and 66/22 kV zone substations. NPV analysis indicates that the costs are equivalent within

the margin of error of the study, however the 66 kV development option is ultimately recommended as it is considered the technically superior option.

The ten year plan for East Coast recommends the installation of a second transformer at Avoca substation to provide firm capacity, as well as projects to reinforce the 22 kV networks into the Ross, Swansea and St Helens areas. The plan discusses the potential to build certain 22 kV feeders at 66 kV to facilitate the future establishment of 66/22 kV zone substations.

The five year plan for East Coast examines the distribution networks of the three terminal substations in the area. No distribution feeder works have been identified in the five year plan for East Coast.

Hobart East

The long term plan for Hobart East recommends the continuation of the existing zone substation strategy. The existing 33 kV injection point at Lindisfarne and the future injection point at Mornington are expected to provide sufficient capacity to the area's zone substations for the scope of the study (after the installation of third transformers at each). Upgrades to the existing zone substations to increase firm capacity and address transformers age limitations are recommended and two new zone substations are proposed at Sandford and in the Risdon Vale area. The conversion of the 11 and 22 kV distribution feeder networks in the Richmond and Coal River Valley areas has been recommended to improve load transfer capability and establish a definitive boundary between the 11 and 22 kV networks.

The ten year plan for Hobart East recommends the establishment of a new zone substation in the Sandford area in order to deload Rokeby substation and address feeder limitations to the peninsula. The plan also recommends the upgrade of Richmond zone substation to 33/11 kV and the replacement of transformers at Lindisfarne and Geilston Bay substations to meet capacity requirements.

The five year plan for Hobart East examines the distribution networks of the six existing (including the Howrah and Rosny) zone substations and the impact of the proposed zone substation at Sandford. The only proposed feeder works in the five year plan is the establishment of a new feeder north from Geilston Bay zone substation. The five year plan also reviews the subtransmission networks from Lindisfarne and Mornington substations, recommending that Bellerive be transferred from Mornington to Lindisfarne after the establishment of Sandford zone substation in 2017.

Hobart West

The long term plan for Hobart West recommends the continuation of the existing zone substation strategy, with the exception that 33 kV switchgear be planned for certain substations to minimise the future 33 kV cable requirements in the city. Terminal substation establishment has only been recommended at Creek Rd, where an existing site and 110 kV source is available in an ideal location. New 33 kV injection points at Bridgewater and McRobies Gully and zone substations at Austin's Ferry, Brighton, West Moonah, the Hobart CBD and Mount Nelson are proposed to address the forecast load growth in the area.

The ten year plan for Hobart West recommends the establishment of a 33 kV injection point at Bridgewater and a new zone substation at Austin's Ferry, in order to deload Bridgewater and Claremont substations and provide future flexibility of supply to Brighton. The plan also recommends the replacement of transformers at Derwent Park and Claremont zone substations to meet capacity requirements.

The five year plan for Hobart West examines the distribution networks of the nine existing 11 kV substations and the impact of the proposed zone substation at Austin's Ferry. Proposed distribution feeder works in the area include load transfers and a new feeder tie at Chapel St, load transfers from East Hobart to West Hobart, splitting of the feeder ring from Sandy Bay to the university and the establishment of a new feeder into the Sandy Bay residential area. The plan also recommends that capacitor banks be investigated for voltage control at Chapel St and North Hobart substations.

The five year plan also reviews the subtransmission networks from Creek Rd and Risdon substations, recommending that the possibility of uprating the 33 kV feeders to Sandy Bay, East Hobart and West Hobart be investigated.

North Coast

The long term plan for North Coast recommends the continuation of the existing philosophy of 110 kV transmission network with 110/22 kV terminal stations. There are no new terminal substations recommended before 2050 in the North Coast area. However, it is recommended that the existing 110/22 kV substation at Wesley Vale be converted to 110/22 kV. A new substation at Westbury in the Tamar area will deload Railton substation in 2017. The transformers at the three existing substations of Wesley Vale, Devonport and Railton are recommended for replacement as part of the long term plan to increase firm capacity and address transformer age limitations.

The ten year plan for North Coast recommends the conversion of the existing Wesley Vale substation to a 110/22 kV terminal substation. A transformer replacement at Wesley Vale is also recommended towards the end of the ten year time frame to increase the capacity at the substation.

The five year plan for North Coast details the distribution works required for the installation of the Wesley Vale substation and the effect on the neighbouring substations of Devonport and Railton.

North East

The long term plan for North East recommends maintaining the existing 110 kV transmission network and terminal substations. The load growth forecast for the area is low and there are no new transmission network connection points recommended before 2050 in the North East area. The transmission network in the North East Coast area is closely linked with the proposed options in the East Coast area. The extension of the 110 kV transmission network from Derby to St Marys is recommended to complete the 110 kV ring.

The ten year plan for North East recommends the installation of a second transformer at Derby to provide firm capacity for the substation.

The five year plan focuses on the distribution works required in the North East area and there are no major distribution works identified before 2017.

North West

The long term plan for North West recommends the continuation of the existing philosophy of 110 kV transmission network with 110/22 kV terminal stations. A staged conversion of the Burnie CBD 11 kV network (supplied from Emu Bay) to 22 kV has been recommended based on the closure of the Burnie paper mill in 2010. Emu Bay will be converted to a 110/22 kV substation and new substations to be established at Wynyard and Penguin.

The ten year plan for North West recommends that the substation bus at Emu Bay be split to provide a 22 kV source of supply to relieve Burnie substation until Wynyard is established in 2014. Alternate supplies for the 11 kV network in the Burnie CBD will be established as part of the staged conversion of Emu Bay.

The five year plan for North West outlines the distribution works associated with the Emu Bay substation bus split, the new Wynyard substation and a major feeder reconfiguration in Burnie including the alternate CBD backup supplies and transfers to relieve Ulverstone.

Sorell/Peninsula

The long term plan for Sorell/Peninsula recommends the establishment of substations at Dunalley and Dodges Ferry. Two alternative development paths are discussed in the plan, with extension of the 110 kV network and 110/22 kV substations compared with the establishment of a 66 kV subtransmission network and 66/22 kV zone substations. NPV analysis indicates that the costs are

equivalent within the margin of error of the study, however the 66 kV development option is ultimately recommended as it is considered the technically superior option.

There are no projects in the ten year plan for Sorell/Peninsula.

The five year plan for Sorell/Peninsula examines the distribution network of the Sorell terminal substation and the impact of the proposed conversion of Richmond zone substation to 33/11 kV. The only proposed distribution feeder works in the area are the conversion of portions of feeder 41512 to 11 kV as part of the Richmond upgrade.

South

The long term plan for the South area recommends the continuation of the existing zone substation strategy, with the future Kingston 33 kV injection point expected to provide sufficient capacity to the area's zone substations (after installation of third transformers) for the scope of the study. Several new zone substations are proposed to address load growth in the area including Blackman's Bay and Margate.

The ten year plan for South recommends the establishment of a new zone substation at Blackman's Bay to deload the Kingston and Brown's Rd[1] substations, and the replacement of transformers at Kermandie terminal substation to meet capacity requirements.

The five year plan for South examines the distribution networks of the five existing substations (including the Browns Rd zone substation) and the impact of the proposed zone substation at Blackman's Bay. Proposed distribution feeder works in the area include load transfers between Electrona feeders to deload 33272, load transfers between Knights Rd feeders to deload 30608 and a new feeder from Kermandie substation as part of the transformer replacement project.

Tamar

The long term plan for Tamar recommends the continuation of the existing philosophy of 110 kV transmission network with 110/22 kV terminal stations. Terminal substation establishment has been recommended near existing 110 kV overhead lines and at existing sites where available. It is proposed that the existing 110 kV ring around Launceston be maintained with the installation of a new Launceston CBD substation to supply the large load centre inside the ring and additional terminal substations to be placed around the outside of the ring to support the load centres developing to the north, south and west of the city.

The ten year plan for Tamar recommends the establishment of new terminal substations at Westbury and Longford. These substations will supply the fast growing areas of Westbury, Deloraine, Longford, Perth, Evandale and the Launceston airport. The Deloraine area is currently situated in the North Coast planning area and will be transferred to the Tamar area with the establishment of the Westbury substation.

The five year plan for Tamar details the distribution works required for the six existing and two new substations in the Tamar area. This includes information on the installation of the new St. Leonard's and Westbury substations and the effect on the surrounding substations.

West Coast

The long term plan for West Coast recommends maintaining the existing 110 kV transmission network and converting the existing 44 kV subtransmission network out of Rosebery substation to 66 kV. This will provide an increase in capacity for the area and remove a non-standard voltage from the subtransmission network. All projects recommended for the West Coast area are subject to impending supply to major mining customer loads.

[1] Proposed name to change to Kingston zone substation

The ten year plan for West Coast recommends an upgrade to Rosebery substation, a 44 kV feeder audit and a staged approach for the replacement of the 44 kV network to 66 kV.

The five year plan focuses on the distribution works required in the West Coast area and outlines the staging for the 44 kV feeder conversion at Rosebery.

5. Project approval process

5.1 Joint planning with Transend

Under the NER, Clause 5.6.2 (c) outlines that 'where the need for an augmentation or a non-network alternative is identified (either by the annual planning review or independently of that review), the relevant parties must undertake joint planning in order to determine plans for consideration by relevant Registered Participants, AEMO and interested parties.

A joint evaluation is required between Aurora and Transend where works are required on both the distribution and transmission networks, or where a constraint exists in the transmission network that may be addressed by reconfiguring or augmenting the distribution network. As part of the evaluation, a full analysis of the costs for both parties will be undertaken and larger projects will be assessed under the framework of the Regulatory Investment Test for Transmission.

The development strategy will allow Aurora to provide Transend with a long term vision for their network and identify areas where joint planning is required.

5.2 Regulatory investment test (RIT)

The RIT is an analysis methodology used by transmission and distribution businesses in the National Electricity Market (NEM) to assess the efficiency of network investment. The aim of the RIT is to develop and compare feasible options (including non-network options) based on financial evaluation including a market benefit/least cost analysis.

For a distribution network service provider, the RIT is to be applied based on Clause 5.6.2 of the NER ('Network development'). For a transmission network service provider, the requirements are based on Clause 5.6.2A for new small network assets and Clause 5.6.6 for new large network assets.

5.3 Internal process for approval

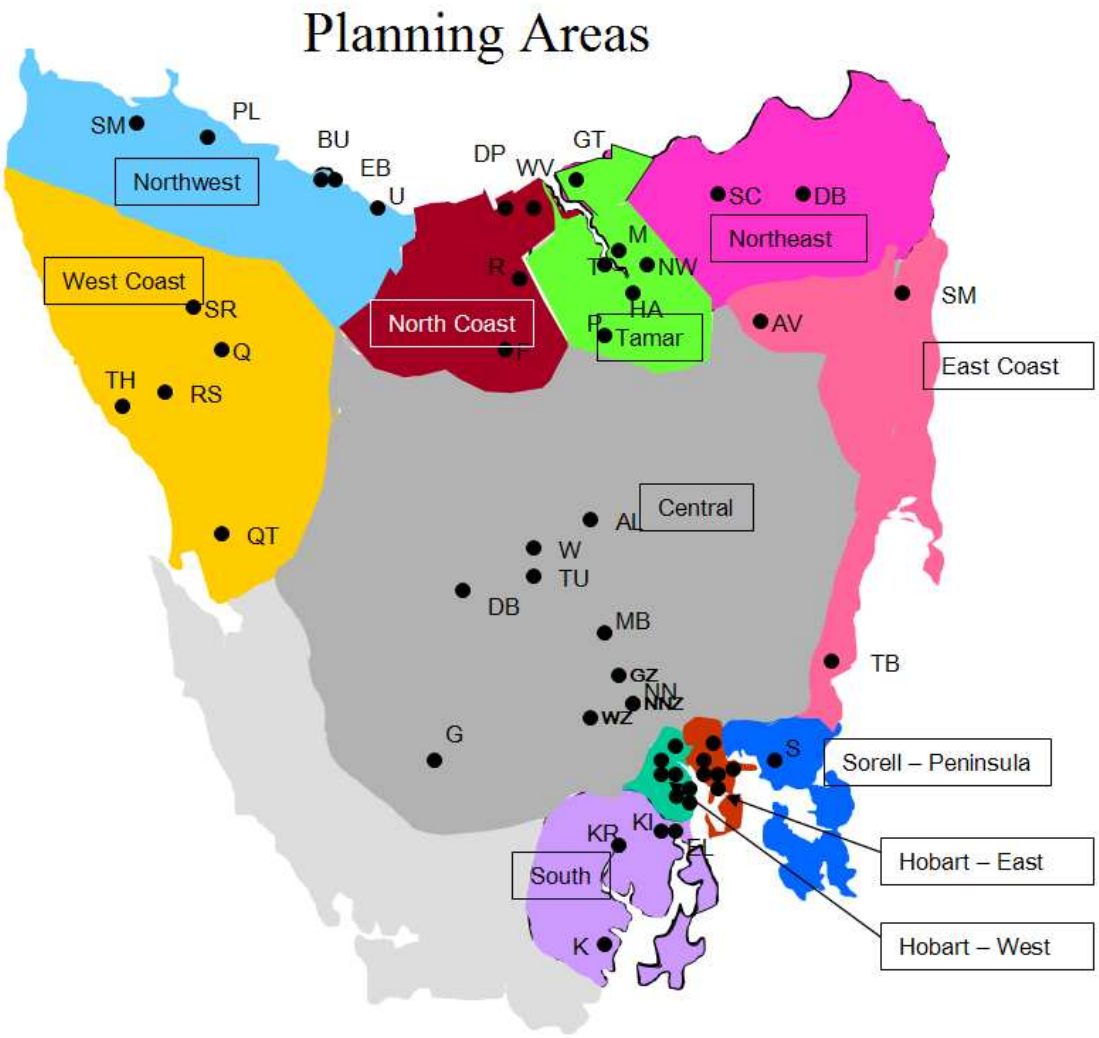
The approval process will follow the following principles:

- An overall strategy and summary report covering the 40 year, 10 year and 5 year plans will be submitted to the Aurora Energy Board. The 40 and 10 year plans will be for information and noting. The 5 year plan will be for approval.
- The Regulatory Investment Test (RIT) will be conducted as prescribed under the National Electricity Rules (NER) covering individual capacity related projects over $1 million[2]
- Individual capacity related projects, above $1M, as contained within the full report will be submitted to the Aurora Energy Board for approval upon their requirement
- Lesser value projects, as contained within the full report and upon their requirement will be approved in accordance with the Aurora Delegation Manual

[2] Subject to change under proposed implementation of the Rule change recommendations from the Australian Energy Market Commission's Review of National Framework for Electricity Distribution Network Planning and Expansion

Appendix A
Map of Aurora planning areas

Appendix A – Map of Aurora planning areas



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Blenheim 64 3 520 6060
Brisbane 61 7 3173 8000
Cairns 61 7 4051 6266
Canberra 61 2 6112 0100
Christchurch 64 3 366 0821
Darwin 61 8 8919 9777
Geraldton 61 8 9964 2764
Gladstone 61 7 4962 0600
Gold Coast 61 7 5591 7775
Hamilton 64 7 834 1565
Hanoi 84 4976 1282
Ho Chi Minh City 84 8 3910 0288
Hong Kong 852 3664 6888
Jakarta 62 21 5140 2470
Karratha 61 8 9185 6344
Kuala Lumpur 60 3 2164 7301
Lithgow 61 2 6351 3750
Mackay 61 7 4951 3500
Maroochydore 61 7 5443 4055
Melbourne 61 3 8683 1333
Mildura 61 3 5022 2766
Morwell 61 3 5116 7205
Nelson 64 3 539 0190
Newcastle 61 2 4941 5415
Paraparaumu 64 4 296 1240
Parramatta 61 2 9890 4100
Perth 61 8 9223 1500
Phnom Penh 855 12 923 248
Port Augusta 61 8 8642 3197
Queenstown 64 3 441 0346
Rangiora 64 3 313 8776
Shanghai 86 21 3313 4750
Singapore 65 6256 6188
Sydney 61 2 9465 5599
Tauranga 64 7 578 6183
Toowoomba 61 7 4632 6249
Townsville 61 7 4772 2858
Traralgon 61 3 5176 0113
Wellington 64 4 472 9589
Whyalla 61 8 8645 5755
Wollongong 61 2 4224 7274

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