Network Augmentation Recommendation

Augmentation Plan Tuggeranong Town Centre – 7522690

		Signature	Date
Network Augmentation Manager	Supported / Not Supported		
Senior Branch Manager Asset Strategy & Planning	Supported / Not Supported		
General Manager Asset Management	Supported / Not Supported		
Chief Executive Officer	Supported / Not Supported		

Executive Summary

The ACT Government Environment and Sustainable Development Directorate (ESDD) has developed a new master plan for the Tuggeranong town centre, including a new residential development ("Greenway" developments).

The existing 11 kV feeder system is heavily loaded, and several options have been investigated to reinforce the supply from either Wanniassa or Theodore zone substations.

The initial construction of 'Greenway' developments has commenced, and ActewAGL is meeting construction supply through operational switching arrangements. Operational arrangements are not sufficient to meet the medium term demand forecast in this area, therefore alternative solutions have been developed, of which 11kV connection to the Wanniassa Z/S was assessed to be a prudent and efficient solution to meet projected demand.

Establishing an 11kV underground distribution line (length 6.3km) from Wanniassa zone substation at an estimated cost of $2.87Million, commencing [1]2016/17 has been identified as the preferred solution to meet the projected demand of 7.1MVA in the Tuggeranong 'Greenway' land development project.

Demand Projection

Electricity demand projections based only on land release forecasts are not entirely accurate as there is a high degree of uncertainty until the land has been sold for development. However, the demand projection is rapidly realised once construction commences, and there is better certainty on timing and demand uptake once construction has commenced. The ACT legislation requiring that dwelling construction must be commenced within 1 year of land sale and completed within 3 years legitimizes this conclusion.

The uncertainty in early stages of development is a common feature of major developments requiring commercial / financial close, however the proponents of development want guarantees for electricity supply to meet all project stages from construction supply through to occupancy/commercial operations. In this instance, the initial land development has commenced, and the ability to predict the forecast electrical loading that ActewAGL is required to supply is good.

The Tuggeranong development plan, and the advanced stage of construction enables ActewAGL to have confidence in its demand projection of 2.57MVA for construction supply, and the total demand projection of 7.1MVA by 2016/2017.

[1] The CAPEX spend is divided into 1Million in 2016/17 and $1.687Million in 2017/18.

Credible Solution Options

Four credible solutions were considered which can be broadly classified into two approaches. The first approach being a limited growth option, and the second is an option that builds flexibility for future growth in demand.

I. Limited Growth Option: Inexpensive options (1 and 2) that allows for **limited growth** up to 2.57MVA, of which 60% is committed load, therefore does not provide for capacity expansion beyond year 2.

II. Flexibility for Future Growth: Higher cost options (3 and 4) that allow for medium term growth requiring the establishment of longer feeders, but which will supply increased capacity to the Tuggeranong development.

Options Analysis

The specific options considered are compared in the table below.

Strategy	Options Considered	Spare Capacity & Cost
Short Term Supply – Limited Growth Option	**Option 1** Feed via the Pitman and Rowland feeders; Extension of underground feeders via underground conduits traversing across the town centre (cable length ~2km) and overground switching station on both feeders.	Minimum development load - 1.5MVA committed load. Max. available capacity: 2.57MVA Cost **$923,250**
	Option 2 Feeder extension via the Pitman and Rowland feeders taking an alternative cable route (not traversing the town centre; cable installed via trenching method of 3.6km in length).	Minimum development load - 1.5MVA committed load. Max. available capacity: 2.57MVA Cost **$1,660,550**
Flexibility for Medium Term Growth	**Option 3** Establish a new feeder of length 7.2km from one of four spare feeder bays at Theodore zone substation.	Max. available capacity: 15MVA (ZS); ~5.5MVA (feeder) Cost **$3055,800**
	Option 4 Establish a feeder of length 6.3km from Wanniassa Zone Substation.	Max. available capacity: 15MVA (ZS); ~5.5MVA (feeder) Cost **$2,686,200**

Limited Growth Options (options 1 &2)

The cable options fed from the Pitman and Rowland feeders are similar in cost, and the spare capacity is identical. The difference between the options is in the ease of implementation and practicality. The cable route in [2]option 1 traverses the town

[2] The cost associated with the approvals and planning difficulty in undergrounding through the town centre has not been included in the costs.

centre and requires conduits, whereas option 2 is a longer but more practical cable route which avoids the town centre, thereby enabling cable installation by trenching.

Options providing Flexibility for Medium Term Growth (options 3&4)

There are three 11kV zones (Wanniassa, Theodore and [3]Gilmore) substations in southern Canberra city that are able to supply Tuggeranong town centre and the lake development. The ease of implementation and cost are the factors that will determine the choice amongst these three options.

The options from Wanniassa and [4]Theodore zone substations respectively require 6.2km and 7.2km of underground feeder to be established. These options allow for flexibility in development to accommodate load growth beyond the initial load development within Tuggeranong township and the residential lake development.

Recommended Option

The selection of the preferred option comes down to deciding whether it is more economical to select a low cost option (Option 2) to meet the initial load increase (2.57MVA), or to select a medium term option (Option 4) which meets the medium term (5 year) load of 7.1MVA. There are also two potential sub-options for Option 2, as shown in the table below.

The following NPV calculation compares the preferred option for medium term growth (option 4) with the staged implementation of the low cost solution (option 2). The NPV of implementing option 4 in 2015/16 is lower than both the "staggered" Option 2 solution, and the Option 2 solution, followed by option 4 in 2018/19.

On this basis, Option 4 is the preferred option.

Preferred Solutions	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**NPV** (8% discount rate)
Option 2 (staggered solution to meet 7.1MVA)	$ 1,660,550	-	$ 1,660,550	-	**$ 2,644,208**
Option 4	$ 2,686,200	-	-	-	**$ 2,302,984**
Option 2 followed by **option 4 in 2018/19**	$ 1,660,550			$2,686,200	**$ 3,398,091**

[3] Connection from Gilmore Z/S is not considered because this option will be identical to Theodore in costs as the distances (7.1km) to Theodore or Gilmore are identical.

[4] Gilmore ZS is about 7.1km from the load centre and is identical to supply from Theodore ZS in term of option costing, and it does not have any special advantage over supply from Theodore ZS.

Network Augmentation Plan

Augmentation Plan Tuggeranong Town Centre – 7522690

Document Management

Version	Changes	Date
2	Update to new format	20/03/2014

Document Author	**Zoltan Tokaji**
Date	05/03/2014
Document Location	Network Augmentation Network Drive
Attachments	
References	Electrical Data Manual
	Zone Substation Reports

Contents

1 Project Requirements

1.1 Objective

To provide supply capacity to the Tuggeranong Town Centre, and reduce peak loadings on feeders in the Tuggeranong area.

1.2 Background

The ACT Government Environment and Sustainable Development Directorate (ESDD), which incorporates the former ACTPLA, has developed a [5]master plan for the Tuggeranong town centre. This master plan incorporates new zoning for areas and potential developments in the Tuggeranong town centre. The Diagram below indicates the expected zoning of the Town Centre. The specific development that is already commenced construction, 'Greenway' is located on the Tuggeranong Lake front.

Figure 13: Proposed land uses

Note: Just because the above image states an area is for a particular use, e.g. community, it does not mean all other uses are excluded. It means that particular use is intended to dominate.

The ACT Planning strategy has set a target for the proportion of new housing delivered through urban intensification. This forecast is part of a larger long term (30 year) vision for land release; however the estimate provided here is a refined 4 year forecast suited for planning purposes. Below is a table from the *'ACT indicative Land release Programs 2013/14 to 2016/17 published June 2013'.*

The forecast from Land Planning Authority has been converted into a conservative estimate for electrical loading, based on the methodology set out in ActewAGL's Network 10 Year Augmentation Plans 08/09– 17/18.

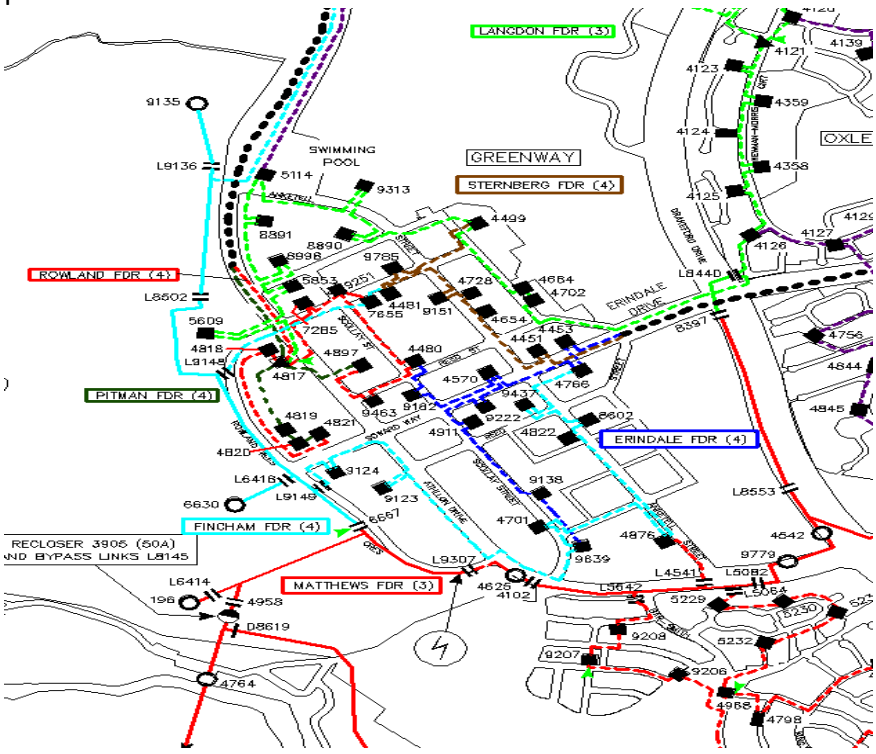
[5] Tuggeranong town centre master plan – 30 September 2012
source:
http://www.actpla.act.gov.au/__data/assets/pdf_file/0016/31390/20120913_Tuggeranong_Master_Plan

Development Plans	2013-14	2014-15	2015-16	2016-17	Unit	Total (MVA)
Commercial - Greenway (sqm)	4100	1100	1100	1100	11kVA	0.8
Residential (dwelling)	456	446	229	300	[6]2.6 –3.8kVA	[7]3.7- [8]5.4
Residential - Greenway (dwelling)	306	296	229	150	2.6 – 3.8kVA	2.6 – 3.7
Community and non-urban (sqm)	20,000	45,000	5,000	45,513	based on specific developments	[9]**Not included**
Yearly Load Projection (MVA)	**2.43**	**2.05**	**1.31**	**1.30**		
Cumulative Load Projection (MVA)	**2.43**	**4.49**	**5.79**	**7.09**		**7.09**

"To determine power requirements for the new development, the average peak demand for ActewAGL's residential customers was determined. A study on multi-unit residential building energy and peak demand, undertaken by Energy Australia and the NSW Dept. of Planning for the NSW Government's Building Sustainability Index found that the peak demand for units/apartments ranged from 0.4KVA to 7.9kVA (***with an average of 2.6kVA***). The averages for units with air conditioners was ***3.8kVA***."

1.3 Network Constraints

The main 11kV Feeders which are supplying the Tuggeranong Centre are shown in the diagram below. To meet the initial construction supply, operational switching arrangements, feeding from the Pitman and Rowland feeders have been put into place. This creates network constraints under n-1 conditions.



[7] Forecast MVA based on conservative avg 2.6kVA per dwelling has been used in the final demand projections

[8] based on avg. 3.8kVA per dwelling (with air conditioner) – this figure has not been used for calculations.

[9] This is not included in the forecast, as it needs to be based on consultation with proponents and be forecasted for specific developments.

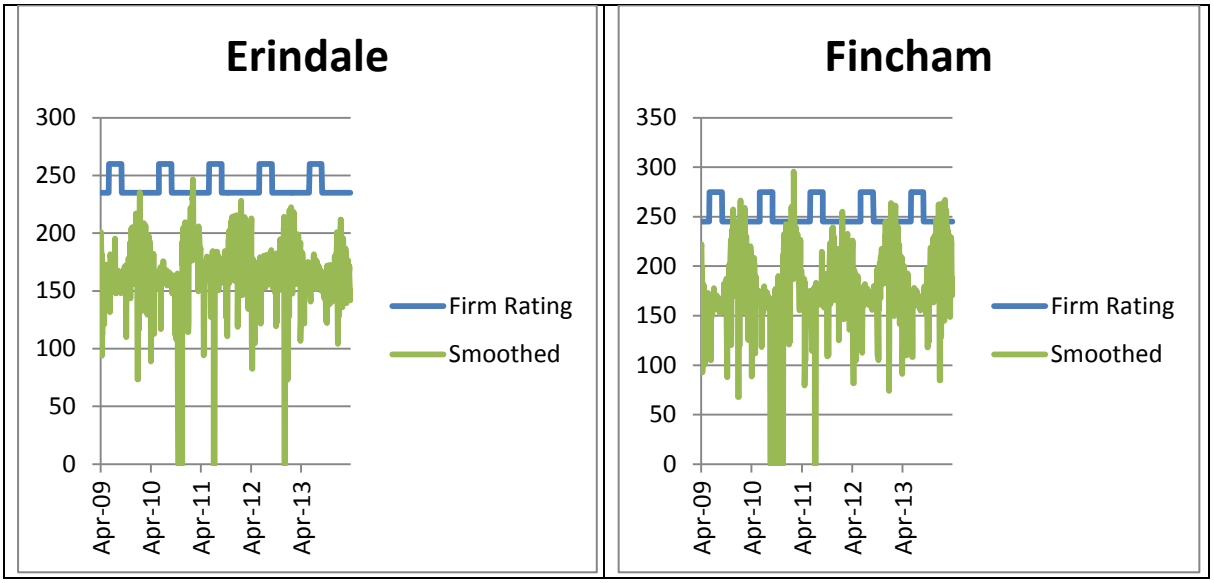
2 Network Capacity and Forecasting

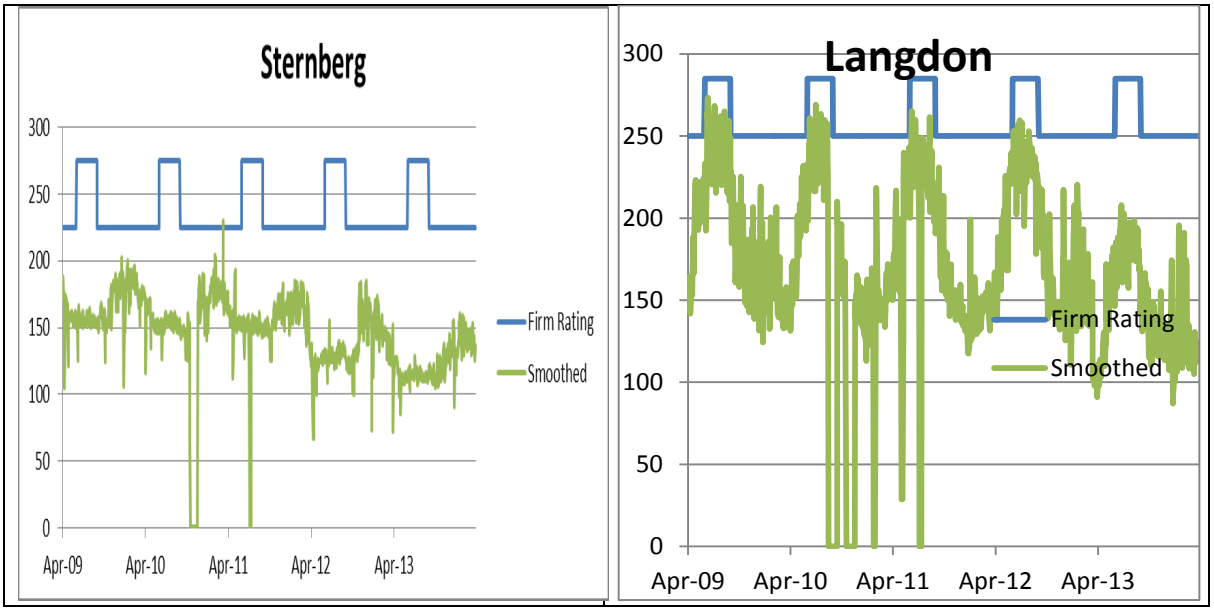
2.1 Feeder Loading

The peak loads over the last three years for each feeder within the vicinity of the town centre is shown in the table below.

					2011		2012		2013		2014
Name	Firm Summer Rating	Thermal Summer Rating	Firm Winter Rating	Thermal Winter Rating	% Load Sum	% Load Win	% Load Sum	% Load Win	% Load Sum	% Load Win	% Load Sum
Sternberg	225	300	275	365	102%	59%	82%	56%	82%	47%	71%
Rowland	250	330	280	370	63%	47%	57%	38%	63%	36%	53%
Pitman	250	330	280	370	63%	47%	60%	38%	62%	36%	52%
Matthews	245	325	275	365	80%	75%	74%	73%	71%	75%	68%
Langdon	250	335	285	380	97%	93%	96%	91%	88%	73%	78%
Fincham	245	325	275	365	121%	78%	104%	66%	108%	65%	109%
Erindale	235	310	260	345	105%	71%	97%	71%	95%	70%	90%

Three feeders have exceeded their firm rating at least once in the last three years. A closer look at the load profile of these feeders is presented below. The feeder loading graphs are based on filtered data to ensure transfer spikes and overloading due to outages has been removed.





- The Erindale feeder has exceeded its firm rating once over the last three years and is at approximately 90% of its firm rating the rest of the time. The load remains below the feeder firm rating for the remainder of the time. This feeder does not have any available capacity for additional loads.

- The Fincham Feeder load profile indicates that the load has exceeded its firm rating several times. There is no capacity on this feeder for additional load.

- Sternberg Feeder has exceeded its firm rating once in the last three years during normal operation. The load has remained below the firm rating for the remainder of the time. There appears to have been a reduction of load in March 2012.

- Langdon Feeder has been operating at full capacity from 2011 to 2013. A load reduction occurred in July 2013; however there is minimal capacity available for additional loads.

2.2 Feeder Forecasting

The table below shows the calculated forecast for the load on the feeders in the Tuggeranong Town Centre area. The red highlighted cells indicate where the expected load has exceeded its firm rating.

The forecast loads do not directly include the forecasts from load increases (in other words, the Tuggeranong developments loads are not included in this forecast). The forecast shown below uses a generic growth factor to forecast feeder loading.

Feeder \ Year		2014	2015	2016	2017	2018	2019	2020	2021	2022
Erindale	50% PoE	245	246	247	249	250	252	253	255	257
	10% PoE	265	267	271	274	278	282	286	290	294
Fincham	50% PoE	304	310	316	322	329	336	343	350	357

	10% PoE	343	352	363	373	384	396	408	420	432
	50% PoE	394	390	386	382	378	374	370	366	363
Langdon	**10% PoE**	407	404	400	397	394	391	388	385	382
	50% PoE	216	220	224	227	231	235	239	243	247
Matthews	**10% PoE**	227	231	235	240	244	249	254	259	264
	50% PoE	166	168	169	170	172	173	174	176	177
Pitman	**10% PoE**	177	179	181	184	186	189	191	194	197
	50% PoE	167	168	169	170	171	172	174	175	176
Rowland	**10% PoE**	177	179	181	184	186	189	191	194	196
	50% PoE	218	218	218	218	218	218	218	218	218
Sternberg	**10% PoE**	237	239	240	241	243	245	247	249	251

Once load on a feeder has reached firm rating, no additional load will be placed on that feeder. The table above displays only the calculated increase of load in the area.

2.3 Zone Substation Capacity and Forecasting

2.3.1 Wanniassa Zone Substation

Table 1 – Wanniassa Zone Capacity

Rating	Summer	Winter
Continuous Rating (MVA)	95	100
Two- hour Emergency Rating (MVA)	95	114

The continuous rating of the substation is limited by the transformer ratings as well as cables between the transformers and the 11kV busbar. The two-hour emergency rating is limited by the cables between the transformers and the 11kV busbar.

Table 2 – Wanniassa Zone Switchboard

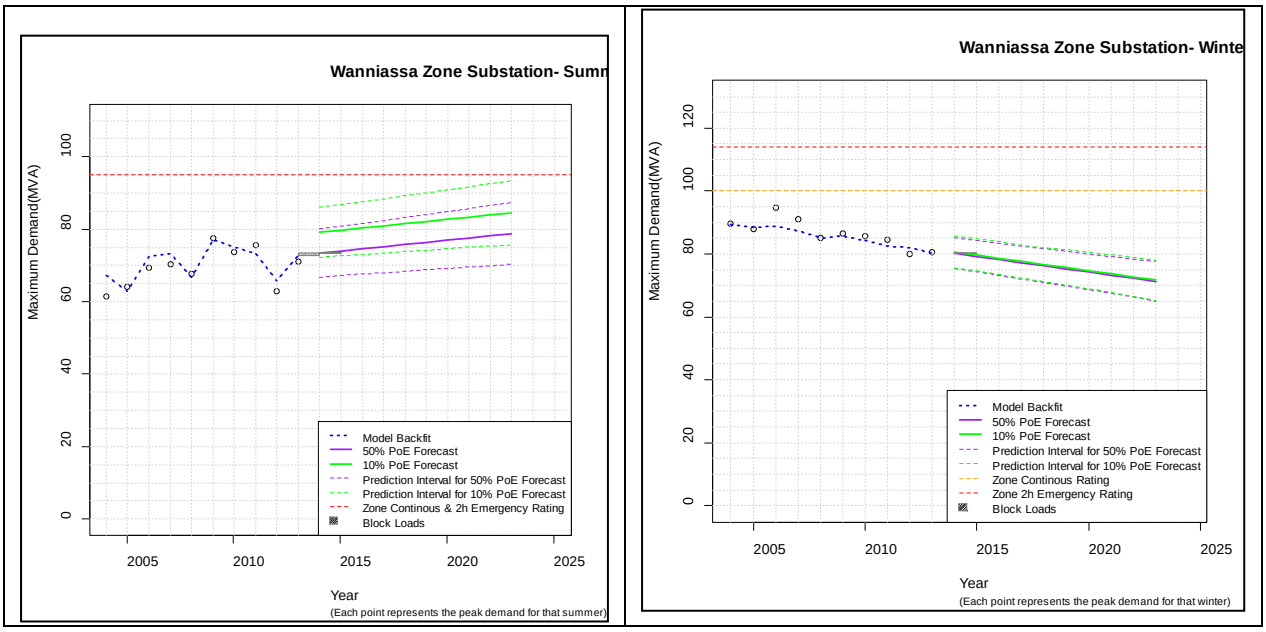
Number of 11kV feeders	28
Number of outgoing 11 kV circuit breakers	26
Number of spare 11 kV circuit breakers	0

There are no spare 11 kV circuit breakers at Wanniassa Zone Substation.

Table 3 – Wanniassa Zone Summer Demand Forecast

Summer ending Feb of	Summer Forecast (MVA)		Winter ending Aug of	Winter Forecast (MVA)	
	50% PoE	*10% PoE*		*50% PoE*	*10% PoE*
2014	73.4	79.1	2014	80.2	80.6
2015	74.0	79.7	2015	79.3	79.6
2016	74.6	80.3	2016	78.3	78.6
2017	75.2	80.9	2017	77.3	77.6
2018	75.8	81.5	2018	76.3	76.6

(PoE = Probability of Exceedance)



2.3.2 Theodore Zone Substation

Table 4 – Theodore Zone Capacity

Rating	Summer	Winter
Continuous Rating (MVA)	45	45
Two-hour Emergency Rating (MVA)	62	69

The ratings of the substation are limited by the transformer ratings.

Table 5 – Theodore Zone Switchboard

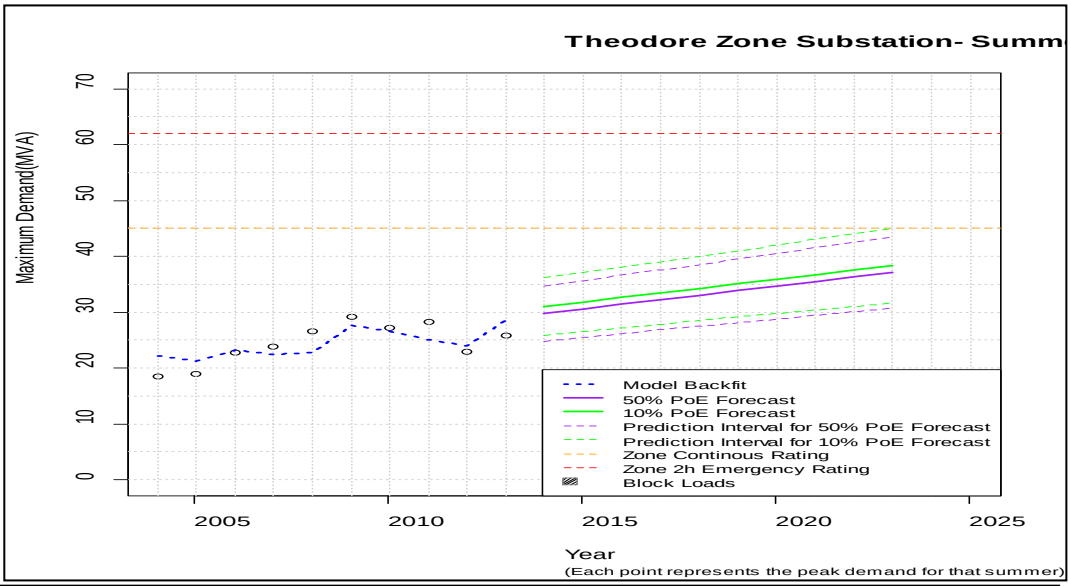
Number of 11kV feeders	9
Number of outgoing 11 kV circuit breakers	13
Number of spare 11 kV circuit breakers	2

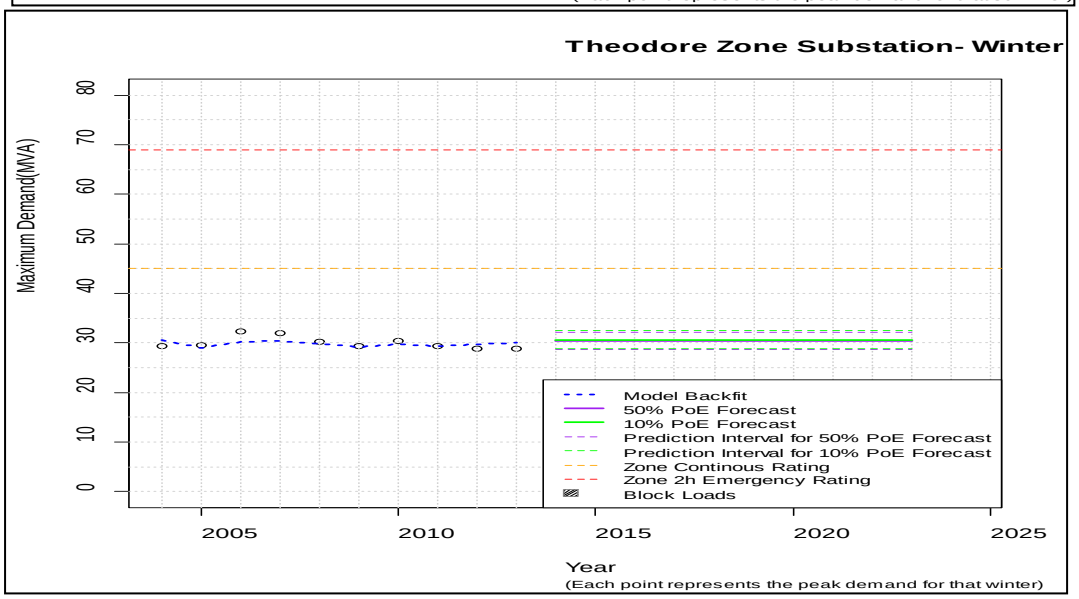
There are 2 spare 11 kV circuit breakers at Theodore Zone Substation.

Table 6 – Theodore Zone Summer Demand Forecast

Summer ending Feb of	Summer Forecast (MVA)		Winter ending Aug of	Winter Forecast (MVA)	
	50% PoE	*10% PoE*		*50% PoE*	*10% PoE*
2014	29.8	31.0	2014	30.4	30.6
2015	30.6	31.8	2015	30.4	30.6
2016	31.4	32.6	2016	30.4	30.6
2017	32.2	33.4	2017	30.4	30.6
2018	33.0	34.3	2018	30.4	30.6

(PoE = Probability of Exceedance)





3 Non Network Options

The demand side management options applicable to this scenario are limited to demand reduction and alternative supply measures.

The initial demand of this development is residential dwellings. The demand reduction measures associated with residential dwellings might reduce some demand but will not able to completely offset and defer a network solution. Further the demand reduction measures such as on- site generation, co-gen and tri- gen which are associated with commercial and industrial businesses will not be applicable in the immediate future and therefore the viability of demand reduction option is not further investigated.

An alternative supply measure in the form of a leasing generator arrangement is identified as a prospective DM option coupled with some improvements to the existing feeders from the [10]Wanniassa ZS. Based on previous experience of similar embedded generation proposals in residential areas, ActewAGL anticipate a high level of community objection and conclude that this option will not be a practical and may be rejected from approval by ACTPLA.

4 Option Analysis

4.1 Option 1 – Pitman and Rowland Feeders Traversing through the City Centre

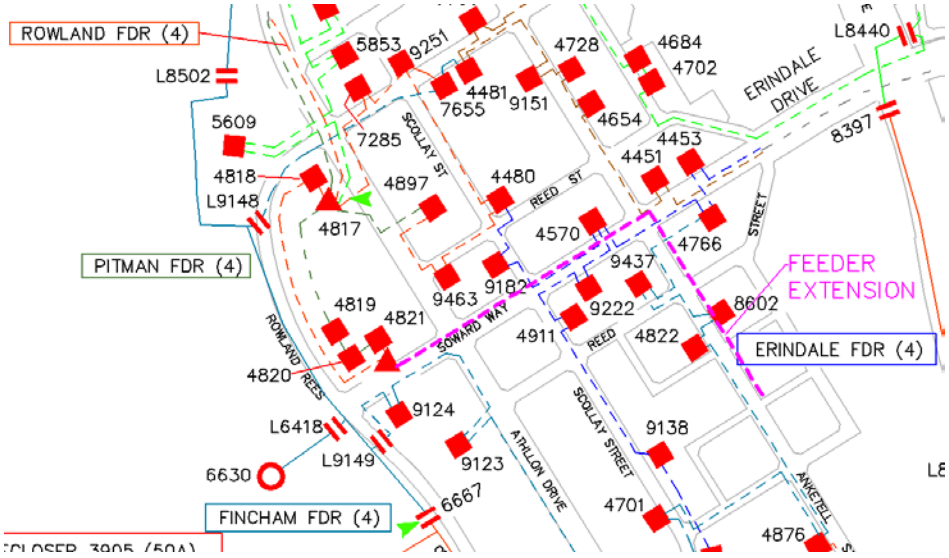
4.1.1 Description

Both the Pitman and Rowland feeders have experienced a maximum load over the last three years of 182.5A. This leaves an additional capacity of 67.5A on each of the feeders. Together Rowland and Pitman feeders have spare capacity of 2.57MVA. It is recommended that this spare capacity be utilised first to supply upcoming developments. The known development which is to occur on the shores of Lake Tuggeranong is estimated to have a maximum load of 1.5MVA. This option is based on Pitman and Rowland Feeders supplying the new development.

This option proposes the installation of an extension from the two feeders mentioned above to supply the development. Since both of these feeders are underground, a ground mounted switching station will need to be installed on both feeders to facilitate the extension. Small pad mount switching station is included in the scope of works to avoid T-joints that can reduce reliability.

Proposed network

[10] The loading of the existing feeders from Wanniassa ZS are given section 2.1 of this report.



The feeder extensions will be installed in underground conduits. Since the cable route is through the main town, the installation of the conduits will have to be executed using an underground boring technique. The conduit installed shall be 125mmØ and the cable shall be 3c HV 240mm² Al XLPE. The cable extension length for each feeder is calculated to be approximately 1km.

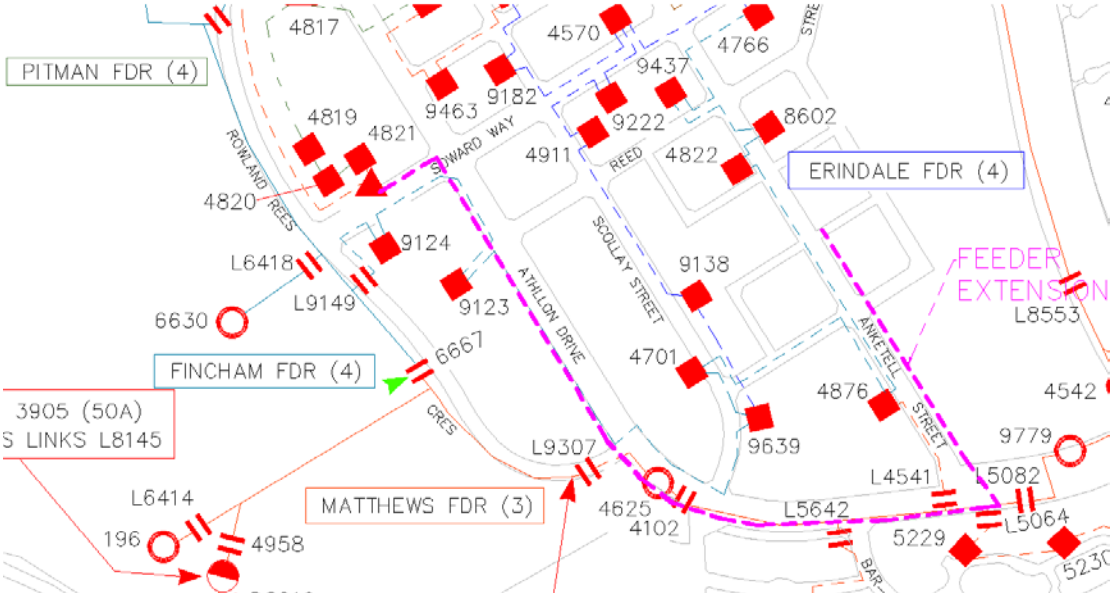
4.1.2 Cost – No trenching

Item	Units (km)	Rate $/m	Total
Civil Works Trench	0.5	[redacted]	[redacted]
Civil Works Bore	0.5	[redacted]	[redacted]
Electrical Works	2	[redacted]	[redacted]
Cable	2	[redacted]	[redacted]
HV Switchgear	2	[redacted]	[redacted]
Additional Conduit	1	[redacted]	[redacted]
Other Materials		[redacted]	[redacted]
Office Labour		[redacted]	[redacted]
Total (±20%)		[redacted]	[redacted]

4.2 Option 2 - Pitman and Rowland Feeders Alternative Cable Route

4.2.1 Description

This option also uses the Pitman and Rowland feeders to supply the new development; however it proposes a different route for the cable extension. The diagram below shows an alternative cable route which goes around, rather than through, the town centre.



The feeder extension cable route in the above diagram is calculated to be 1.9km in total. Because this cable route does not go through the town centre, it is possible to install the conduit using the trenching method.

4.2.2 Cost

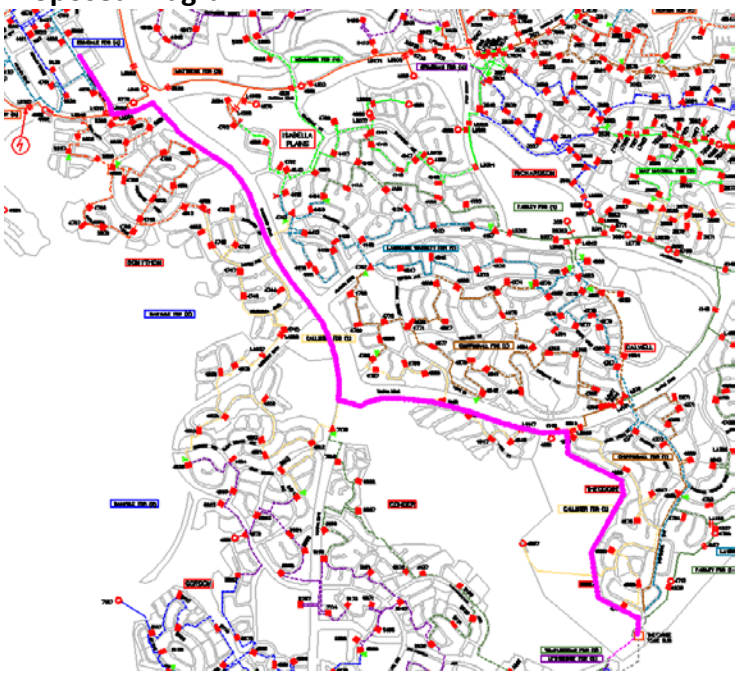
Item	Units (km)	Rate $/m	Total
Civil Works Trench	0.9	[redacted]	[redacted]
Civil Works Bore	1	[redacted]	[redacted]
Electrical Works	3.8	[redacted]	[redacted]
Cable	3.8	[redacted]	[redacted]
HV Switchgear	2	[redacted]	[redacted]
Additional Conduit	1.9	[redacted]	[redacted]
Other Materials		[redacted]	[redacted]
Office Labour		[redacted]	[redacted]
Total (±20%)		[redacted]	[redacted]

4.3 Option 3 - Supply from Theodore ZS

4.3.1 Description

Theodore Zone Substation currently has two spare 11kV breakers and a spare capacity of at least 15MVA. The cable route is approximately 7.2km in length. It originates at Theodore Z/S and ends at the proposed development in the Tuggeranong Town Centre. It will be possible to install the majority of this cable route using the trenching method but boring must be used under road ways and near significant trees. The new feeder shall be 3c HV 300mm² Al XLPE installed in 125mmØ conduit.

Proposed Diagram



4.3.2 Cost – No trenching

Item	Units (km)	Rate $/m	Total
Civil Works Trench	5	[redacted]	[redacted]
Civil Works Bore	2.2	[redacted]	[redacted]
Electrical Works	7.2	[redacted]	[redacted]
Cable	7.2	[redacted]	[redacted]
Additional Conduit	0	[redacted]	[redacted]
Other Materials		[redacted]	[redacted]
Office Labour		[redacted]	[redacted]
Total (±20%)		[redacted]	[redacted]

4.4 Option 4 – Supply from Wanniassa ZS

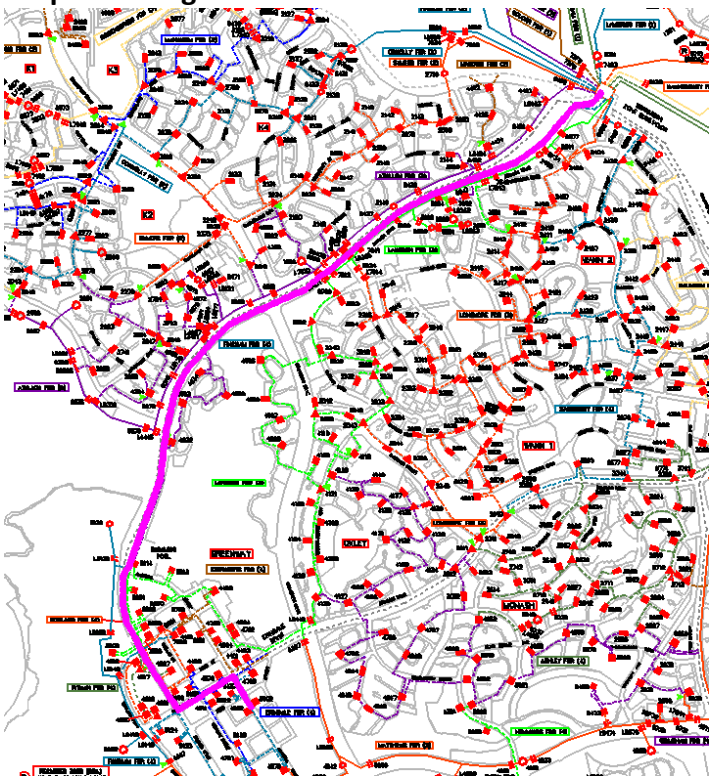
4.4.1 Description

This option explores the possibilities of installing a new feeder from Wanniassa Zone Substation to the Tuggeranong Town Centre. The proposed cable route in the above diagram is approximately 6.3km in length.

Although the Wanniassa ZS does not currently have spare 11kV circuit breakers at the zone, additional breakers may be installed in the future. Wanniassa Z/S currently has spare capacity of at least 15MVA.

To reduce the cost of this solution, the proposal is to double up the new feeder on to the existing circuit breaker at the Wanniassa Zone Substation.

Proposed Diagram



4.4.2 Cost

Item	Units (km)	Rate $/m	Total
Civil Works Trench	4.3	[redacted]	[redacted]
Civil Works Bore	2	[redacted]	[redacted]
Electrical Works	6.3	[redacted]	[redacted]
Cable	6.3	[redacted]	[redacted]
Other Materials		[redacted]	[redacted]
Office Labour		[redacted]	[redacted]
Total (±20%)			[redacted]

5 Comparison of Options

Strategy	Options Considered	Spare Capacity & Cost
Short Term Supply – Limited Growth Option	**Option 1** Feed via the Pitman and Rowland feeders; Extension of underground feeders via underground conduits traversing across the town centre (cable length ~2km) and overground switching station on both feeders.	Minimum development load - 1.5MVA committed load. Max. available capacity: 2.57MVA Cost **$923,250**
	Option 2 Feeder extension via the Pitman and Rowland feeders taking an alternative cable route (not traversing the town centre; cable installed via trenching method of 3.6km in length).	Minimum development load - 1.5MVA committed load. Max. available capacity: 2.57MVA Cost **$1,660,550**
Flexibility for Medium Term Growth	**Option 3** Establish a new feeder of length 7.2km from one of four spare feeder bays at Theodore zone substation.	Max. available capacity: 15MVA (ZS); ~5.5MVA (feeder) Cost **$3,055,800**
	Option 4 Establish a feeder of length 6.3km from Wanniassa Zone Substation.	Max. available capacity: 15MVA (ZS); ~5.5MVA (feeder) Cost **$2,686,200**

6 Recommended Option

The committed capacity for the developments is 2.57MVA, however this is expected to grow by conservative estimates to 5.43MVA, therefore the spare capacity in the network available for development is an important criteria.

This report offers 4 viable options to supply the new development in the Tuggeranong town centre, however broadly speaking there are two options, one offering limited growth option and the other providing medium term growth capacity

I. Inexpensive options (1 and 2) that allows for limited growth up to 2.57MVA, of which 60% is committed load, therefore does not provide for capacity expansion beyond year 2.

II. Relatively more expensive options (3 and 4) that allow for medium term growth requiring the establishment of longer feeders.

Limited Growth Options (options 1 &2)
The cable options fed from the Pitman and Rowland feeders are similar in cost, and the spare capacity is identical. The difference between the two options is in the ease of implementation and practicality. The cables route in [11]option 1 traverses the town centre and requires conduits whereas option 2 is a longer but is a more accessible cable route which avoids the town centre, and allows cable installation by trenching.

Of the limited growth options, option 2 is chosen as the preferred solution.

Options providing Flexibility for Medium Term Growth (options 3&4)
There are three 11kV zones (Wanniassa, Theodore and [12]Gilmore) substations in southern Canberra city that are almost equidistant from Tuggeranong town centre and lake development. While all are possible sources of supply, the ease of implementation and costs are the factors that will determine the choice amongst these three options.

The options from Wanniassa and Theodore zone substations require 6.2km and 7.2km of underground line to be established, respectively. These options allow for flexibility in development to accommodate load growth.

Of the options providing flexibility for medium term growth, option 4, from Wanniassa ZS is the preferred solution.

Recommended Option

The following NPV calculation compares the preferred option for medium term growth (option 4) with the staged implementation of the low cost solution (option 2).
The NPV of implementing option 4 in 2015/16 is lower than both the "staggered" Option 2 solution, or the Option 2 solution , followed by option 4 in 2018/19.

Preferred Solutions	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**NPV** (8% discount rate)
Option 2 (staggered solution to meet 7.1MVA)	$ 1,660,550	-	$ 1,660,550	-	**$ 2,644,208**
Option 4	$ 2,686,200	-	-	-	**$ 2,302,984**
Option 2	$ 1,660,550			$2,686,200	**$ 3,398,091**

[11] The cost associated with the approvals and planning difficulty in undergrounding through the town centre has not been included in the costs.
[12] Connection from Gilmore ZS is not considered because this option will be identical to Theodore in costs as the distances (7.1km) to Theodore or Gilmore are identical.

followed by **option 4 in 2018/19**					

On this basis, the augmentation from Wanniassa Z/S is assessed to be **prudent** to meet the high confidence load projection for a development that has commenced construction. Investment in a short term solution is not considered prudent as it is likely to require further investment within 2-3 years.

Timing

ActewAGL has confidence in the timing of the 'Greenway' development project as construction has commenced and expects that augmentation in 2016/17 – 2017/18 will meet the load uptake. The timing will be refined based on discussions with the developers over the next 6months.

7 References and Supporting Documents

1. Dec 2012 Zone Reports
2. Dec 2013 Zone Load Forecasts
3. 2014 STIPS
4. Tuggeranong town centre master plan – 30 Sep 2012 source:http://www.actpla.act.gov.au
5. Indicative Land Release Programs – 2013/14 – 2016/17 – ACT Govt Economic Development
6. Maximum Demand Estimates for Residential, Commercial and Industrial Installations – V3. Networks Division, W Cleland, 30th December 2010
7. Underground Residential Distribution Design Manual-v6, Asset Management Division – 6 June 2013.
8. Network Reconfiguration Request – Tuggeranong Development (Anketell St.) load transfer from Fincham – Z Tokaji, 2014.