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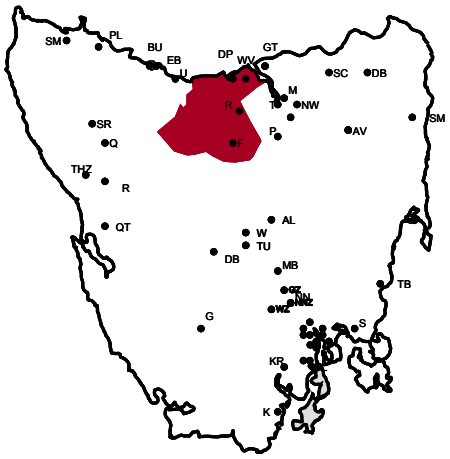

NORTH COAST

DEVELOPMENT PLAN

REV NO.	DATE	REVISION DESCRIPTION	APPROVALS	
0		Working Draft	Prepared by	
			Reviewed by	
			Approved by	

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1. EXECUTIVE SUMMARY

The North Coast NC covers an area east of Ulverstone to Devonport and south to the Cradle Mountain tourism area.

The industries in the North Coast area are a continuation from the North West area including commercial and residential towns along the coast and an inland farming industry. There is a strong tourism industry in the Cradle Mountain area and localised 'bubble' developments at Port Sorell and Hawley Beach.

The growth in the areas around Devonport and Railton terminal substations vary between medium and high growth development. For the purposes of the long term strategic study, the assumed high growth areas include Wesley Vale (Devonport Airport), Latrobe, Port Sorell and Hawley Beach. The assumed medium growth areas include Devonport CBD and adjacent developed areas to the south and west, Railton Township and south/south east of Railton.

To facilitate the current and forecast load, the NC planning area maintains a 22kV distribution network, supplied from the Devonport and Railton terminal substations. The network supplies 26,171 connected customers supplied via 1,927 km of OH and UG circuit.[1]

The identified or known large constraints are as follows:

- Wesley Vale 110/11kV Terminal Substation is currently under utilised due to the Wesley Vale Paper Mill being closed since March 2010. Only load connected to the substation is DIM furniture that currently has a peak load less than 2MVA.
- Devonport is currently running above firm capacity.
- Meander Valley has had a high Irrigation Load Growth which has caused voltage issues in area. Poor power factor caused by many small irrigation pumps has cause voltage constraints on the HV network

To address the above constraints the following is being proposed:

- Convert Wesley Vale 110/11kV Terminal Substation to a 110/22kV injection point. The plan is to connect five new 22kV feeders over a five-year period.
- The introduction of a new 22kV injection point at Wesley Vale will unload Devonport Terminal Substation below its firm capacity.
- A report was undertaken by Hill Michael Associates to understand the constraints in the Meander valley Area and to provide solutions.

[1] Data available in NW-#30146137-Feeder Data for Development Plans.

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2. EXISTING SYSTEM

2.1 Substations

The substations supplying this area are listed below.

Note: hyperlinks in the section below will display the power circuit one line diagram from Transend's Operational Diagram System.

Transend owned substations

- Devonport (click here to see the 110/22kV single line diagram)
- Railton (110/22kV)
- Wesley Vale (110/11kV existing supply to Tasmanian Paper)

Aurora owned substations

- There are no Aurora owned zone substations in the North Coast Planning Area.

2.2 Supply Network

Distribution within this planning area is at 22kV, supplied by Devonport and Railton 110/22kV terminal stations.

The existing Wesley Vale substation is located to the east of Devonport and close to the Devonport airport. This substation currently supplies a direct connected customer, Tasmanian Paper, at 11 kV with four 11 kV customer feeders. However, the plant is to be shut down by June 2010 which will remove the requirement for an 11 kV supply in the area. An additional factory site is supplied by a 1.8 km 22 kV cable that is operating at 11 kV.

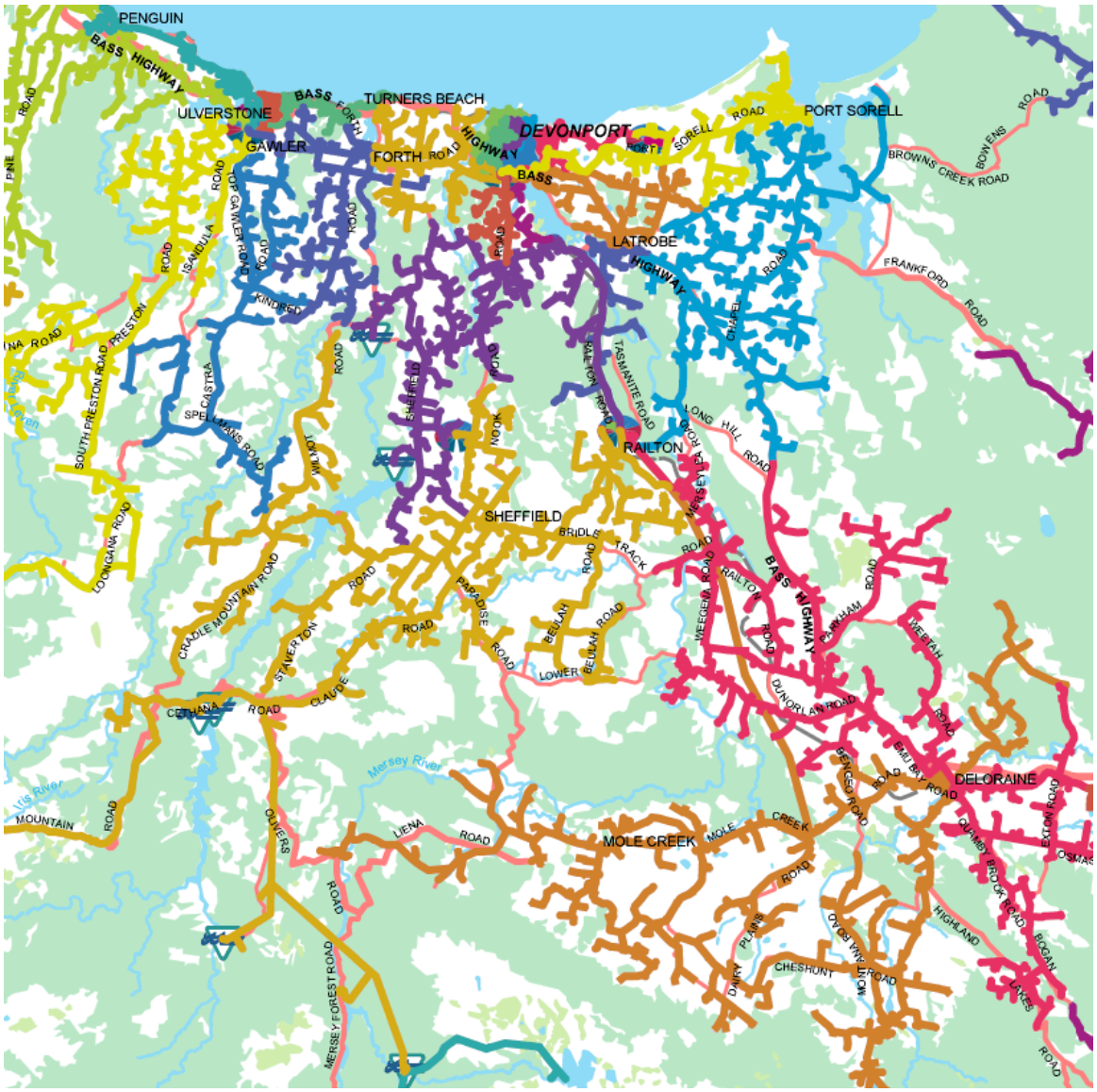
2.3 Network Statistics

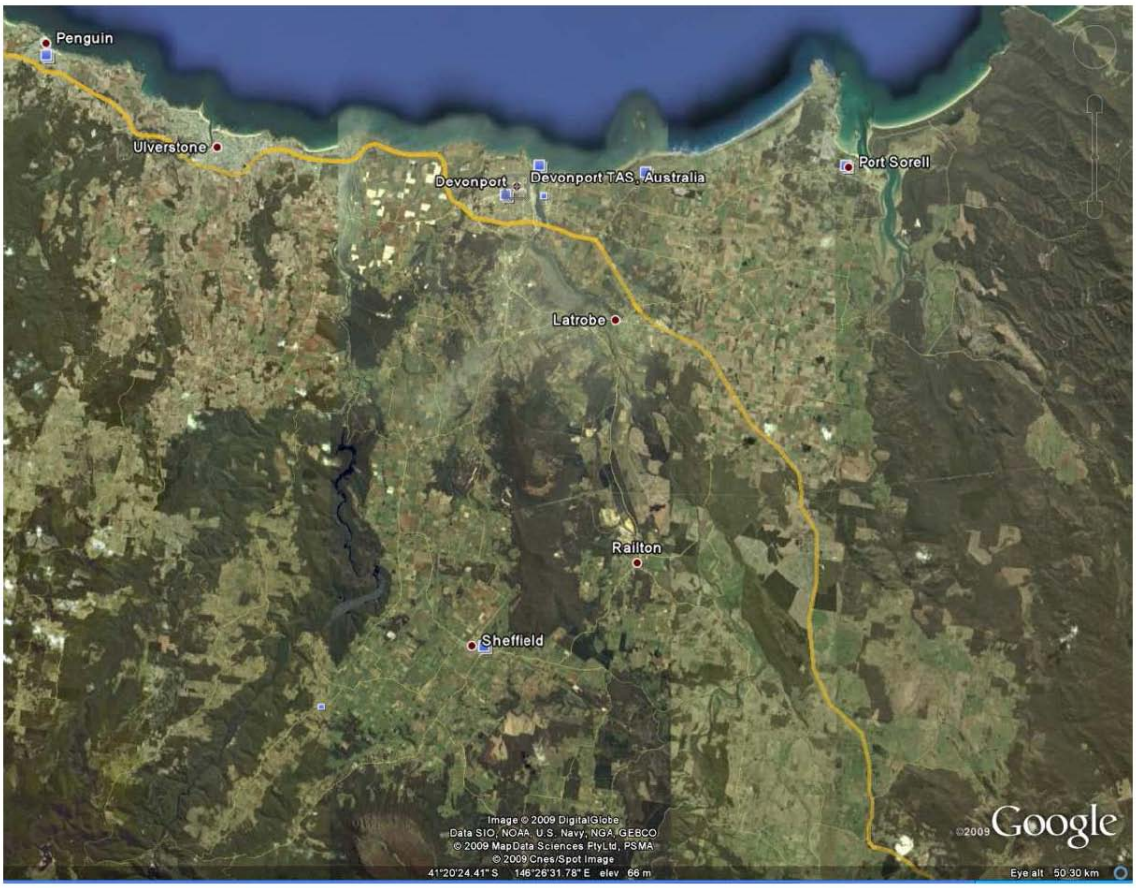
NC area network statistics [2]

22kV circuit length	1,926	km
Connected customers	26,171	
Connected transformer capacity	380,148	kVA
Customer density	14	per 22kV circuit km
Transformer capacity density	197	kVA per 22kV circuit km

[2] Data sourced from Gtech, query DISTFDR. See NW-#30146137-Feeder Data for Development Plans.

The maps below show the area referred to as the North Coast planning area.




Penguin
Ulverstone
Devonport
Devonport TAS, Australia
Port Sorell
Latrobe
Railton
Sheffield
Image © 2009 DigitalGlobe
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2009 MapData Sciences Pty Ltd, PSMA
© 2009 Cnes/Spot Image
41°20'24.41" S 146°26'31.78" E elev 66 m
©2009 Google
Eye alt 50.30 km

3. LOCAL PLANNING ISSUES

3.1 Long Term System Strategy

NC will continue the development of a radial 22 kV distribution network for the foreseeable future.

In the urban areas, interconnected Low Voltage reticulation will continue to develop at 433V. In rural areas use of low voltage reticulation will be minimised.

Embedded Generation options will be encouraged at the 22 kV and 433V connection points.

Demand Side Management solutions will be encouraged to reduce system peaks and defer large system upgrades where possible.

3.2 Local Government Authorities

For planning purposes, Aurora consults closely with the following local government authorities in the NC planning area:

- Devonport Council
- Latrobe Council
- Meander Valley Council
- Kentish Council

Other relevant authorities include:

- Department of Infrastructure, Energy and Resources (DIER); and
- Cradle Mountain Water

3.3 Existing Critical Loads

NC planning area has a number of existing critical loads requiring a higher level of supply security or a limit to operational flexibility. Table 1 below details critical loads in the area:

Load Type	Description	Substation(s)	Feeder(s)	Asset Connection Point(s) - if applicable
Commercial / Major Retail	K-Mart, Devonport	Devonport	80008	T780378
	Devonport CBD	Devonport	80004 80009	
	Devonport 4 Ways, Devonport	Devonport	80008	
	Woolworth, Devonport	Devonport	80008 80009	T780389
	Latrobe CBD	Railton	85008	
	Cradle Mountain Resorts	Railton	85004	
Medical	Mersey Hospital	Railton Devonport (Back up)	85008 80011	T700125
Rehabilitation Services & Nursing Homes	Meercroft Park Nursing Home	Devonport	80009	
Industrial	Montague Cold Store, Quoiba	Devonport	80002	T780590
	Grain Elevator, Devonport	Devonport	80004	T780085
	Tasman Starch, Devonport	Devonport	80004	T780293
	Goliath Cement, Devonport	Devonport	80004	T780337
	Tallows, Devonport	Devonport	80004	T780536
	Petuna Seafood, East Devonport	Devonport	80007	T780167
	East Devonport Ferry Terminal	Devonport	80007	
	Goliath Cement, Railton	Railton	85005 85007	
	Delta Hydraulics, Don	Devonport	80010	T780557
	Simplot, Quoiba	Devonport	80002 80003	T780718
	Fonterra, Quoiba	Devonport	80003	T780581
Sewerage/Water Treatment Plants	River Road Sewerage Works, Latrobe	Devonport	80011	T700119
	Great Bend APPM Pumps, Latrobe	Railton	85008	T700204
	Log Creek Council Pumps, Paloona	Railton	85003	T780027
	Cradle Mountain Sewerage Treatment Plant	Railton	85004	T651116
	Pardoe Waste Water Treatment Plan, East Devonport	Devonport	80007	T780595
	Caroline St Pump Station, East Devonport	Devonport	80007	T780480
Education	Don College, Don	Devonport	80010	T780523

Table 1 – North Coast Planning Area - Critical Loads

Improvements to supply security for the above connections and supply areas are encouraged.

3.4 Future Developments and Restrictions

- Council planning schemes

Each council has its own planning schemes and strategic plans for their area.

Devonport

The Devonport Council has a strategic plan document for 2009-2030. This document outlines the main goals of the council. The priorities of the Devonport council include living lightly on the environment, building a unique city, growing a vibrant economy, building quality of life and practicing excellence in governance.

The Devonport planning scheme was originally published in 1984 and includes amendments up to August 2009. The planning scheme outlines a number of different zones and the development that is allowed in each zone. These intents will be taken into account in the development of the strategic plan for the North Coast.

http://www.devonport.tas.gov.au/upload/documents/yourcity/planning_and_development/devonport_and_environs_planning_scheme_1984_-_30_march_2010.pdf

http://www.devonport.tas.gov.au/upload/documents/yourcity/planning_and_development/town_planning_zones_oct_2010_urban.pdf

http://www.devonport.tas.gov.au/upload/documents/yourcity/planning_and_development/cbdoverlay20080108.pdf

Latrobe

The Latrobe Council has a strategic plan document for 2006-2011. This document outlines the main goals of the council. The priorities of the Latrobe council include leadership, community participation, natural resource management, employee management, asset management and regional co-operation.

The Latrobe Township and environs strategic plan was adopted by council in September 2009. One of the major recommendations of this strategy is the extension of residential and commercial developments eastwards of the existing area.

The Latrobe Council area also includes the high growth area of Port Sorell and Hawley Beach. The Port Sorell and environs strategic plan was released in 2008. The strategy recommends:

- New development to be concentrated around the new Alexander Street town centre

- Development in the Shearwater area to attract and support tourism and leisure activities
- Shearwater village commercial development
- Residential site development in and to the west of Rubicon Grove
- Arthur Street area residential development
- Port Sorell Marina site
- Expansion of Hawley residential development and tourist accommodation

http://www.latrobe.tas.gov.au/webdata/resources/files/PORT_SORELL_AND_ENVIRONS_STRATEGIC_PLAN_2008_CM.pdf

http://www.latrobe.tas.gov.au/webdata/resources/files/LATROBE_TOWNSHIP_AND_ENVIRONS_Strategic_Plan_2009.pdf

http://www.latrobe.tas.gov.au/webdata/resources/files/Planning_Scheme_Updated_12_May_2010.pdf

Meander Valley

The Meander Valley Council has a strategic plan document for 2004-2014. This document outlines the main objectives of the council. The priorities of the Meander Valley council include natural and built environment, economic growth, creative community learning, heath and well being, working together and infrastructure and services.

The Meander Valley planning scheme was originally published in 2007. The planning scheme outlines a number of different zones and the development that is allowed in each zone. These intents will be taken into account in the development of the strategic plans for the North Coast and Tamar areas. The document also outlines strategies for individual areas.

- Deloraine – develop industrial development in the East Goderich/Lake highway precinct and the Butter Factory site on mole Creek Road
- Westbury – develop industrial development in the vicinity of Tasmanian Alkanoids off Birralee Road, promote low density residential development
- Prospect Vale – encourage commercial uses and restrict industrial, key area for residential growth
- Blackstone Heights – will not be promoted for residential development
- Hadspen – significant growth area between Meander Valley Road and the South Esk River
- Mole Creek – promote future incremental residential growth
- Chudleigh/ Meander/Elizabeth Town – low density residential development
- Bracknell/Kimberley/Exton/Hagley – not promoted for future growth

http://www.meander.tas.gov.au/webdata/resources/files/Meander_Valley_Planning_Scheme_1995.pdf

Kentish

The Kentish Council has a strategic plan document for 2009-2014. This document outlines the main objectives of the council. The priorities of the Meander Valley council include environment stability, financial stability and community cohesion.

The Kentish Council planning scheme was originally published in 2005. The planning scheme outlines a number of different zones and the development that is allowed in each zone. These intents will be taken into account in the development of the strategic plan for the North Coast.

http://www.kentish.tas.gov.au/webdata/resources/files/Kentish_Planning_Scheme_2005_from_15-10-2010.pdf

3.5 Reliability for the area

The North Coast Area includes the following Reliability communities:

- High Density Commercial - Devonport CBD
- Urban – Deloraine, Devonport, Latrobe, Port Sorrell, Sheffield, Turners Beach
- High Density Rural - Cradle Coast, Meander Valley Rural
- Low Density Rural - Railton Rural

Details of actual reliability performance in the 09/10 financial year are available in here. (DM ref# 30061377)

On figures for the 9 months to March 2010 the following communities appear likely to have reliability performance worse than target in 2010:

- Devonport CBD
- Deloraine
- Latrobe
- Port Sorrell
- Sheffield
- Turners Beach
- Cradle Coast
- Meander Valley Rural
- Railton Rural

All but one of the reliability communities in the North Coast Planning area have shown inadequate reliability performance in 2009/10 up to March 2010. Devonport is the only community that appears likely to achieve its targets for the financial year.

3.6 Asset issues

There are no North Coast substation transformers at or beyond their nominal end of life or in poor condition.

The large amount of Consac cables in this area which is nearing it's end of life.
There are ???km LV Consac in the NC area.

There are no existing Aurora owned zone substation transformers in the North Coast Area.

Further information is detailed in the following Asset Management Plans relevant to the NC planning area:

NW30084385 - Management Plan 2010: Ground Mounted Substations

NW30070052 - Management Plan 2010: High Voltage Regulators

NW30084411 - Management Plan 2010: Overhead System and Structures

NW30043361 - Management Plan 2010: Underground System

3.7 Links

LAM Area Management Plans relevant to the North Coast planning area are:

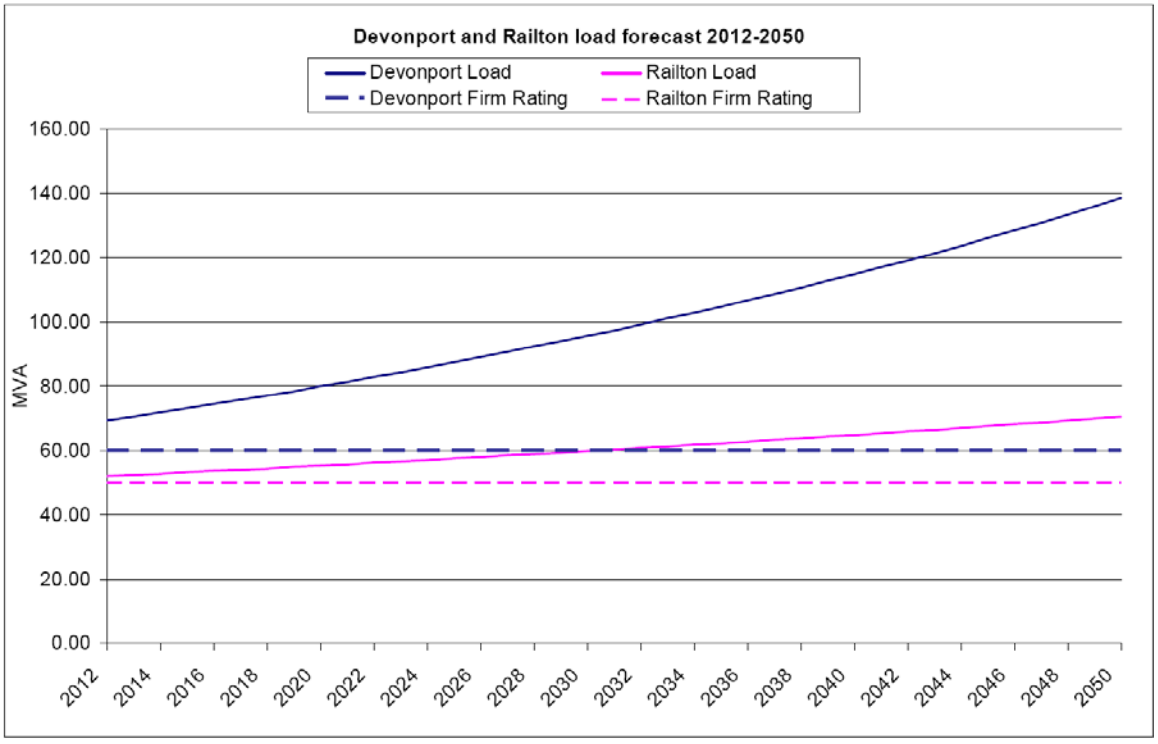
- Devonport NW-#183904-Area Management Plan Devonport
- North Central NW-#257597-Area Management Plan North Central

In addition Transend's Annual Planning Report contains relevant information. It can be found on their website www.transend.com.au.

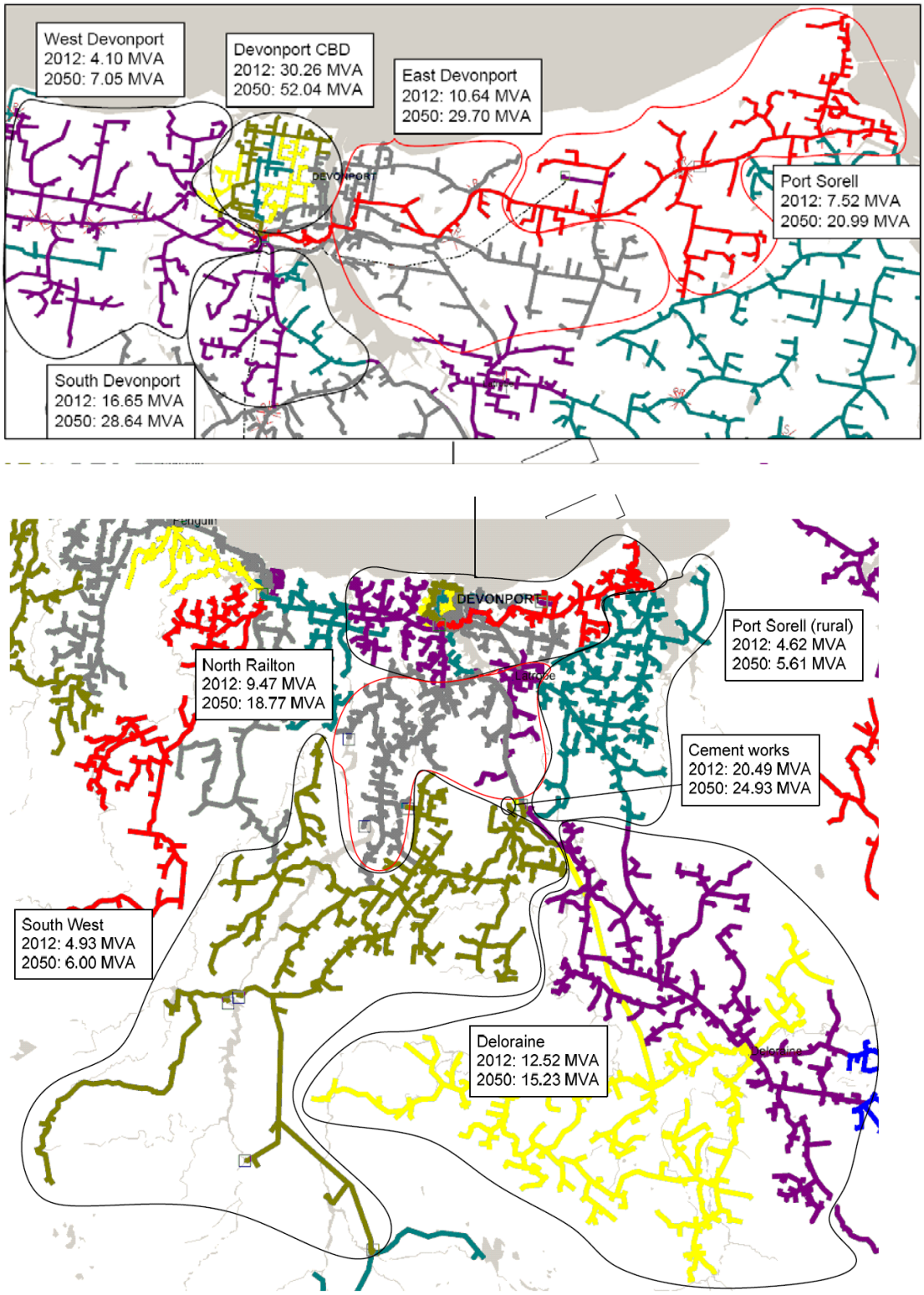
4. LOAD FORECAST

The growth in the areas around Devonport and Railton terminal substations vary between medium and high growth development. For the purposes of the long term strategic study, the assumed high growth areas include Wesley Vale (Devonport Airport), Latrobe, Port Sorell and Hawley Beach. The assumed medium growth areas include Devonport CBD and adjacent developed areas to the south and west, Railton Township and south/south east of Railton.

The resulting 38 year load forecast and firm ratings for North Coast planning area substations Devonport and Railton are provided below.



The following figure provides a geographic view of the resulting load distribution in 2012 and 2050.



The 2009 10 year load forecast report by UES is used as the basis for this plan. NW30089965 - Aurora 2009 Maximum Demand & Consumption 10 year Forecast Report

Forecast load growth tables are stored in the spreadsheet NW-#30040697-Zone and Area MD and consumption tables 2009

	Planning Area	Connection Point Substation	Forecast Growth pa
	North Coast	Devonport	1.0%
	North Coast	Fisher	#N/A
	North Coast	Railton	-0.4%
	North Coast	Wesley Vale	#N/A

The 2009 load model is available at NW-#30067810-North Coast area load model (2009)

Although the table above that Railton peak demand is not expected to increase in the 10 year forecasting window, there is an expectation that summer peak load will rise by 1.1% pa.

Copy of load profile

4.1 Future committed point loads (> 1 MVA)

- Big W Store, Devonport

4.2 Possible point loads (> 1 MVA)

- Rogers – Victoria Parade Commercial Development, Devonport
- Major Subdivisions (>200 lots)
  - None identified

4.3 Possible point loads to be removed (> 1 MVA)

- Tascot Templeton Carpets (Closed December 2010)
- Wesley Vale APPM mill (Closed March 2010)

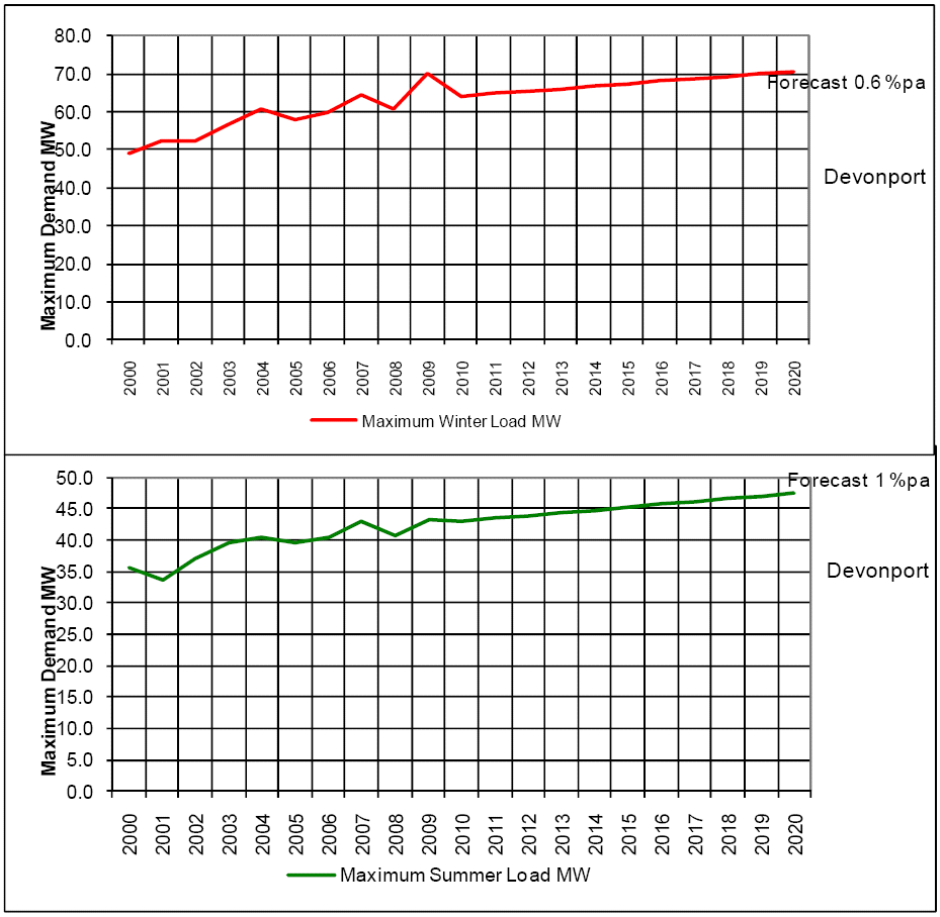
4.4 Possible future embedded generation (> 1 MVA)

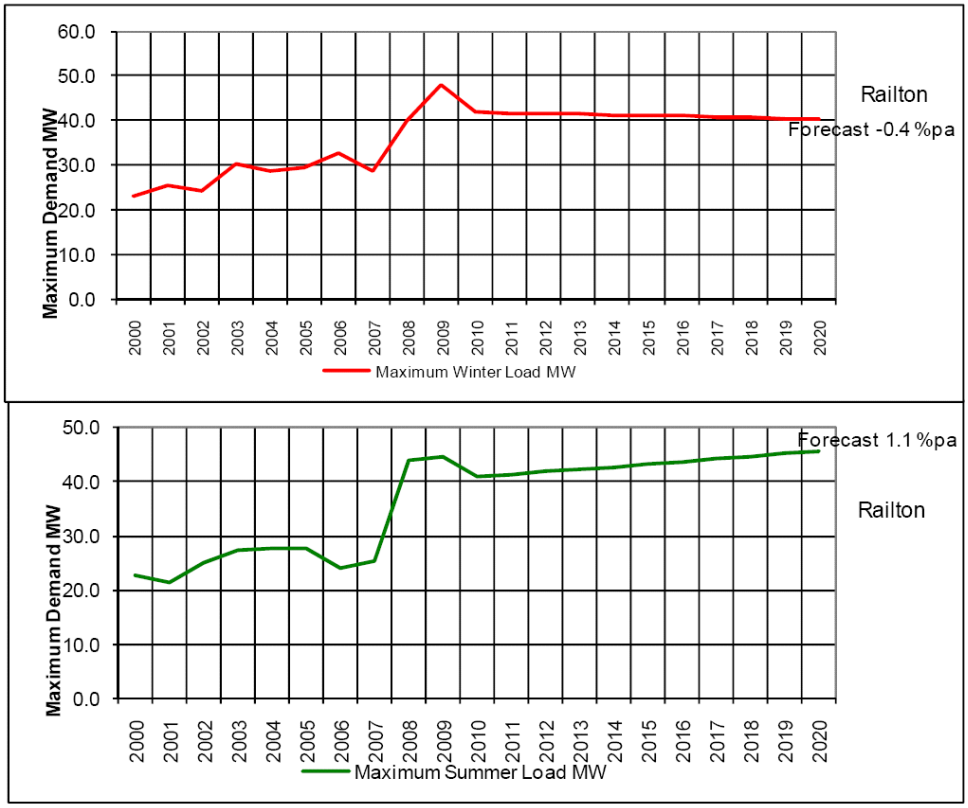
- Simplot 8 MVA Embedded Generator

4.5 Analysis of Load Forecast

- Load model hyperlink / reference NW-#30067810-North Coast area load model (2009)
- Copy of load forecast graph NW30089965 - Aurora 2009 Maximum Demand & Consumption 10 year Forecast Report

  Since UES does not provide a consolidated forecast for the North Coast region, charts for Devonport and Railton are shown below.


Maximum Demand MW
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Forecast 0.6 %pa
Devonport
Maximum Winter Load MW
Maximum Demand MW
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Forecast 1 %pa
Devonport
Maximum Summer Load MW


Maximum Demand MW
60.0
50.0
40.0
30.0
20.0
10.0
0.0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Railton
Forecast -0.4 %pa
Maximum Winter Load MW
Maximum Demand MW
50.0
40.0
30.0
20.0
10.0
0.0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Forecast 1.1 %pa
Railton
Maximum Summer Load MW

5. PLANNING CRITERIA

Aurora's Distribution Network Planning Manual issued in May 1999 is available in DM, ref NW10250570.

More up to date information is included in this document in Appendix E on page 36.

6. CONSTRAINTS (LIMITATIONS)

Constraints in the NC planning area are classified under the following management groups:

Constraint	Description	Definition
Capacity	Substation Firm Capacity	Substation Maximum Demand > Substation Firm Capacity (N-1)
	Feeder Tail Capacity	Feeder Maximum Demand > 5 MVA for 11 kV OR 10 MVA for 22 kV
	Feeder Section Capacity	Load through conductor >conductor continuous rating
	Feeder Tie Capacity	Transfer Capacity limited due to undersized conductor/equipment
Fault Level	Substation Bus Fault Level	Maximum 3-phase fault level > 13.1 kA OR Maximum 1-phase > XX.X kA
	Equipment Rating Fault Level	Maximum 3-phase OR 1-phase fault level > equipment rating
Voltage	Normal load Voltage Drop	Voltage drop exceeds ± 6%
	Emergency load Voltage Drop	Voltage drop exceeds ± 10%
Reliability	SAIDI	Reliability community SAIDI performance has or is likely to exceed target
	SAIFI	Reliability community SAIFI performance has or is likely to exceed target

Table 2 - Constraint Definitions

Constraints are managed at the following levels

- Zone Substation
- Subtransmission Feeder
- Distribution Feeder
- Distribution Substation
- LV Systems

This document details constraints at the Zone Substation (inc Rural Zone Substations), Subtransmission Feeder and Distribution Feeder levels only. Refer to XXXXXXXXX for State wide management plans for the Distribution Substation and LV System planning levels

6.1 Summary of Constraints

6.1.1 Terminal Substation Constraints

Capacity Constraints				
Substation	**Firm Capacity (MVA)**	**Current Load (MW)**	**Forecast to exceed (year)**	**Comments**
Devonport Terminal	60	68.1	Already exceeded	There are no spare 22kV CBs
Railton Terminal	50	44.9 summer peak		There are no spare 22kV CBs
Wesley Vale Terminal	30			Aged Asset: Transformers recommended for replacement in 2021.

Fault Level Constraints			
Substation	**Fault Level Description**	**Forecast replacement (year)**	**Comments**
			None identified

6.1.2 Zone Substation Constraints

The SP planning area does not include any zone substation assets.

6.1.3 Subtransmission Constraints

The SP planning area does not include any subtransmission assets.

6.1.4 Distribution Feeder Constraints

Capacity Constraints				
Substation	**Feeder**	**Capacity constraint type**	**Forecast to exceed (year)**	**Comments**
		Feeder Tail		
		Feeder Section		
		Feeder Tie		

Voltage Constraints			
Substation	**Feeder**	**Forecast to exceed (year)**	**Comments**
Railton	85006	Already in the Meander Valley Area	Study undertaken by Hill Michael Assoc. Meander Valley Technical Assessment – 18 August 2010

Reliability Constraints			
Substation	**Feeder**	**Forecast to exceed (year)**	**Comments**
			None identified

6.2 Security

Aurora's zone substations are typically run in N-1 secure mode. This means that in the event of any single outage of a network element all load can still be supplied.

Since there are no Aurora zone substations in the NC area this level of security is not considered. When Transend converts Wesley Vale to 22kV operation N-1 security will be restored at both Devonport and Railton.

6.3 Transfer and Operational Capability

The table below shows the rating, peak load and transfer capacity for substations in the area. The peak load figures are those forecast for winter 2010. Since Aurora's substations are subject to winter peaks, these are the most onerous.

	MVA				
Substation	**Rating**	**N-1 Rating**	**Peak Load (MW)**	**Transfer Capacity (2010)**	**Transfer Substation**
Devonport	90	60	68.1	5	Railton
				4	Ulverstone
Railton	100	50	38.1	10	Devonport

The table shows that Devonport is within 1MVA from reaching the load transfer capacity with it's N-1 Rating.

Details of the analysis carried out on load transfers in the NC area are available in NW-#30075509-North_Coast_area_area_load_transfer_(2009).

6.4 Power Factor

- Customer power factor correction
- Network power factor correction

6.5 LV issues

There are no locations in the NC Planning area where widespread LV network issues have been identified.

The table below shows the count of transformers in the planning area and the count of those that are at risk of overloading. This is determined by the count of connected customers indicated a load greater than 130% of nameplate rating. It should be noted that the actual load on a transformer may be much different to its value calculated in this way.

	Total		>130% of rating[3]	
Tx size	**Count**	**Customer Count**	**Count**	**Customer Count**
< 50 kVA	1,826	3,944	70	408
>= 50 kVA	1,845	21,867	48	2,446

7. SHORT TERM PLAN (<5YR)

The North Coast Area Strategic Plan provides the background to much of the planning information in this document. It can be found at: : NW-#30103837-North Coast area strategic plan Rev_3.

A summary of the proposed works from 2010 to 2015 in the North Coast planning area is outlined in the following table.

Year	Proposed Project	Proposed Outcomes
2012	Conversion of Wesley Vale terminal station	Address firm capacity issues Devonport and Railton, improved reliability for North Coast area

Details of the constraints, options and possible solutions analysed to arrive at these proposed projects are included in Appendix A on page 29.

8. MEDIUM TERM PLAN (5 TO 10YR)

The North Coast Area Strategic Plan provides the background to much of the planning information in this document. It can be found at: NW-#30103837-North Coast area strategic plan Rev_3

A summary of the proposed works from 2016 to 2020 in the North Coast planning area is outlined in the following table.

Year	Proposed Project	Proposed Outcomes
2017	Westbury terminal station	Address firm capacity issues at Railton and Hadspen (Tamar area), improved reliability of supply to the Deloraine and Westbury area

Details of the constraints, options and possible solutions analysed to arrive at these proposed projects are included in Appendix B on page 32.

[3] Data sourced from NW-#30075639-Statewide Distribution Transformers Customer Count Nov 09. Transformer data extracted from Gtech in November 2009.

9. LONG TERM PLAN (10YR+)

The North Coast Area Strategic Plan provides the background to much of the planning information in this document. It can be found at: NW-#30103837-North Coast area strategic plan Rev_3.

A summary of the proposed works from 2021 to 2050 in the North Coast planning area is outlined in the following table.

Year	Proposed Project	Proposed Outcomes
2021	Wesley Vale transformer replacement	Address asset age at Wesley Vale and firm capacity issues Devonport and Railton, improved reliability for North Coast area
2032	Railton transformer upgrade	Addresses age and firm capacity limitations at Railton
2040s	Devonport transformer replacement	Address firm capacity issues at Devonport and Railton
2046	Devonport 22 kV switchgear extension	Utilise spare firm capacity at Devonport

Details of the constraints, options and possible solutions analysed to arrive at these proposed projects are included in Appendix C on page 32.

10. PROGRAM OF WORK DRAFT

Project	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Install UG HV - 6 feeder tails New Norfolk Zone		$ 173,000				
(Project BW 006] Install 0.2 km HV UG Huntingtier Rd PID 221007 to Hardwicks Rd Bagdad PID 390836	$ 80,000					
Augment OH HV - 14 Mile Rd, Tarraleah					$ 210,000	
Augment OH HV - Fdr 37002 stage 1 Gretna Zone associated with Zone replacement					$ 411,000	
Augment OH HV - Fdr 37002 stage 2 Gretna Zone associated with Zone replacement					$ 411,000	
Augment OH HV - Fdr 37002 stage 3 Gretna Zone associated with Zone replacement					$ 206,000	
Derwent Bridge - Install 3rd wire Lyell Hwy (generator stability) 2 kms	$ 40,000					
Derwent Bridge - Install permanent connection point generator	$ 25,000					
Install 1 x 6.6/ 22 kV step up stations at todds corner						$ -
Install 19/3.25 AA OH link Hamilton - F45003 2 kms	$ 130,000					
Install OH HV - Auburn Rd to Macquarie Rd						
Install OH HV - Derwent Bridge to Bronte Link					$ 630,000	
Install OH HV - link Meadowbank 45003 to Wayatinah 49412 to Tunagtinah 49305						$ 420,000
Install OH HV - link to Lake Cresent 3 ph (to assist in removal of SWER)				$ 630,000		
Install OH HV - link Victoria Valley SWER to Tungatinah fdr 49303, Dee Lagoon					$ 124,000	
Install OH HV - new Feeder, Elderside						$ -
Install OH HV - Upgrade SWER, Dee Lagoon Link, Victoria Valley Rd				$ 294,000		
Project BW 004 Reinsulate7.6 k & 8 tx Bridgewater F48 190 to 22 kV and supply from Meadowbank TS	$ 300,000					
Project BW 005 Reinsulate 10.0 k &11 tx Bridgewater F 48 190 to 22 kV and supply from Meadowbank TS		$ 352,000				
Project MB 001 - Westerway 38002 OH conversion to 22 kV (10 km OH and 15 tx's)		$ 400,000				
Project MB 002 - Westerway 38002 OH conversion to 22 kV (12 km OH and 22 tx's)			$ 460,000			
Project MB 003 - Westerway 38002 OH conversion to 22 kV (11 km OH and 15 tx's)					$ 360,000	
Tods corner - Convert 6.6 kv line to 22 kv						$ -
Augment pole sub 300 kVA First Avenue New Norfolk	$ 40,000					
Augment pole sub Fairfax Terrace New Norfolk	$ 40,000					
Install new pole sub George Street New Norfolk	$ 40,000					
Install Substation - new or augment pole type 300 kVA				$ 30,000	$ 30,000	$ 30,000
Augment OH LV - overloaded LV ccts Highlands stage 2		$ 14,000				
Augment OH LV - overloaded LV ccts Midlands South stage 2		$ 14,000				
Augment OH LV - overloaded LV ccts Midlands South stage 3		$ 14,000				
Augment OH LV - overloaded LV ccts Midlands South stage 4				$ 14,000		
	$ 695,000	$ 967,000	$ 460,000	$ 968,000	$ 2,382,000	$ 450,000

11. OPERATIONAL PLANS

- Contingency plans (not at operational level)

Operations Group have developed a number of contingency plans to define operational actions to be taken in the event of substation, busbar and feeder outages. The document NW-#30126392-Contingency Plan Register provides links to contingency plan documents as they are produced.

12. REFERENCE DOCUMENTS

Self explanatory but listed documents for system studies, council plans etc

- Listing of DINIS personal files
- Links to other work documents

13. NOTES

- System development plans identified for the area should link to other plans. Consultation with other work groups, in particular System Performance, Distribution Operations, Area Managers and key external stakeholders e.g. Councils and Government Departments, is essential to ensure optimum outcomes.
- It would be useful to include any details of reference documents and schematic diagrams indicating current substation layout and HV feeder arrangements.

Appendix A. Short Term Plan (<5 years) – Constraints Options and Solutions

A.1 Conversion of Wesley Vale terminal station

A.1.1. Constraints

Devonport terminal substation has three 30 MVA 110/22 kV transformers. The terminal substation load in 2012 is forecast to be 69.17 MVA and it is forecast to grow to 82.82 MVA in 2022. This load is well above the firm capacity of the substation.

Railton terminal substation has two 50 MVA 110/22-11 kV transformers. The forecast load for 2012 is 52.02 MVA and it is forecast to grow to 56.15 MVA in 2022. The distribution feeders are heavily loaded and there are no spare circuit breakers on the 22kV switchboard.

High residential growth is forecast for the Port Sorell and Hawley Beach areas to the east of Devonport. These areas are currently supplied by long feeders from Devonport and Railton and reliability is an issue.

A.1.2. Options considered

1. Conversion of Wesley Vale to an 110/22 kV connection point
2. Transformer replacement and new 22 kV feeders from Devonport
3. Non-network option
4. Do nothing option

Option 1 – Conversion of Wesley Vale to an 110/22 kV connection point

It is recommended that the two existing 110/22/11 kV transformers be converted to operate at 110/22 kV utilising the existing 22 kV switchgear (currently operating at 11 kV). A 22/11 kV transformer will be required for the furniture factory currently supplied at 11 kV.

Option 2 – Transformer replacement and new 22 kV feeders from Devonport

This option includes the replacement of the three existing 110/22 kV 30 MVA transformers with three 110/22 kV 60 MVA transformers. This will address short term loading issues at Devonport substation and provide firm capacity for the future growth in the area.

Option 3 – Non-network option

No non-network alternatives have been considered.

Option 4 – Do nothing option

The do nothing option is not considered a feasible option as the firm capacity at Devonport and Railton has been exceeded.

Technical comparison

Option	Description	Advantages	Disadvantages
1	Conversion of Wesley Vale to an 110/22 kV connection point	• Addresses firm capacity limitations at Devonport and Railton • Highest operational flexibility • Consistent with network • development plan (remove surrounding load from Devonport so it can feed the CBD) • Utilises existing 22 kV feeders that run past the site • Utilises existing site and transformers/switchgear	•
2	Replacement of the Devonport transformers	• Addresses firm capacity limitations at Devonport and Railton • Utilises existing site	• Not consistent with network development plan (Devonport to focus on immediate substation supply area) • Construction of long 22 kV feeders required • Feeder congestion around substation and towards Wesley

			Vale • Devonport transformers were only installed in the last 5 years and are not due for replacement

The above technical comparison of options indicates that option 1 provides the best technical solution.

Cost comparison

Option	Initial Capital Cost ($M)	Total Capital Cost ($M)	Net Present Value ($M)
1	1.2	18.9	5.2
2	11.7	18.9	13.8

The above cost comparison of options indicates that option 1 provides the lowest cost solution. Details of the NPV analysis are given in appendix B of NW-#30141801-North Coast area strategic plan Rev_5_2010 final report.

A.1.3. Possible Solution

Based on the technical and cost comparison, option 1 is considered the preferred option to address the forecast limitations.

Therefore it is recommended that:

Transend:

- Changeover to the 22 kV windings

Aurora:

- Install a 22/11 kV transformer at the substation or at the customer site
- Install 22 kV feeder tails to existing 22kV switchgear (currently operated at 11kV).

Appendix B. Medium Term Plan (5 to 10 years) – Constraints Options and Solutions

B.1 Westbury terminal station

It is recommended that a new terminal substation is established in Westbury in the Tamar area in 2017. Two 110/22 kV 60 MVA transformers should be installed. This will address the firm capacity issues at Hadspen and also at Railton and Devonport in the North Coast area. Large industrial point loads are expected in the Westbury area and Hadspen will be unable to support the large load increases.

More information on this project is available in the Tamar area development plan.

Appendix C. Long Term Plan (>10 years) – Constraints Options and Solutions

C.1 Wesley Vale transformer replacement

The transformers at Wesley Vale terminal substation were installed in 1970 and 1971. Assuming an asset life of 50 years, it is predicted that the transformers will need replacement in 2021.

The recommended option is to replace the two existing 110/22 kV 22.5 MVA transformers with two new 110/22 kV 60 MVA transformers in 2021. This will address the age limitation of the existing transformers and provide more firm capacity for the future growth in the area.

The estimated cost of the upgrade is $6 million.

C.2 Railton transformer upgrade

It is recommended that the transformers at Railton be replaced with two 110/22 kV 60 MVA transformers in 2032. This will address the transformer age limitation and the approaching firm capacity issue at Railton. This timing can be refined further by completing regular testing on the transformer as it approaches the 50 year mark.

C.3 Devonport transformer replacement

It is recommended that the three transformers at Devonport substation be replaced with three 110/22kV 60 MVA transformers. The transformers will need to be installed in 2041, 2042 and 2046.

This project will double the firm capacity of the Devonport substation. Distribution feeder works will be required to obtain an optimal feeder loading

on each of the existing feeders. There are no existing spare circuit breakers but there is room for four future panels on the switchboard.

C.4 Replace Devonport 110/22kV transformer

It is recommended that the 22kV switchgear at Devonport be extended in 2046. This will allow the spare firm capacity of the substation to be fully utilised. The timing for this project will be refined dependent on the load growth in the Devonport area.

Appendix D. Technical Data

D.1 Substation loading

Not required??

Gretna			Capacity with all elements in service (N)		Capacity with one element out of service (N-1)		Maxium Demand 2008		Maxium Demand predicted summer 2009		Maximum Demand predicted for winter 2009	
Elements	No	Emergency Rating MVA	Summer MVA	Winter MVA	Summer MVA	Winter MVA	Summer MVA	Winter MVA	Summer MVA	N-1 Load at Risk	Summer MVA	N-1 Load at Risk
Transfomers	2	1	45	45	22.5	22.5			0	0	0	0
Distributed Subtransmission Feeder NNxxx	1	N/a										

Reference master document # 30006462

D.2 Aurora Zone Substation data sheet

Section Not required??

Reference master document #30040697

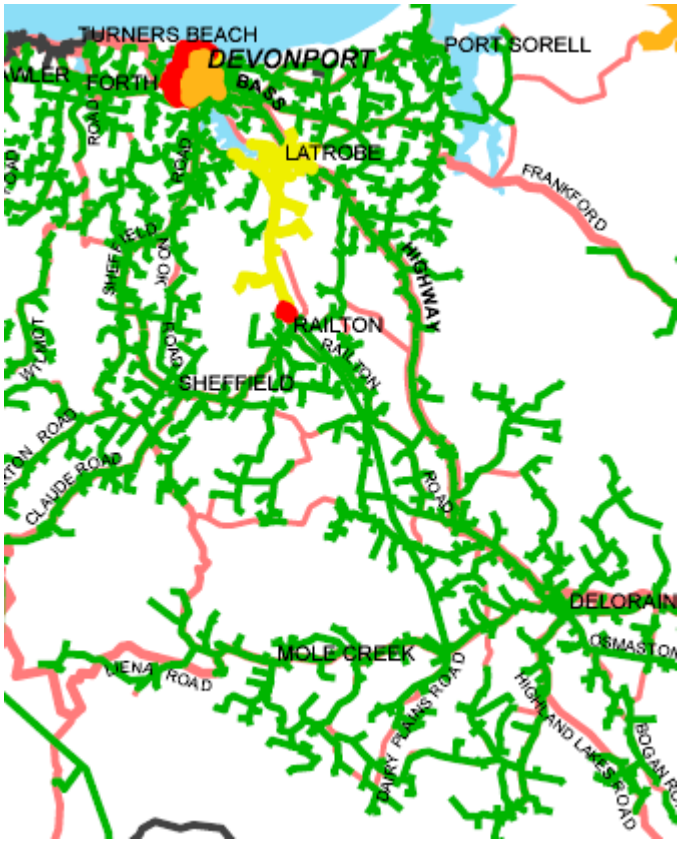
D.3 Transend Station data sheet

Planning Area	Connect Point Substation	Connection Company	Connection Voltage kV	No. Of Connection Points	Type
North Coast	Devonport	Transend Networks	22	11	Distribution
North Coast	Railton	Transend Networks	22	8	Distribution
North Coast	Wesley Vale	Transend Networks	11	1	Distribution

Reference master document #30040697

D.4 High Voltage feeder loading

2008/09 financial year



Planning Area	Station	Feeder Number	Voltage	Sum of MD (MVA)	Planning Std (MVA)	Load in 5 years (MVA)
Central	Fisher	3 (C252)	11	0.9	5	1.0
		4 (D252)	11	0.0	5	0.1
	Meadowbank	45001	22	1.6	10	1.9
		45002	22	2.1	10	2.4
		45003	22	3.2	10	3.6
	New Norfolk (Terminal)	39563	22	7.5	10	8.3
		39565	22	6.2	10	6.9
		39568	22	2.3	10	2.6
		39569	22	0.1	10	0.2
		39570	22	6.1	10	6.8
		39571	22	3.6	10	4.0
	New Norfolk (Zone)	35010	11	2.9	5	3.2
		35011	11	2.3	5	2.7
		35012	11	2.3	5	2.6
	Tungatinah	T8&T9	22	1.4	10	1.6
	Waddamana	202	22	0.6	10	0.7
	Wayatinah	1	0	0.0	0	0.1
		2	0	0.0	0	0.1
		3	0	0.0	0	0.1

Reference master document #30040697

D.5 Transfer Capacity

- MD transfer capacity with other stations (order of)
-
-
- Brief outline of transmission and subtransmission feeder arrangements, ratings and capabilities

Note it would be useful to include any details of reference documents and schematic diagrams

- HV feeder ratings, current summer and winter loads. MD's
- Provide high and low load forecasts i.e. +/- 10% of base load as above for each HV feeder for the next 10 years
- Indicate anticipated summer and winter load growths for each of the existing HV feeders in the area including ratings of the feeder.
- As above for major zones
- Reference Transend Annual Planning Report.

Appendix E. Planning Criteria and Guidelines

E.1 Transmission Planning Criteria

Transend's planning criteria are fundamentally based on:

- the National Electricity Rules (NER);
- the Electricity Supply Industry (Network Performance Requirements) Regulations 2007; and
- good electricity industry practice

The following criteria are used when planning for the transmission system.

Transmission and transformer loading

- Transmission lines and autotransformer loadings for an intact system or for a contingency (N–1) should not exceed their continuous ratings in planning studies. For supply transformers four-hour emergency ratings can be used to defer augmentations depending on the peak duration of the load duration curve.
- Transmission line loading on circuits covered by NCSPS should not exceed 95 per cent of their rating for an intact system when Basslink is exporting. When Basslink is not in service or importing, standard N–1 criteria applies.

Load interruptions

For an intact system, i.e. where no elements are out of service for maintenance the following should apply as per Network Performance Requirements:

- no credible single contingency event will interrupt more than 25 MW load;
- no single asset failure will interrupt more than 850 MW or, in any event cause a system black;
- the unserved energy to loads interrupted as a result of damage to a network element related to a credible contingency event must not exceed 300 MWh; and
- the unserved energy to loads interrupted as a result of a single asset failure must not exceed 3,000 MWh

Single asset failure that would cause large load interruptions is the loss of a double circuit line, a bus section fault or a bus coupler fault. In calculating unserved energy, the ability to transfer load and the time required for load restoration should be taken into account.

Exposure due to maintenance outage

- Where a network element has been withdrawn from service for maintenance, replacement or repair, the energy exposed to interruption by a credible contingency event must not exceed 18,000 MWh.

In calculating unserved energy, the ability to transfer load should be taken into account.

Maximum repair / replacement time

Minimum Performance Requirements state that for the purpose of calculating unserved energy, any replacements or repairs undertaken, should not exceed the following:

- Transmission line repair – 48 hours
- Transformer replacement – 8 days
- Auto transformer replacement – 18 days

E.2 Distribution Planning Criteria

Key planning standards include: -

System Performance

- Voltage regulation range of + 6% and – 6% of the nominal HV voltage and a LV voltage range of 230/400 V +10% and –2%;
- Power quality standards are recognised in accordance with the TEC, NER and applicable Australian Standards; and
- Tasmanian Reliability Performance Standards

Table Appendix E -1 Tasmanian Reliability Performance Standards

Community category	Frequency standard (Maximum average number of supply interruptions per year)		Duration standard (Maximum total time without electricity in a year measured in minutes)	
	For the category	For each community	For the category	For each community
Critical infrastructure	0.2	0.2	30	30
High density commercial	1	2	60	120
Urban and regional centres	2	4	120	240
Higher density rural	4	6	480	600
Lower density rural	6	8	600	720

Source: Tasmanian Electricity Code

Capacity

Maximum average loading considerations for distribution feeders facilitating HV feeder interconnectivity;

- 22 kV – 10 MVA continuous and 15 MVA (typically one hour) emergency;
- 11 kV - 5 MVA continuous and 7.5 MVA (typically one hour) emergency.

Security of supply

Group firm philosophy or a deterministic planning standard, e.g. “N-1”, dependent on elements of security, load and exposure to risk

Schedule 5.1.2.2 (a) of the NER states:

> *“In the satisfactory operating state, the power system must be capable of providing the highest reasonably expected requirement for power transfer (with appropriate recognition of diversity between individual peak requirements and the necessity to withstand credible contingency events) at any time.”*