countryenergy

TransGrid

PROJECT SPECIFICATION CONSULTATION REPORT

DEVELOPMENT OF ELECTRICITY SUPPLY TO THE GUNNEDAH / NARRABRI / MOREE AREA

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Executive Summary

TransGrid's 132 kV network linking Tamworth and Armidale 330/132 kV substations provides supply to Country Energy at, inter alia, Gunnedah, Narrabri and Moree. The capacity of that network is expected to be reached by Summer 2010/11. Consequently there is a need to consult on options to relieve the limitations within that network.

This Report has been prepared to provide a basis for TransGrid and Country Energy to consult with AEMO, registered participants and interested parties to identify options for the development of electricity supply to the Gunnedah/Narrabri/Moree area of New South Wales that will be included in an application of the Australian Energy Regulator's Regulatory Investment Test for Transmission (RIT-T).

Section 1 provides the context of this Report within the regulatory process. It is proposed to allow interested parties to make submissions and provide other feedback in the period to 3rd June 2011. A Project Assessment Draft Report which will include a preliminary decision on the preferred option is envisaged to be published in the period to mid to late 2011.

Section 2 describes the existing supply arrangements and nature of the load in the Gunnedah/Narrabri/ Moree area and the network limitations that give rise to the identified need. The agreed network performance requirements (planning criterion) against which the need and effectiveness of augmentation options are assessed are also described as are four possible load scenarios.

Section 3 describes the performance which would be required of non-network or market network service options.

In Section 4 two credible options, each involving construction of an additional 132 kV line between Tamworth and Gunnedah, are described. A number of other network developments that were considered but not put forward as credible options are also described.

Section 5 discusses which market benefits are, or may be, material to the assessment of the credible options under the RIT-T.

Section 6 provides contact details for provision of written submissions on this Report.

1. Introduction

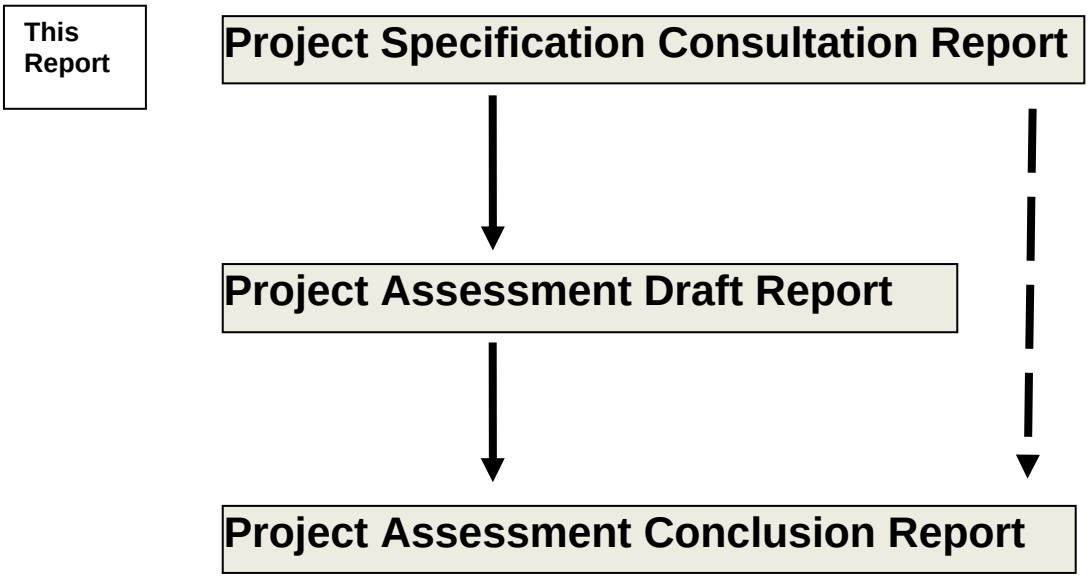
1.1. Background

This Project Specification Consultation Report (Report) has been prepared by TransGrid and Country Energy in accordance with the requirements of clause 5.6.6 of the National Electricity Rules (NER) and the Australian Energy Regulator's (AER) guidelines for application of the RIT-T.

This Report represents the first stage of the consultation process in relation to the application of the RIT-T to the development of supply to the Gunnedah/Narrabri/Moree area.

Figure 1 shows the consultation documents required under the RIT-T process. In some circumstances, the transmission business can claim exemption from producing the Project Assessment Draft Report. However in this current case the requirements for claiming exemption are not met.

Figure 1 Consultation Documents under the RIT-T Process



1.2. Purpose and Scope

TransGrid owns the majority of the transmission network within NSW and is responsible inter alia for planning and developing its network to meet the requirements of customers within the state and to facilitate operation of the National Electricity Market (NEM). As part of its planning responsibilities and the requirements of the NER TransGrid consults with NEM registered participants, AEMO and interested parties on emerging limitations within its transmission network and options being considered to relieve them.

Country Energy owns the subtransmission and distribution networks in the Gunnedah/Narrabri/Moree area and is responsible for planning and developing those networks.

TransGrid and Country Energy have responsibilities under the NER to carry out joint planning to facilitate the optimal development of connections between the transmission and distribution networks within Country Energy's network area.

This Report has been prepared in accordance with Clause 5.6.6 (c) of the NER. It relates to a proposal for a new transmission asset that will address emerging limitations in the transmission network supplying the Gunnedah/Narrabri/Moree area. The investment would therefore be classed as a reliability corrective action under the NER.

In accordance with the requirements in NER clause 5.6.6(c) this Report:

- Describes the identified need which TransGrid and Country Energy are seeking to address, together with the assumptions used in identifying that need, including:

  - A summary of the load forecast for the area;
  - A description of the network reliability criterion used for planning purposes;
  - A description of transmission network limitations identified by TransGrid and Country Energy that have led to the necessity for reliability corrective action in the transmission network supplying the Gunnedah/Narrabri/Moree area;
- Sets out the technical characteristics that a non-network or market network service option would be required to deliver in order to address the identified need;
- Describes the known credible options that TransGrid and Country Energy currently consider may address the identified need, including for each:
  - Its technical characteristics;
  - Whether it is likely to have a material inter-regional impact[1];
  - The classes of market benefits that are not likely to be material; and
  - The construction timetable and, to the extent possible, indicative costs; and
- An invitation to NEM registered participants, AEMO and interested parties to make submissions on this Report.

These requirements are underpinned by Clause 5.6.2 (c) of the NER which requires that the necessity for an augmentation to the transmission system or a non-network alternative should be identified by network service providers.

1.3. Outline of Consultation Process

TransGrid has published a description of limitations affecting the transmission network supplying the Gunnedah/Narrabri/Moree area in its Annual Planning Reports (APRs) from 2005 onwards.

This Report commences the formal RIT-T consultation process.

A summary of this Report has been published on AEMO's website. In accordance with Clause 5.6.6 of the NER it is intended to proceed with further consultation on this new transmission asset proposal as follows:

- Registered participants, AEMO and interested parties have until 3rd June 2011 to provide written submissions in respect of this proposal - refer to Section 6 for contact details.
- The NER provides for a further period of up to 12 months for the consideration of submissions and the preparation and publication of a Project Assessment Draft Report which is to, inter alia, identify the preferred option.
- Following a further consultation period of at least six weeks a Project Assessment Conclusions Report is to be published.

The Project Assessment Draft Report for this consultation is envisaged to be published in the period to mid to late 2011.

[1] The term "material *inter-regional impact*" is not defined in the NER. TransGrid and Country Energy take this to be "*material inter-network impact*".

2. Identified Need

2.1. Description of Identified Needs

TransGrid and Country Energy have identified that likely spot-load increases in the Gunnedah-Narrabri-Moree area together with recently identified issues with the conductors of one of the 132 kV lines supplying the area (the 969 Tamworth – Gunnedah line[2]) means that the mandated network performance requirements are at risk of not being met from summer 2010/11[3].

The objective need is to satisfy the requirements of schedule 5.1 of the NER along with the jurisdictional reliability requirements for the load forecast as set out in section 2.5 of this report.

The identified need is based on a full N-1 criterion[4] assuming that flows on QNI are at a level representative of maximum exports at times of high area load[5]. Under this criterion, the capacity of the network supplying this area is limited by the summer day rating of the 969 Tamworth – Gunnedah 132 kV line on outage of the 968 Tamworth – Narrabri 132 kV line.

2.2. Jurisdictional Requirements – Reliability Criterion

As stated in its Annual Planning Report, TransGrid is expected by the NSW jurisdiction to plan and develop its transmission network on an "N-1" basis. That is, unless specifically agreed otherwise by TransGrid and the affected distribution network owner or major directly connected end-use customer, there will be no inadvertent loss of load (other than load which is interruptible or dispatchable) following an outage of a single element (a line or a cable) or transformer, during periods of forecast high load.

These requirements are underpinned by mandatory licence conditions for New South Wales Distribution Network Service Providers. The licence conditions for Country Energy specify N-1, one minute reliability levels for subtransmission lines and zone substations supplying loads greater than or equal to 15 MVA in urban and non-urban areas. Consequently Country Energy has requested TransGrid to incorporate N-1 reliability levels into its planning standards and processes.

In accordance with these principles TransGrid and Country Energy have jointly agreed that the network performance requirements for reliability to be applied to the Gunnedah-Narrabri-Moree area are as follows:

1. With all network elements in service the loading on each element is not to exceed the normal rating of that element and the voltage levels at end-user premises are to be within acceptable levels.
2. Following outage of one network element the loading on each remaining element is not to exceed the short time emergency rating of that element whilst operator actions, such as opening of other network elements and transferring of loads via lower voltage networks, are taking place.
3. With one network element out of service and following operator actions:
    - The loading on each remaining element is not to exceed the contingency rating of that element;
    - The voltage levels at end-user premises are to be within acceptable levels following switching of reactive plant and operation of transformer tap-changers. This requires that voltages at the low voltage busbars of TransGrid substations at Gunnedah, Narrabri and Moree do not fall below 105% of nominal.

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2 969 line was constructed in the early/mid 1960s as a Tamworth – Narrabri line. It has Emu conductors which are unusual in that they have only a single layer of aluminium strands surrounding the steel core. When Gunnedah 132/66 kV substation was established in 1985 the original 969 Tamworth - Narrabri line became the present 969 Tamworth – Gunnedah and 9U3 Gunnedah – Narrabri lines. These are the only lines in TransGrid's network which have Emu conductors. A recent review of the rating of 969 line revealed that, due to the unusual nature of its Emu conductors, its rating is less than previously believed (as is the rating of 9U3 line).

3 The imminent onset of this limitation results from the issues with the Emu conductor referred to in footnote 2 and the short lead times of spot load developments relative to those of network or non-network developments, particularly construction of transmission lines. In line with the National Electricity Objective, TransGrid's normal practice in these circumstances is to provide an "opportunity supply" to the new loads in the period before any network or non-network development can be completed.

4 That is with one network element (a transmission line or a transformer) out of service the network is capable of supplying the forecast maximum demands at the various substations in the area (the "full" forecast load).

5 In four of the last five summers there have been exports of around 300 MW to Queensland via QNI at times of high Gunnedah/ Narrabri/Moree area load. Under these conditions, the capacity of the transmission network following a critical contingency at times of high summer load is expected to be exceeded from summer 2010/11.

In terms of network reliability standards as described in the NER this constitutes a "N-1" reliability criterion (as described in NER Schedule S5.1.2.2 (b) (4)).

2.3. Local Supply Arrangements

Gunnedah, Narrabri and Moree 132/66 kV substations are supplied via a 132 kV network some 500 kilometres long between Tamworth and Armidale 330/132 kV substations, as shown in Figure 2.

These three 132 kV substations supply Country Energy's 66 kV and lower voltage networks in the immediate area and areas to the west and north-west. That area covers the local government areas of Brewarrina (part), Gunnedah (part), Moree Plains, Narrabri and Walgett. It has a population of around 45,000.

The 132 kV network parallels the 330 kV network between Tamworth and Armidale. Consequently power flows within the 132 kV network are affected by flows on the main 330 kV network, particularly inter-state flows on QNI[6].

Due to the distances involved, the capacity of TransGrid's network has generally been determined by voltage drop considerations. Consequently, over the years a number of banks of capacitors have been installed to help to manage voltage levels. Table 1 shows the capacitor installations at TransGrid's substations. In addition to these, there are capacitors within Country Energy's networks.

Table 1 Capacitor Installations at TransGrid Substations

Substation	Capacitors Installed
Gunnedah	2 x 6 MVAr 66 kV
Narrabri	1 x 12 MVAr and 1 x 8 MVAr 66 kV 2 x 4 MVAr 11 kV (connected to transformer tertiary windings)
Moree	1 x 12 MVAr 132 kV 2 x 6 MVAr 66 kV

The previous voltage limitations have been overcome by progressive installation of capacitors. The capacity of the 132 kV network supplying Gunnedah, Narrabri and Moree is now limited by line summer day thermal capacities.

There is an existing gas fuelled power station at Wilga Park near Narrabri. It was established in 2004 as a nominal 12 MW station using 1 MW reciprocating engine generators fuelled by a conventional gas field in the area. Difficulties were experienced with the gas supply and in late 2009 a pipeline was established to bring coal seam methane from development wells to fuel the station. The station presently has four 1 MW and one 3 MW units[7] and there is a proposal to expand to a total capacity of 40 MW by progressively adding additional 3 MW units. At this stage the use of coal seam methane is being trialled and it is not certain if or when an expansion may occur.

There is also a 6 MW hydro generator at Keepit dam (near Gunnedah). Keepit dam primarily provides water for irrigation and the generator operates when water is being released. As there is no guarantee that there will be water available for irrigation or that the timing of irrigation releases would align with times of high area demand for electricity, the Keepit generator cannot be relied upon to reduce the loading on TransGrid's 132 kV network.

Tamworth 132/66 kV substation was established in 1961 and options to refurbish or replace it are presently being investigated. Gunnedah 132/66 kV substation was established in 1985 and, apart from some control and protection systems, no major asset replacements are expected to be required in the short to medium term.

A section of the existing 969 line near Tamworth was recently realigned. During that project, it was converted to a double circuit to provide an additional outlet from the Tamworth area.

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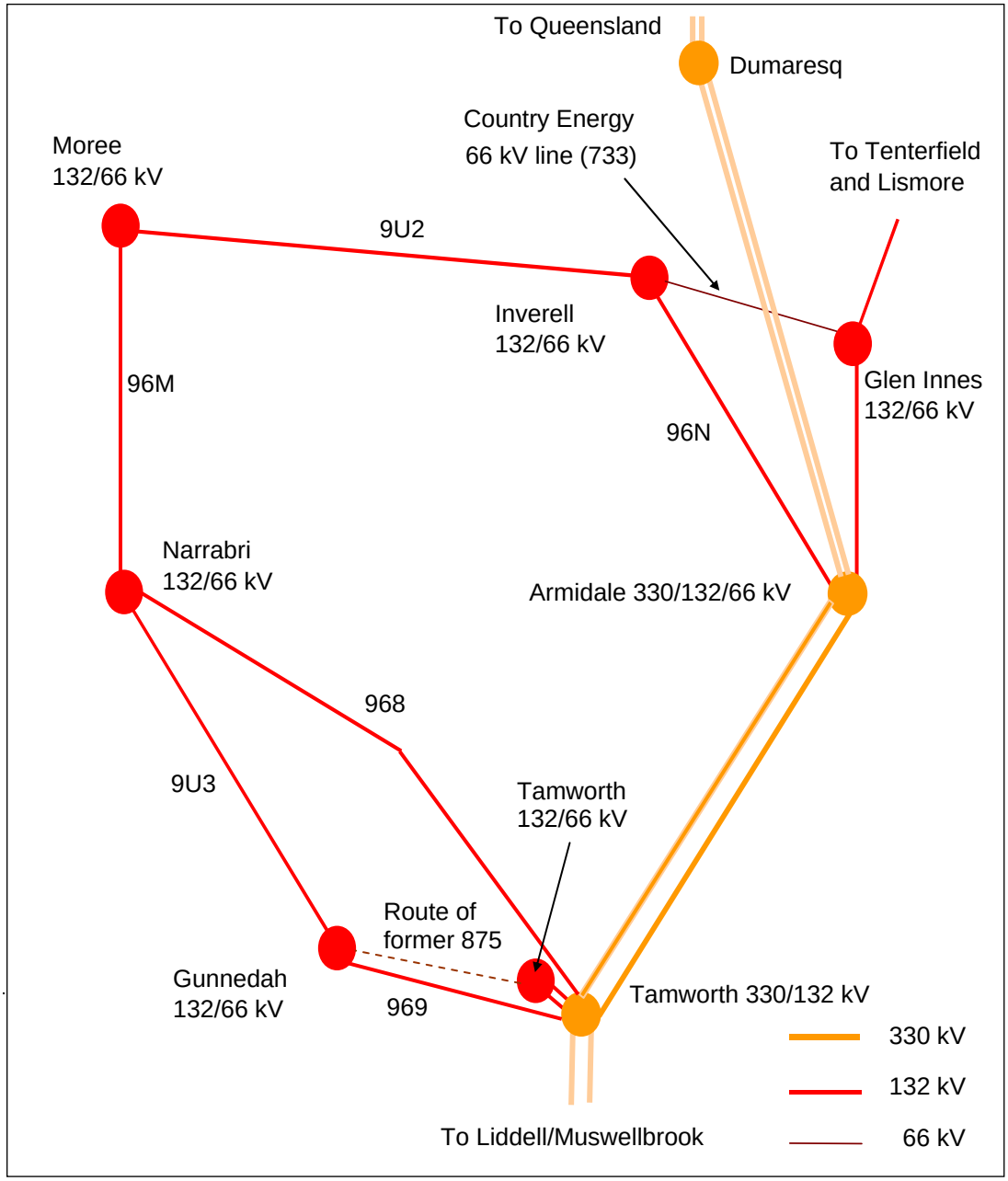
[6] Effectively, some of the inter-state flows pass through the 132 kV network, adding to or reducing (depending on the direction of the inter-state flows) the flows associated with supplying the 132 kV substations within that network. For example, flows from NSW to Queensland increase flows in the 132 kV lines from Tamworth to Gunnedah and Narrabri (including on 969 line) and reduce flows in the 132 kV lines from Armidale to Inverell and onwards to Moree.

[7] Some of the original 1 MW units were removed and (based on information on their website) subsequently a 3 MW unit was installed.

A new 132 kV transmission line between Glen Innes and Inverell is expected to be commissioned in early/mid 2011.

Figure 2 Transmission System Supplying Gunnedah, Narrabri and Moree



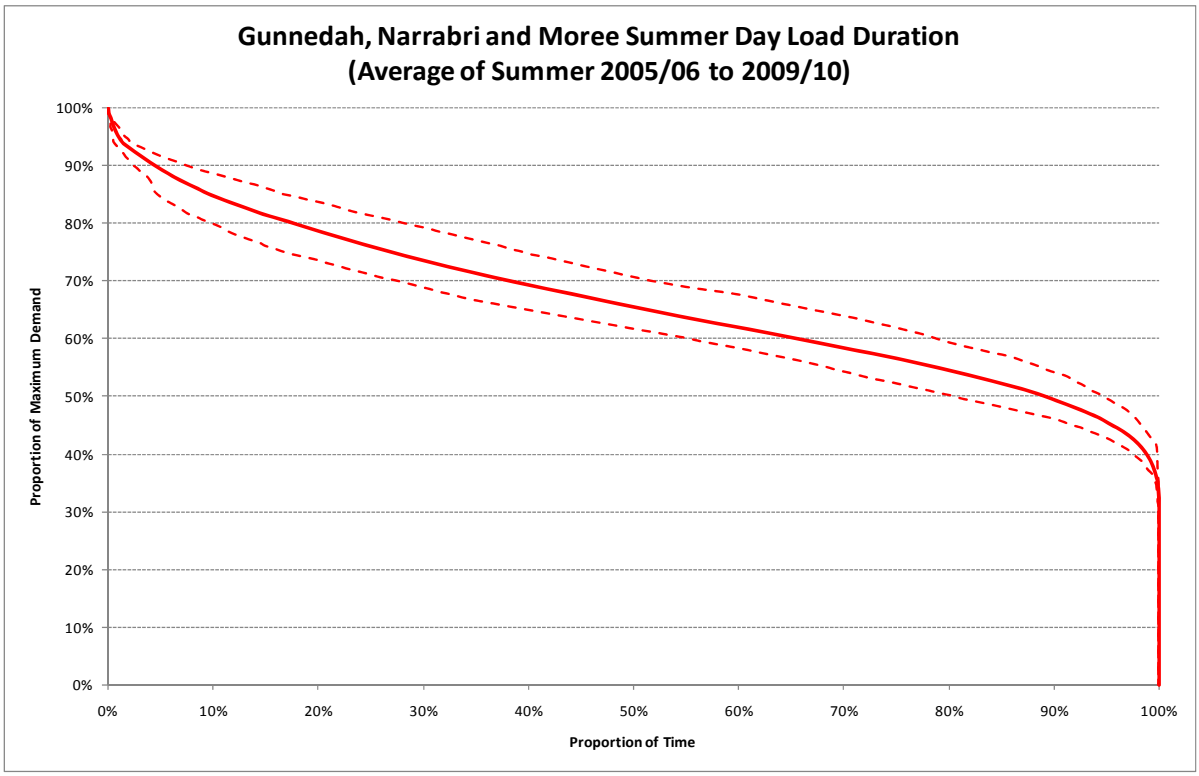
2.4. Nature of the Load

The area electrical load is characterised primarily by rural loads (including water pumping associated with cotton growing), cotton ginning and coal mining in the Gunnedah/Narrabri area, with urban residential and commercial/light industrial loads in the major population centres.

There has been some variation in summer and winter maximum demands over recent years. Figure 3 and Figure 4 show summer day and winter load duration curves. Figure 5 and Figure 6 show the load profile on day of summer and winter maximum demand. All are based on the individual curves for the last five

summers or winters. In each figure, the solid line shows the average for those seasons and the dashed lines the "envelope" within which the individual curves fit[8].

Figure 3 Summer Day Load Duration Curve



8 In more normal circumstances the average curves would provide a reasonable estimate of what could be expected under "typical" conditions in the future. However, in this case where other factors such as the availability of water can have an impact, the "envelopes" have been included to give a broad indication of the variability of the load.

Figure 4 Winter Load Duration Curve

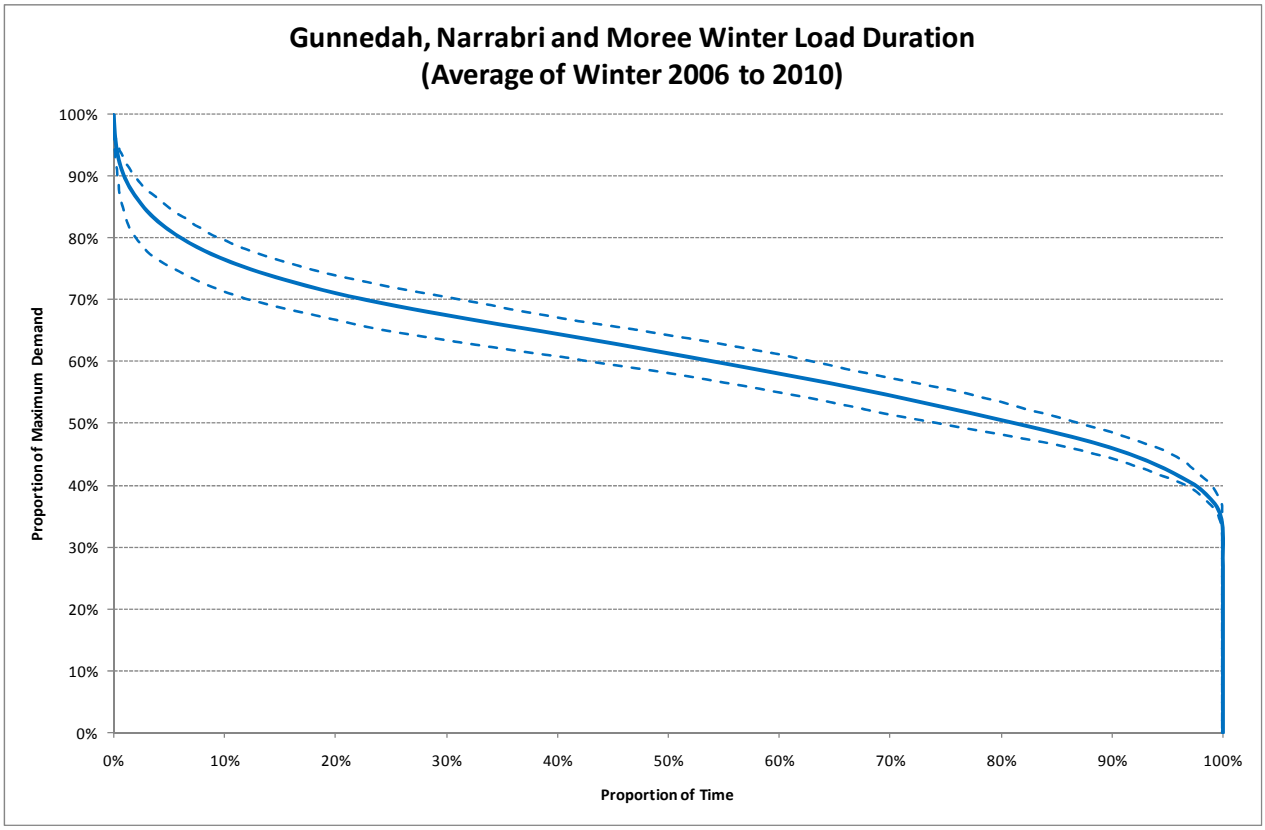


Figure 5 Load Profile on Day of Summer Maximum Demand

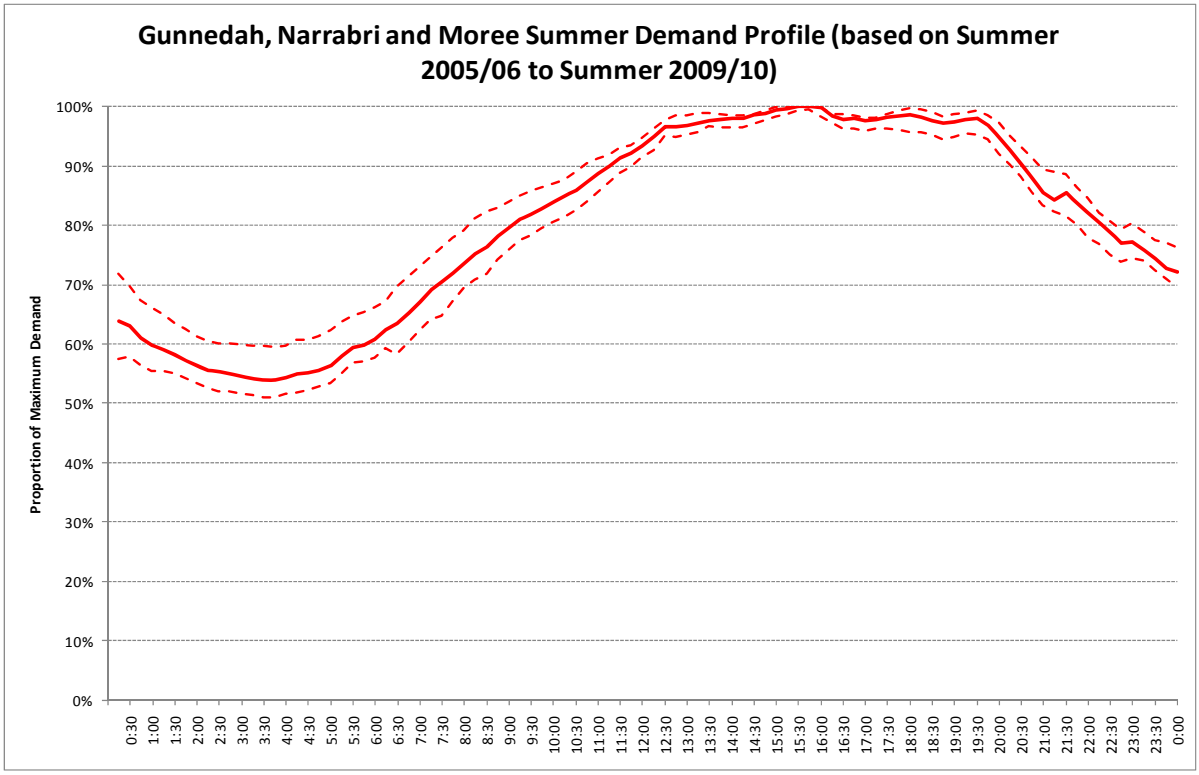
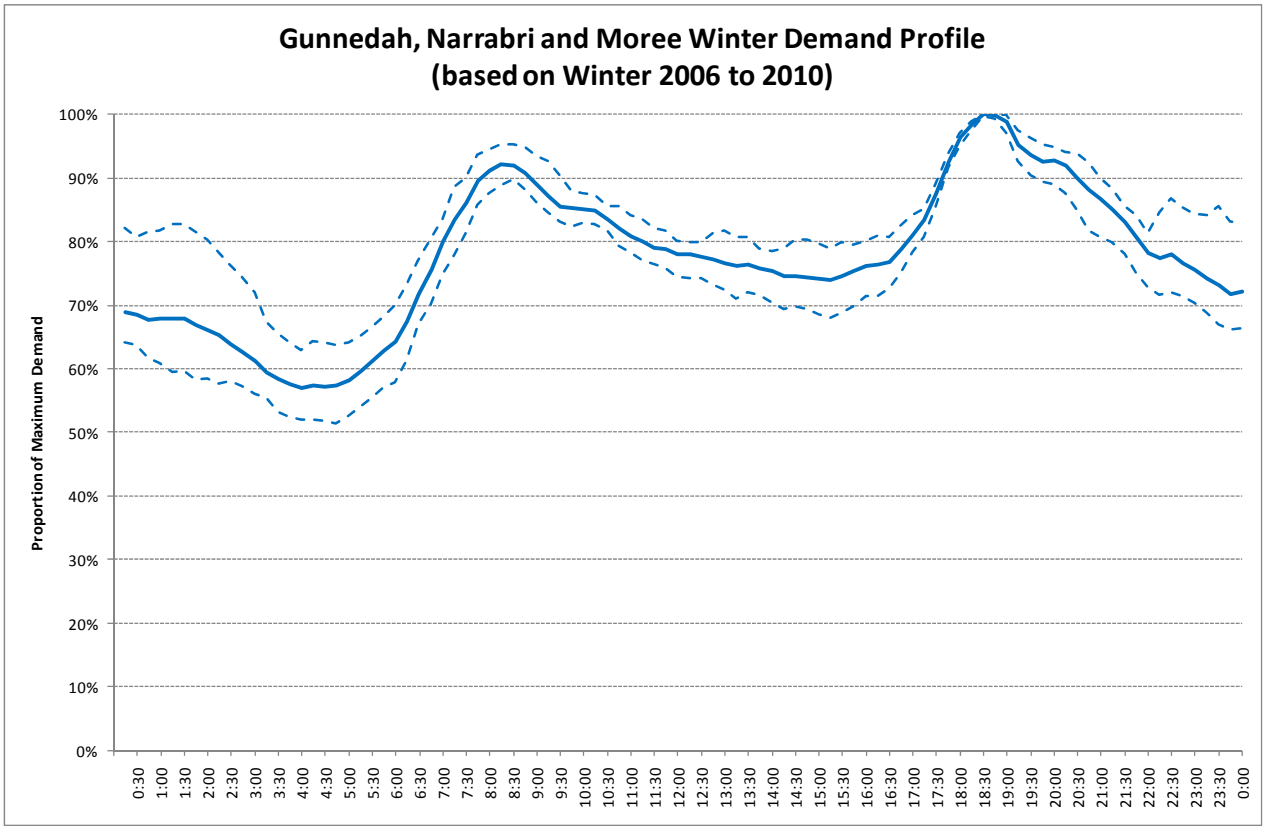


Figure 6 Load Profile on Day of Winter Maximum Demand



2.5. Local Load Forecast

The load supplied from Gunnedah, Narrabri and Moree 132 kV substations[9] has shown modest growth over recent years. However the biggest impact on future demand, and therefore the identified need, is likely to come from spot load increases, rather than the underlying growth in demand.

A recent committed expansion of a mine supplied from Narrabri will result in a "step change" in the area load in summer 2011/12, as shown in the most recent summer and winter forecasts for the area[10] (refer to Table 2 and Table 3). This increase in load has contributed to the identified need occurring within the forecast period. Additional spot load growth would compound this impact on demand.

As a result, the load related scenarios which are most likely to impact on the identified need are those that reflect the establishment of additional "spot loads"[11].

TransGrid is presently progressing Connection Enquiries and Applications to Connect from a number of parties relating to new developments or expansion of existing developments in the area. Under clause 5.3.8 of the NER, these applications are confidential.

At this stage, the timeframe in which these may become committed developments is not clear. Consequently, a broad range of load scenarios, namely none, one, two or three additional "spot loads" proceeding is being considered. However, it is expected that the situation will be clearer by the time that

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9 The load of these three substations is the main factor affecting flows on the 132 kV lines supplying the Gunnedah/Narrabri/Moree area. While the load at Inverell does have an impact, it is much less than that of the Gunnedah, Narrabri and Moree loads. Consequently, forecasts of the loads at Inverell substation have not been included.

10 Each year TransGrid requests (and Country Energy provides) updated forecasts of summer and winter 50% probability of exceedence maximum demands at each supply point to Country Energy for the next ten years. Those forecasts are used in network planning and are published in TransGrid's Annual Planning Reports.

11 Inclusion of low and high economic growth scenarios was considered. However, the variation in area load from the medium economic growth case under these scenarios is considerably less than under scenarios involving "spot loads". Consequently, the low and high economic growth scenarios were not pursued.

the Project Assessment Draft Report is published and that that document will consider a lesser number of load related scenarios.

Each "spot load" has been assumed to be in the Boggabri area (mid way between Gunnedah and Narrabri) and to be supplied from TransGrid's 132 kV network rather than from Country Energy's Boggabri zone substation. The magnitude of the spot load has been taken to be 7 MW, approximately that due to the committed expansion of the mine supplied from Narrabri. They have been assumed to occur prior to winter 2012.

The four scenarios are described in the following sections.

2.5.1. No Additional Spot Loads

Under this scenario, the forecast loads are those published in TransGrid's APR2010. Those forecast summer and winter maximum demands are shown in Table 2 and Table 3 respectively, and include the committed mine expansion discussed above. Excluding the contribution of the committed mine expansion, the forecast growth of maximum demands in both summer and winter is modest (at around 1 MW p.a.).

Table 2 Forecast Summer Maximum Demands (No Spot Loads)

		2010 /11	2011 /12	2012 /13	2013 /14	2014 /15	2015 /16	2016 /17	2017 /18	2018 /19	2019 /20
Gunnedah	MW	26	27	27	28	28	28	29	29	30	31
	MVAr	13	8	8	8	8	8	8	9	9	9
Narrabri	MW	46	56	56	56	57	59	59	60	60	60
	MVAr	15	18	18	18	19	19	19	20	20	20
Moree	MW	26	27	27	27	28	28	28	29	29	29
	MVAr	7	7	7	7	7	7	7	7	7	7
Total	MW	98	110	110	111	113	115	116	118	119	120
Diversified Total	MW	96	108	108	109	111	113	114	116	117	118

Table 3 Forecast Winter Maximum Demands (No Spot Loads)

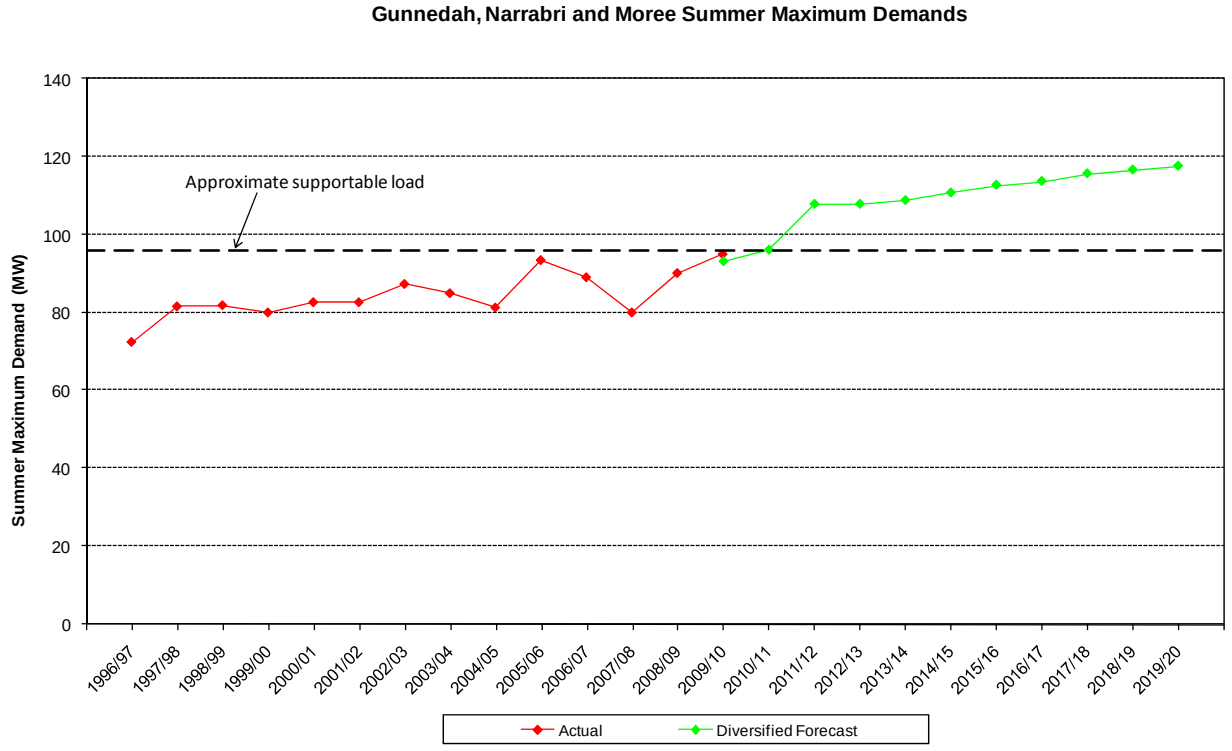
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Gunnedah	MW	26	27	27	27	28	28	28	29	29	29
	MVAr	10	10	7	7	7	7	7	7	7	7
Narrabri	MW	44	47	56	56	56	57	59	59	59	59
	MVAr	14	15	18	19	19	19	19	19	19	19
Moree	MW	34	34	35	35	36	36	36	37	37	38
	MVAr	9	9	9	9	9	9	9	9	9	9
Total	MW	104	108	118	118	120	121	123	125	125	126
Diversified Total	MW	99	103	112	112	114	115	117	119	119	120

Actual and forecast summer and winter maximum demands are shown in Figure 7 and Figure 8. The actual maximum demands reflect variations in a number of factors[12] including weather conditions and local economic activity.

[12] Typically actual loads reflect a number of factors including economic activity and weather conditions. Actual weather conditions vary from year to year and those that occur in any particular year may differ from long term average conditions. Consequently, some of the year to year variation in actual demands would be due to variation in actual weather conditions.

Cotton growing is an important component of the local economy. Its main direct contributions to electrical loads are pumping of water and ginning of the cotton. The magnitude of pumping loads depends on the need for water (for example pumping can be offset by rainfall) and the availability of water to pump (for example when storage levels are low, no or only limited pumping may be possible). Ginning typically commences in mid/late autumn and runs until all of the harvested cotton has been processed. In "good years" all gins will operate and their operation will extend into winter (when there is a possibility that the gins are operating

Figure 7 Actual and Forecast Summer Maximum Demands (No Spot Loads)

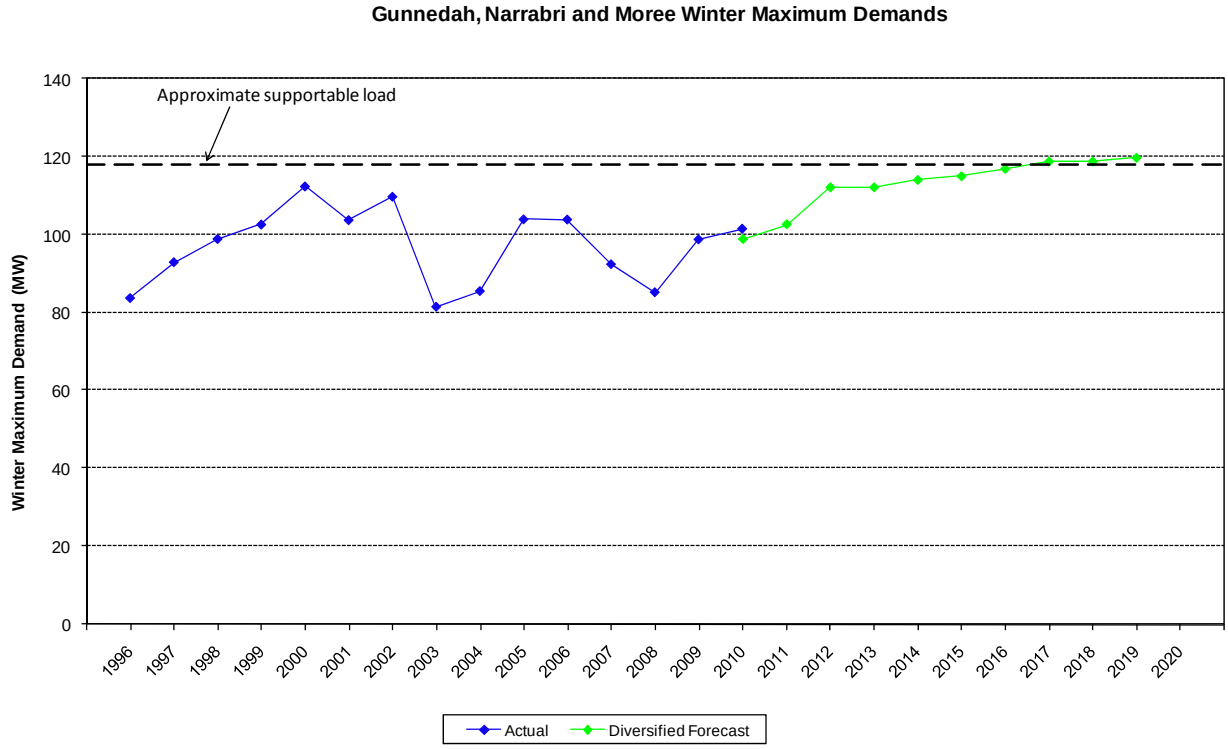


at the time of the winter maximum demand). In “bad years” some gins may not operate and the ginning “season” will be shorter. Water pumping can also sometimes occur during the ginning season, should there be water available at that time.

Also, as the cotton industry is an important component of the local economy, “good” and “bad” seasons can impact on general economic activity in the area which will in turn have an impact on electricity usage.

Consequently, some of the year to year variation in actual demands reflects the impact on the cotton industry of drought and/or low water storage levels.

Figure 8 Actual and Forecast Winter Maximum Demands (No Spot Loads)



2.5.2. With One Additional Spot Load

The forecast summer and winter maximum demands for this scenario are shown in Table 4 and Table 5 respectively.

Table 4 Forecast Summer Maximum Demands (One Additional Spot Load)

		2010 /11	2011 /12	2012 /13	2013 /14	2014 /15	2015 /16	2016 /17	2017 /18	2018 /19	2019 /20
Gunnedah	MW	26	27	27	28	28	28	29	29	30	31
	MVAr	13	8	8	8	8	8	8	9	9	9
Boggabri	MW			7	7	7	7	7	7	7	7
	MVAr			2	2	2	2	2	2	2	2
Narrabri	MW	46	56	56	56	57	59	59	60	60	60
	MVAr	15	18	18	18	19	19	19	20	20	20
Moree	MW	26	27	27	27	28	28	28	29	29	29
	MVAr	7	7	7	7	7	7	7	7	7	7
Total	MW	98	110	117	118	120	122	123	125	126	127
Diversified Total	MW	96	108	115	116	118	120	121	123	123	124

Table 5 Forecast Winter Maximum Demands (One Additional Spot Load)

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Gunnedah	MW	26	27	27	27	28	28	28	29	29	29
	MVAr	10	10	7	7	7	7	7	7	7	7
Boggabri	MW			7	7	7	7	7	7	7	7
	MVAr			2	2	2	2	2	2	2	2
Narrabri	MW	44	47	56	56	56	57	59	59	59	59
	MVAr	14	15	18	19	19	19	19	19	19	19
Moree	MW	34	34	35	35	36	36	36	37	37	38
	MVAr	9	9	9	9	9	9	9	9	9	9
Total	MW	104	108	125	125	127	128	130	132	132	133
Diversified Total	MW	99	103	119	119	121	122	124	125	125	126

2.5.3. With Two Additional Spot Loads

The forecast summer and winter maximum demands for this scenario are shown in Table 6 and Table 7 respectively.

Table 6 Forecast Summer Maximum Demands (Two Additional Spot Loads)

		2010 /11	2011 /12	2012 /13	2013 /14	2014 /15	2015 /16	2016 /17	2017 /18	2018 /19	2019 /20
Gunnedah	MW	26	27	27	28	28	28	29	29	30	31
	MVAr	13	8	8	8	8	8	8	9	9	9
Boggabri	MW			14	14	14	14	14	14	14	14
	MVAr			5	5	5	5	5	5	5	5
Narrabri	MW	46	56	56	56	57	59	59	60	60	60
	MVAr	15	18	18	18	19	19	19	20	20	20
Moree	MW	26	27	27	27	28	28	28	29	29	29
	MVAr	7	7	7	7	7	7	7	7	7	7
Total	MW	98	110	124	125	127	129	130	132	133	134
Diversified Total	MW	96	108	122	123	124	126	127	129	130	131

Table 7 Forecast Winter Maximum Demands (Two Additional Spot Loads)

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Gunnedah	MW	26	27	27	27	28	28	28	29	29	29
	MVAr	10	10	7	7	7	7	7	7	7	7
Boggabri	MW			14	14	14	14	14	14	14	14
	MVAr			5	5	5	5	5	5	5	5
Narrabri	MW	44	47	56	56	56	57	59	59	59	59
	MVAr	14	15	18	19	19	19	19	19	19	19
Moree	MW	34	34	35	35	36	36	36	37	37	38
	MVAr	9	9	9	9	9	9	9	9	9	9
Total	MW	104	108	132	132	134	135	137	139	139	140
Diversified Total	MW	99	103	125	125	127	128	130	132	132	133

2.5.4. With Three Additional Spot Loads

The forecast summer and winter maximum demands for this scenario are shown in Table 8 and Table 9 respectively.

Table 8 Forecast Summer Maximum Demands (Three Additional Spot Loads)

		2010 /11	2011 /12	2012 /13	2013 /14	2014 /15	2015 /16	2016 /17	2017 /18	2018 /19	2019 /20
Gunnedah	MW	26	27	27	28	28	28	29	29	30	31
	MVAr	13	8	8	8	8	8	8	9	9	9
Boggabri	MW			21	21	21	21	21	21	21	21
	MVAr			7	7	7	7	7	7	7	7
Narrabri	MW	46	56	56	56	57	59	59	60	60	60
	MVAr	15	18	18	18	19	19	19	20	20	20
Moree	MW	26	27	27	27	28	28	28	29	29	29
	MVAr	7	7	7	7	7	7	7	7	7	7
Total	MW	98	110	131	132	134	136	137	139	140	141
Diversified Total	MW	96	108	128	129	131	133	134	136	137	138

Table 9 Forecast Winter Maximum Demands (Three Additional Spot Loads)

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Gunnedah	MW	26	27	27	27	28	28	28	29	29	29
	MVAr	10	10	7	7	7	7	7	7	7	7
Boggabri	MW			21	21	21	21	21	21	21	21
	MVAr			7	7	7	7	7	7	7	7
Narrabri	MW	44	47	56	56	56	57	59	59	59	59
	MVAr	14	15	18	19	19	19	19	19	19	19
Moree	MW	34	34	35	35	36	36	36	37	37	38
	MVAr	9	9	9	9	9	9	9	9	9	9
Total	MW	104	108	139	139	141	142	144	146	146	147
Diversified Total	MW	99	103	132	132	134	135	137	139	139	140

2.6. Joint Planning

Country Energy and TransGrid have jointly planned the 132 kV network supplying the Gunnedah/ Narrabri/Moree area for many years.

TransGrid and Country Energy have carried out joint annual planning reviews as required by Clause 5.6.2 (b) of the NER. As required by Clause 5.6.2(c) they have identified that the limitations described in Section 2.1**Error! Reference source not found.** give rise to a need for network augmentations and have carried out joint planning to determine options for these augmentations.

3. Non-Network or Market Network Service Options Performance Requirements

Non-network or market network service options would need to be able to reduce the loading on 969 line to within its thermal rating should the critical contingency occur at times of high area load. This could be achieved by:

1. Pre-emptive loading reductions. This arrangement would involve measures to reduce the load at times when a critical contingency would result in 969 line being overloaded, in anticipation of that outage occurring; and/or
2. Post contingent loading reductions. This arrangement would involve measures to reduce the load should a critical outage occur and 969 line be overloaded. Such reductions would need to occur within a few minutes[13] of the critical contingency occurring. Consequently it is expected that reliable communications and control systems would be needed to enable the necessary load reductions to be initiated automatically.

Proposed services must be capable of reliably meeting electricity demand under a range of conditions and, if a generator, must meet all relevant NER requirements related to grid connection.

TransGrid has obligations, including under the NER, to ensure supply reliability is maintained to customers. Failure to meet these obligations may give rise to liability.

If the proponent of a proposed service wishes to provide network support services to TransGrid as part of meeting TransGrid's reliability obligations, it must also be willing to accept any liability that may arise from its contribution to a reliability of supply failure.

The magnitude and duration of required load reductions would depend on the amount of load in the area at the time at which the critical contingency occurred. The effectiveness of load reductions would depend on where those reductions were effected. Table 10 shows the approximate effectiveness of reductions in the load supplied from each of TransGrid's 132/66 kV substations in the area.

Table 10 Effectiveness of Load Reductions

Substation	Approximate Effectiveness	Comments
Gunnedah	100%	Gunnedah 132/66 kV substation supplies Country Energy substations at Boggabri and Gunnedah.
Narrabri	80%	Narrabri 132/66 kV supplies Country Energy substations at Brewarrina, Burren Junction, Lightning Ridge, Merrywinebone, Narrabri, Walgett and Wee Waa.
Moree	60%	Moree 132/66 kV supplies Country Energy substations at Ashley, Bellata, Moree, Mungindi, Wathagar and Wenna.

Submissions are sought from potential proponents even if they cannot on their own provide the magnitude of demand reductions being sought, as it may be possible to establish a "portfolio" of demand reductions from a number of sources which meets the overall requirements.

The (optimally located) load reductions required under the four load growth scenarios are described in the following sections[14].

[13] When a sudden increase in the load on a transmission line occurs (such as when another line is forced out of service) the temperature of the line conductors (wires) does not change instantaneously. Rather, due to the (small) thermal mass of the conductors, it can take some minutes for the conductor temperature to reach the level associated with the higher loading. This affords the opportunity to allow short term overloads during which the loading on the line can be reduced to or below the long term (contingency) rating of the line. Due to the magnitude of the possible overload and the small size of the Emu conductor, it is anticipated that the load would need to be reduced within a few minutes.

[14] If the load reductions were to be achieved by non-network options which are to be dispatched (eg, generation options), factors such as the sizes of the load reductions delivered by each option and the inability to perfectly forecast the requirements for a particular day would most probably lead to those non-network options being dispatched more often than indicated by the tables.

3.1. No Additional Spot Loads

Information on the magnitude and duration of load reductions required for this load scenario is provided in Table 11 and Table 12.

Table 11 Summer Load Reductions Required (No Spot Loads)

Summer	Load Reduction Required (MW in optimal location)	Total Duration Over Summer (hours)	Number of Days	Duration on a Day (hours)
2010/11	Up to 4	Up to 15	Up to 5	Up to 8
2011/12	Up to 11	Up to 90	Up to 20	Up to 11
2012/13	Up to 12	Up to 115	Up to 20	Up to 11
2013/14	Up to 13	Up to 125	Up to 25	Up to 11
2014/15	Up to 14	Up to 150	Up to 25	Up to 12
2015/16	Up to 16	Up to 190	Up to 30	Up to 12
2016/17	Up to 18	Up to 225	Up to 35	Up to 13
2017/18	Up to 19	Up to 240	Up to 35	Up to 13
2018/19	Up to 20	Up to 265	Up to 49	Up to 14

Table 12 Winter Load Reductions Required (No Spot Loads)

Winter	Load Reduction Required (MW in optimal location)	Total Duration Over Winter (hours)	Number of Days	Duration on a Day (hours) [Note]
2013	Up to 1	Up to 2	Up to 2	Up to 1
2014	Up to 3	Up to 5	Up to 4	Up to 2
2015	Up to 4	Up to 5	Up to 4	Up to 2
2016	Up to 6	Up to 15	Up to 11	Up to 12
2017	Up to 8	Up to 25	Up to 15	Up to 13
2018	Up to 9	Up to 25	Up to 16	Up to 13
2019	Up to 10	Up to 35	Up to 19	Up to 14

Note: This duration is based on the period between when support would first be required and when it would no longer be required on a particular day. There may be periods between these times (such as between the morning and evening peaks) when support may not be required.

3.2. One Additional Spot Load

Information on the magnitude and duration of load reductions required for this load scenario is provided in Table 13 and Table 14.

Table 13 Summer Load Reductions Required (One Additional Spot Load)

Summer	Load Reduction Required (MW in optimal location)	Total Duration Over Summer (hours)	Number of Days	Duration on a Day (hours)
2010/11	Up to 4	Up to 15	Up to 5	Up to 8
2011/12	Up to 11	Up to 90	Up to 20	Up to 11
2012/13	Up to 20	Up to 265	Up to 40	Up to 14
2013/14	Up to 21	Up to 290	Up to 45	Up to 14
2014/15	Up to 23	Up to 335	Up to 50	Up to 15
2015/16	Up to 25	Up to 365	Up to 55	Up to 15
2016/17	Up to 26	Up to 400	Up to 55	Up to 16
2017/18	Up to 28	Up to 430	Up to 60	Up to 16
2018/19	Up to 29	Up to 445	Up to 60	Up to 16

Table 14 Winter Load Reductions Required (One Additional Spot Load)

Winter	Load Reduction Required (MW in optimal location)	Total Duration Over Winter (hours)	Number of Days	Duration on a Day (hours) Note
2012	Up to 7	Up to 15	Up to 15	Up to 12
2013	Up to 8	Up to 25	Up to 15	Up to 13
2014	Up to 9	Up to 25	Up to 15	Up to 13
2015	Up to 10	Up to 35	Up to 20	Up to 14
2016	Up to 12	Up to 50	Up to 25	Up to 14
2017	Up to 14	Up to 70	Up to 30	Up to 14
2018	Up to 15	Up to 75	Up to 30	Up to 14
2019	Up to 16	Up to 95	Up to 35	Up to 15

Note: Refer to the note in Table 12.

3.3. Two Additional Spot Loads

Information on the magnitude and duration of load reductions required for this load scenario is provided in Table 15 and Table 14.

Table 15 Summer Load Reductions Required (Two Additional Spot Loads)

Summer	Load Reduction Required (MW in optimal location)	Total Duration Over Summer (hours)	Number of Days	Duration on a Day (hours)
2010/11	Up to 4	Up to 15	Up to 5	Up to 8
2011/12	Up to 11	Up to 90	Up to 20	Up to 11
2012/13	Up to 26	Up to 385	Up to 55	Up to 15
2013/14	Up to 27	Up to 415	Up to 55	Up to 16
2014/15	Up to 29	Up to 445	Up to 60	Up to 16
2015/16	Up to 31	Up to 485	Up to 60	Up to 17
2016/17	Up to 32	Up to 495	Up to 60	Up to 17
2017/18	Up to 35	Up to 550	Up to 65	Up to 17
2018/19	Up to 36	Up to 570	Up to 65	Up to 17

Table 16 Winter Load Reductions Required (Two Additional Spot Loads)

Winter	Load Reduction Required (MW in optimal location)	Total Duration Over Winter (hours)	Number of Days	Duration on a Day (hours) Note
2012	Up to 13	Up to 55	Up to 30	Up to 14
2013	Up to 14	Up to 70	Up to 30	Up to 14
2014	Up to 15	Up to 75	Up to 30	Up to 14
2015	Up to 17	Up to 95	Up to 35	Up to 15
2016	Up to 19	Up to 125	Up to 45	Up to 16
2017	Up to 20	Up to 145	Up to 50	Up to 17
2018	Up to 21	Up to 155	Up to 50	Up to 17
2019	Up to 22	Up to 180	Up to 55	Up to 17

Note: Refer to the note in Table 12.

3.4. Three Additional Spot Loads

Information on the magnitude and duration of load reductions required for this load scenario is provided in Table 17 and Table 18.

Table 17 Summer Load Reductions Required (Three Additional Spot Loads)

Summer	Load Reduction Required (MW in optimal location)	Total Duration Over Summer (hours)	Number of Days	Duration on a Day (hours)
2010/11	Up to 4	Up to 15	Up to 5	Up to 8
2011/12	Up to 11	Up to 90	Up to 20	Up to 11
2012/13	Up to 33	Up to 550	Up to 65	Up to 17
2013/14	Up to 34	Up to 570	Up to 65	Up to 17
2014/15	Up to 36	Up to 600	Up to 70	Up to 18
2015/16	Up to 38	Up to 645	Up to 75	Up to 18
2016/17	Up to 40	Up to 690	Up to 75	Up to 18
2017/18	Up to 42	Up to 735	Up to 75	Up to 19
2018/19	Up to 43	Up to 755	Up to 80	Up to 19

Table 18 Winter Load Reductions Required (Three Additional Spot Loads)

Winter	Load Reduction Required (MW in optimal location)	Total Duration Over Winter (hours)	Number of Days	Duration on a Day (hours) Note
2012	Up to 19	Up to 125	Up to 45	Up to 16
2013	Up to 20	Up to 145	Up to 50	Up to 17
2014	Up to 22	Up to 165	Up to 50	Up to 17
2015	Up to 23	Up to 195	Up to 55	Up to 17
2016	Up to 25	Up to 215	Up to 60	Up to 19
2017	Up to 27	Up to 245	Up to 65	Up to 19
2018	Up to 28	Up to 275	Up to 75	Up to 20
2019	Up to 29	Up to 300	Up to 75	Up to 20

Note: Refer to the note in Table 12.

4. Credible Options

Clause 5.6.6 (c)(5) of the Rules requires the Project Specification Consultation Report to include "… a description of all credible options of which the Transmission Network Service Provider is aware that address the identified need…".

Credible options must be commercially and technically feasible.

This section covers the known credible options considered, possible non-network options (the details of which are presently not known) and other options which TransGrid considered but has decided not to pursue, for the reasons given.

4.1. Requirements of the Energy Services Corporations Act

In addition to the requirements of the NER, TransGrid is also subject to obligations under its enabling legislation, the Energy Services Corporation Act 1995. Section 6B of the Act sets out the five principal objectives which in summary are:

1. To be a successful business. This includes:
    a. To operate at least as efficiently as any comparable business;
    b. To maximise the net worth of the State's investment in it;
    c. To exhibit a sense of social responsibility by having regard to the interest of the community in which it operates;
2. To protect the environment by conducting its operations in compliance with the principles of ecologically sustainable development;
3. To exhibit a sense of responsibility to regional development;
4. To operate efficient, safe and reliable facilities; and
5. To promote effective access.

It is important to note that the Act explicitly identifies that each of these objectives is of equal value, and thus a balanced approach must be taken in decision making to reflect this obligation. In particular it is worth noting that efficiency is not superior to the environment or the community.

When developing options to overcome actual or potential network constraints, TransGrid initially assesses possible options to see whether they are technically and commercially feasible, taking into account the above requirements and then applies the RIT-T to those which satisfy them.

Possible options which were considered but not pursued are described in Section 4.5.

4.2. Other Relevant Considerations

To be consistent with the National Electricity Objective, credible options should be compatible with developments to meet other future requirements. In this case, the possible replacement of 969 and 9U3 lines and the replacement of Tamworth 132/66 kV substation should also be considered.

4.2.1. Possible Replacement of 969 and 9U3 Lines

The 969 line was constructed in the early/mid 1960s as a Tamworth – Narrabri line. When Gunnedah 132/66 kV substation was established in 1985 it was "looped" into the original 969 line to form the present 969 Tamworth – Gunnedah and 9U3 Gunnedah – Narrabri circuits. While the need to replace 969 line and 9U3 line is not imminent, it is important that, if possible, other developments in the area facilitate their replacement when that is eventually required.

TransGrid is aware that this is a replacement project and thus is not required to be covered by a RIT-T application. However, this work cannot be disregarded when considering the limitations imposed by the capacity of 969 line.

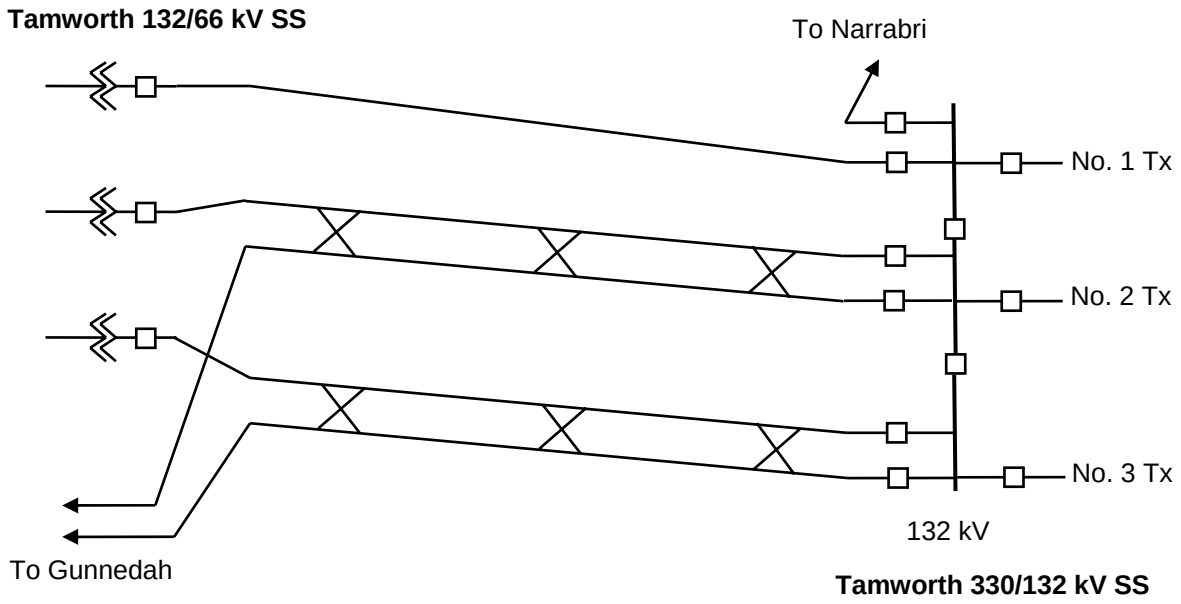
4.2.2. Replacement of Tamworth 132/66 kV Substation

Tamworth 132/66 kV substation was established in 1961 and options to refurbish or replace it are presently being investigated. At this stage the most likely development would be to replace the substation by one which does not have a 132 kV busbar. The three 132/66 kV transformers would be "tail-ended" to 132 kV circuits from Tamworth 330/132 kV substation as shown in Figure 9.

Such a development would require an additional 132 kV circuit between Tamworth 330/132 kV substation and Tamworth 132/66 kV substation. It would also be necessary to arrange the 132 kV circuit connections at Tamworth 330/132 kV substation to provide segregation between circuits supplying the same area[15].

TransGrid is aware that this is a replacement project component and thus not required to be covered by a RIT-T application. However, this work cannot be disregarded when considering the limitations imposed by the capacity of 969 line.

Figure 9 Possible 132 kV Connections Following Tamworth 132/66 kV Substation Works



4.3. Known Credible Options

Credible options must, inter alia, address the identified need. In this case that entails providing sufficient capacity or network support to enable the forecast maximum demands to be supplied should one network element be out of service.

Two credible options have been identified. Both involve construction of an additional 132 kV line between the Tamworth area and Gunnedah. The difference between them is that in one, the new line would initially operate at 66 kV.

4.3.1. Second Tamworth – Gunnedah 132 kV Circuit

TransGrid would be the proponent of this option, which is shown in diagrammatic form in Figure 10.

Technical Characteristics

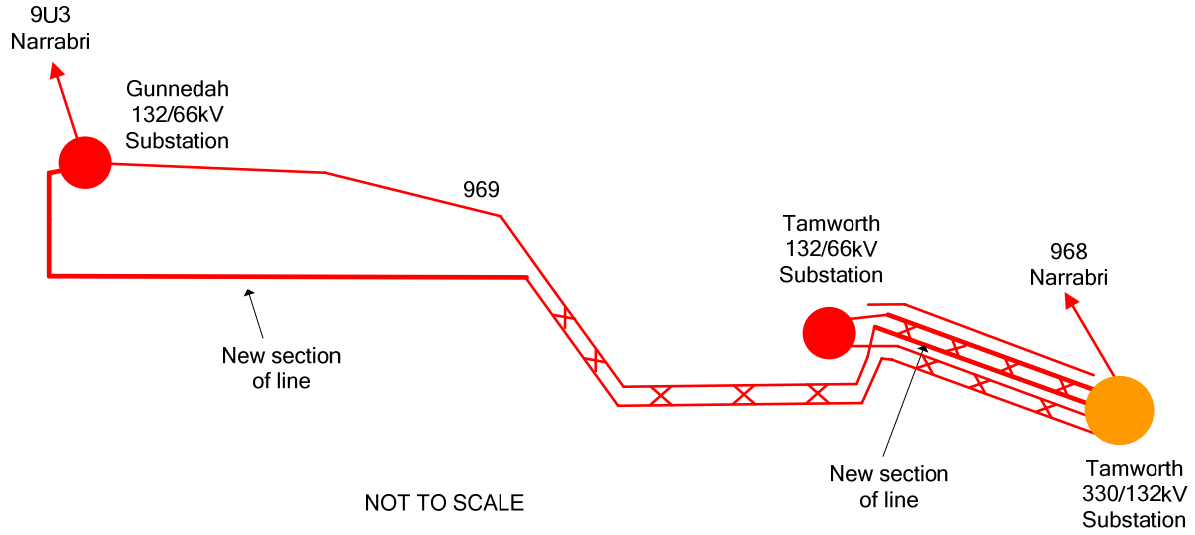
This option would involve:

- Construction of a section of single circuit 132 kV line approximately 51 km long between the end of the double circuit section of 969 line (approximately 14 km west of Tamworth) and Gunnedah. That line would have Nitrogen conductors designed for a maximum operating temperature of 85 ^{O}C and be equipped with OPGW. It would be capable of being converted to a double circuit should that be required in the future. It is expected that it would utilise parts of the route of a 66 kV line between Tamworth and Gunnedah which has recently been removed.

[15] Under this arrangement, Tamworth 330/132 kV substation would have three sections of 132 kV busbar each connecting a circuit to Tamworth 132/66 kV substation and another to Gunnedah or Narrabri as shown in Figure 9.

- Reconstruction of one of the single circuit 132 kV lines approximately 3.5 km long between Tamworth 330/132 kV substation and Tamworth 132/66 kV substation to enable the second circuit to Gunnedah to be connected to the 330/132 kV substation[16].
- Provision of an additional 132 kV line switchbay and an additional 132 kV bus section switchbay at Tamworth 330 kV substation and an additional 132 kV line switchbay at Gunnedah.

Figure 10 Second Tamworth – Gunnedah 132 kV Circuit



Construction Timetable and Anticipated Costs

It is expected that it would take around four years to complete this option and that it would cost approximately $36 million (2010 $). Annual operation and maintenance costs are anticipated to be around 2% of the capital cost. Until this option could be completed there would be a risk of load interruptions should a critical line outage occur at times of high summer load.

Material Inter-network Impact

As indicated in Section 2.3, the 132 kV network connecting Tamworth and Armidale via the Gunnedah/ Narrabri/Moree area is around 500 kilometres long. The provision of an additional 132 kV circuit between Tamworth and Gunnedah (approximately 70 kilometres) would not materially reduce the impedance of the 330 kV and 132 kV network linking Tamworth and Armidale and would have even less impact on the impedance of the network connecting generation in the Hunter Valley to generation in the Darling Downs and southern Queensland[17]. Consequently, a second Tamworth – Gunnedah 132 kV circuit would not have a material inter-network impact.[18]

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16 One of the options being considered for the refurbishment/replacement of Tamworth 132/66 kV substation is establishment of a new substation having no 132 kV busbar (with the 132/66 kV transformers being "tail-ended" to 132 kV circuits from Tamworth 330/132 kV substation as shown in Figure 9). Consequently, in this case it would not be possible to connect the second Gunnedah circuit to the 132 kV busbar at Tamworth 132/66 kV substation.

17 A second Tamworth – Gunnedah 132 kV circuit would reduce the impedance of the 330 kV and 132 kV network between Tamworth and Armidale by around 0.03%. As Tamworth – Armidale is only part of the connection between generation in the Hunter Valley and generation on the Darling Downs and southern Queensland, a second Tamworth – Gunnedah 132 kV circuit would have an even smaller effect on the impedance of that network.

18 AEMO's "Criteria for Assessing Material Inter-Network Impact of Transmission Augmentations" acknowledges that an assessment against the criteria it lists is not always required. It also states that "… in some circumstances it may be possible to exercise professional judgement that there will not be a material impact".

Given that:

- The new line would result in a miniscule change in the impedance of the 330 kV and 132 kV network between Tamworth and Armidale; and
- The Tamworth – Armidale "link" forms only part of the network connecting the generation centres in the Hunter Valley and in Darling Downs/Southeast Queensland area;

TransGrid believes that the new line would not have a material impact.

National Transmission Network Development Plan

This option has not been mentioned in the National Transmission Network Development Plan.

4.3.2. Second Tamworth – Gunnedah 132 kV Circuit Initially Operating at 66 kV

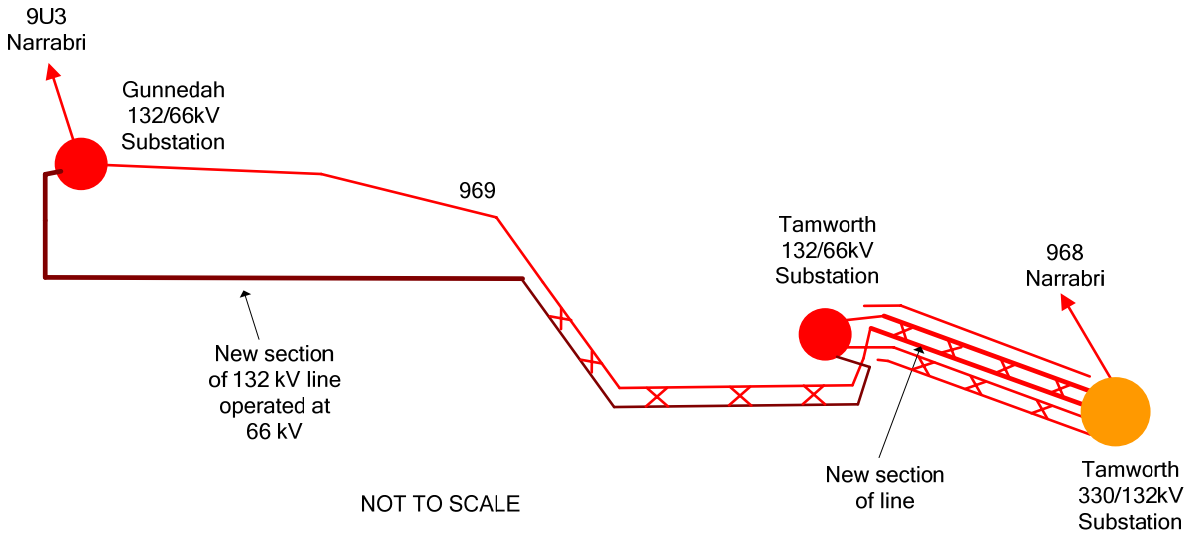
TransGrid would be the proponent of this option, which is shown in diagrammatic form in Figure 10. This option is a credible option for scenario 1 and scenario 2 only. It would not provide sufficient additional capacity to accommodate the additional spot loads in scenario 3 and scenario 4 and is therefore not a credible option under these scenarios.

Technical Characteristics

This option would involve:

- Construction of a section of single circuit 132 kV line approximately 51 km long between the end of the double circuit section of 969 line (approximately 14 km west of Tamworth) and Gunnedah. That line would have Nitrogen conductors designed for a maximum operating temperature of 85 ^{O}C and be equipped with OPGW. It would be capable of being converted to a double circuit should that be required in the future. It is expected that it would utilise parts of the route of a 66 kV line between Tamworth and Gunnedah which has recently been removed.
- Reconstruction of one of the single circuit 132 kV lines approximately 3.5 km long between Tamworth 330/132 kV substation and Tamworth 132/66 kV substation to enable the second circuit to Gunnedah to be connected to the 330/132 kV substation.
- Provision of an additional 66 kV line switchbay at Tamworth 132/66 kV substation and an additional 66 kV line switchbay at Gunnedah.
- Later provision of 132 kV line switchbays at Tamworth and Gunnedah to enable the line to be reconnected to operate at 132 kV. This would be required by summer 2017/18 under scenario 1 and by summer 2014/15 under scenario 2.

Figure 11 Second Tamworth – Gunnedah 132 kV Circuit Operated at 66 kV



Construction Timetable and Anticipated Costs

It is expected that it would take around four years to complete this option and that it would cost approximately $36 million (2010 $). Annual operation and maintenance costs are anticipated to be

around 2% of the capital cost. Until this option could be completed there would be a risk of load interruptions should a critical line outage occur at times of high summer load.

Material Inter-network Impact

As indicated in Section 2.3, the 132 kV network connecting Tamworth and Armidale via the Gunnedah/ Narrabri/Moree area is around 500 kilometres long. The provision of an additional 132 kV circuit initially operating at 66 kV between Tamworth and Gunnedah would not materially reduce the impedance of the 330 kV and 132 kV network linking Tamworth and Armidale and would have even less impact on the impedance of the network connecting generation in the Hunter Valley to generation in the Darling Downs and southern Queensland[19]. Consequently, a second Tamworth – Gunnedah 132 kV circuit initially operating at 66 kV would not have a material inter-network impact.

National Transmission Network Development Plan

This option has not been mentioned in the National Transmission Network Development Plan.

4.4. Potential Credible Options

Non-network or market network service developments may potentially be feasible options.

Potential non-network options include network support provided by a generator. As discussed in section 2.3 there is currently a generator located at Wilga Park (near Narrabri). The expansion of capacity at this location, if pursued, may represent a credible option to delay network investment. Alternatively other generators may decide to locate in the area to provide network support. Demand management may also represent a potential credible option.

Constraints in the network supplying the Gunnedah/Narrabri/Moree area have been described in TransGrid's Annual Planning Reports from 2005 onwards. To date, no proposals have been received from non-network or market network service providers to address these constraints. Nonetheless, potential proponents of possible non-network or market network service developments are encouraged to make submissions in response to this document. Section 3 provides information on the performance that would be required of non-network or market network service options under the load scenarios being considered. Section 6 contains contact details for submissions and enquiries.

4.5. Options Considered but not Pursued

A number of options and sub-options were considered but not pursued for a variety of reasons. These are discussed in the following sections.

4.5.1. Uprating 969 Line

This option is not considered to be technically feasible as it would be necessary to uprate the line to a conductor operating temperature above 100 ^{O}C (the highest considered to be practical with older conductors).

4.5.2. Second Tamworth – Gunnedah 132 kV Circuit (new route)

In TransGrid's experience community expectations are generally that, where possible, existing line routes should be utilised in preference to establishing new routes. Consequently, it is unlikely that environmental approval could be obtained for a new route as it is practical to use (sections of) the route of a 66 kV line which has recently been removed. Consequently this option was not pursued as it is not technically feasible.

4.5.3. Tamworth – Gunnedah 66 kV Line

This option would:

- Have a cost comparable to the option described in Section 4.3.1;
- "Under-utilise" the route occupied by the new line. It is expected that it would need to be replaced at a later stage by a 132 kV line; and
- Have higher losses than the option described in Section 4.3.1.

[19] A second Tamworth – Gunnedah 132 kV circuit operating at 66 kV would reduce the impedance of the 330 kV and 132 kV network between Tamworth and Armidale by less than if the line was operating at 132 kV (that is option 1). As option 1 would not have a material inter-network impact, neither would this option.

As this option is considered to be contrary to TransGrid's environmental, community and efficiency obligations under the Energy Services Corporations Act for the above reasons, it was not pursued.

4.5.4. Tamworth – Narrabri 132 kV Line

A second Tamworth – Narrabri 132 kV circuit would be significantly longer and therefore more costly than a second Tamworth – Gunnedah 132 kV circuit. As it would not be expected to provide any material additional benefits in the short/medium term it was not considered to be commercially feasible, and so hasn't been pursued.

4.5.5. 330 kV Developments

In the longer term it may be appropriate to establish a 330/132 kV substation in the Narrabri/Moree area. That substation could possibly be supplied via a new 330 kV line from either Tamworth or Dumaresq. Due to the length of 330 kV line involved and its higher cost (per kilometre) than 132 kV lines, this option has not been pursued at this stage.

4.5.6. 132 kV Single Circuit (not convertible to double circuit)

TransGrid's experience is that the ability to acquire new line routes is becoming increasingly more difficult. In most cases, community preferences are that the routes of existing lines be re-used where possible. Considering this and TransGrid's obligations under the Energy Services Corporations Act in relation to environmental and community matters, providing for a new line to be converted to a double circuit if required is considered to be prudent. Consequently, this option was not pursued.

4.5.7. Operational Measures

The option of opening the Narrabri – Moree 132 kV line following a critical contingency was considered. However, it was not pursued as that would actually exacerbate the overloading of 969 line. As a result TransGrid does not consider it to be technically feasible.

4.5.8. Use of an existing section of single circuit line between the two Tamworth substations

This sub-option considers line arrangements between the two Tamworth substations. It alone would not relieve the network limitations, rather it is a possible variation of the credible option described in section 4.3.1. It involves delaying the reconstruction of the existing short sections of single circuit line between the two Tamworth substations as a double circuit until the refurbishment/replacement of Tamworth 132/66 kV substation occurs. However, it would require:

- an extended outage of the 132 kV line when it was to be rebuilt; and
- a separate contract to cover construction of a short section of line (with attendant set-up costs) rather than having it included as part of a larger package of line works.

Consequently this sub-option was not pursued, as not being commercially feasible.

4.5.9. Provision of a 132 kV busbar at the reconstructed Tamworth 132/66 kV Substation

This sub-option considers the connection of 132 kV lines in the Tamworth area. It alone would not relieve the network limitations, rather it is a possible variation of the credible option described in section 4.3.1. It involves the establishment of a 132 kV busbar at Tamworth 132/66 kV substation when it is reconstructed, to allow the reconstruction of the 132 kV line between the Tamworth substations to be deferred. However, the consequent increase in the cost of reconstructing Tamworth 132/66 kV substation would exceed the cost of the line reconstruction.

Consequently, this sub-option was not pursued, as not being commercially feasible.

5. Materiality of Market Benefits

The NER requires all market benefits to be considered to be material unless it can be demonstrated that for a particular credible option:

- particular benefits are not likely to materially affect the assessment of that credible option under the RIT-T; or
- the estimated cost of undertaking the analysis to quantify the market benefit is likely to be disproportionate to the scale, size and potential benefits of that credible option.

This section considers each of the market benefits identified in the RIT-T Final Determination for each credible option.

5.1. Second Tamworth – Gunnedah 132 kV Circuit

5.1.1. Changes in Network Losses

A second Tamworth – Gunnedah 132 kV line would give a modest reduction in losses of around 2 to 3 MW at time of maximum demand. This may be material, depending on the nature of other credible options that may be proposed.

5.1.2. Benefits Related to Wholesale Market Outcomes

The option of establishing a second Tamworth – Gunnedah 132 kV circuit does not materially affect wholesale market outcomes, as it does not have any impact on network constraints between competing generation centres or materially alter flows on major transmission flow paths. Therefore it would not result in any material change to dispatch outcomes and wholesale market prices. Consequently, the following benefits are not considered to be material to the assessment of this option:

- Changes in fuel consumption arising through different patterns of generation dispatch;
- Changes in voluntary load curtailment (since there is no material impact on pool prices);
- Changes in costs for parties other than TransGrid, due to:
    - Differences in the timing of new plant;
    - Differences in capital costs; and
    - Differences in operation and maintenance costs (since there will be no deferral of generation investment);
- Changes in ancillary service costs;
- Competition benefits; and
- Renewable Energy Target (RET) penalties.

TransGrid notes that any non-network options that may be proposed in response to this Report may potentially have an impact on wholesale market outcomes, to the extent that they defer or replace generation investment in the area. TransGrid intends to consider the materiality of any such benefits at the time of the Draft Report, where it has received proposals for credible non-network options.

5.1.3. Option Value

TransGrid and Country Energy note the AER's view that option value is likely to arise where there is uncertainty regarding future outcomes, the information that is available in the future is likely to change and the credible options considered are sufficiently flexible to respond to that change.

TransGrid and Country Energy also note the AER's view that appropriate identification of credible options and reasonable scenarios captures any option value, thereby meeting the NER requirement to consider option value as a class of market benefit under the RIT-T.

For this RIT-T assessment, the estimation of any option value benefit over and above that already captured via the scenario analysis in the RIT-T would require a significant modelling assessment,

which would be disproportionate to any additional option value benefit that may be identified for this specific RIT-T assessment. TransGrid and Country Energy therefore do not propose to estimate any additional option value market benefit for this RIT-T assessment.

5.1.4. Changes in the Timing of Transmission Investment

If other credible options that may allow deferral of non-related transmission investment are proposed, this may be material.

5.1.5. Changes in Involuntary Load Shedding

All credible options must result in no involuntary load shedding for an outage of a single network element, in order to meet the identified need. Thus the benefit of reduced involuntary load shedding will be the same for all credible options and will not affect their assessment under the RIT-T. Therefore changes in involuntary load shedding are not material.

The benefits that any option may provide for more onerous events (such as concurrent outages of two or more network elements) are not considered to be material due to the low probability of those events occurring and the consequent low expected value of the benefits, compared to the costs of the investment.

5.2. Second Tamworth – Gunnedah 132 kV Circuit Initially Operated at 66 kV

5.2.1. Changes in Network Losses

A second Tamworth – Gunnedah 132 kV line initially operated at 66 kV would give a modest reduction in losses of around 1 MW at time of maximum demand. This may be material, depending on the nature of other credible options that may be proposed.

5.2.2. Benefits Related to Wholesale Market Outcomes

The option of establishing a second Tamworth – Gunnedah 132 kV circuit initially operated at 66 kV does not materially affect wholesale market outcomes, as it does not have any impact on network constraints between competing generation centres or materially alter flows on major transmission flow paths. Therefore it would not result in any material change to dispatch outcomes and wholesale market prices. Consequently, the following benefits are not considered to be material to the assessment of this option:

- Changes in fuel consumption arising through different patterns of generation dispatch;
- Changes in voluntary load curtailment (since there is no material impact on pool prices);
- Changes in costs for parties other than TransGrid, due to:
    - Differences in the timing of new plant;
    - Differences in capital costs; and
    - Differences in operation and maintenance costs (since there will be no deferral of generation investment);
- Changes in ancillary service costs;
- Competition benefits; and
- RET penalties.

TransGrid notes that any non-network options that may be proposed in response to this Report may potentially have an impact on wholesale market outcomes, to the extent that they defer or replace generation investment in the area. TransGrid intends to consider the materiality of any such benefits at the time of the Draft Report, where it has received proposals for credible non-network options.

5.2.3. Option Value

TransGrid and Country Energy note the AER's view that option value is likely to arise where there is uncertainty regarding future outcomes, the information that is available in the future is likely to change and the credible options considered are sufficiently flexible to respond to that change.

TransGrid and Country Energy also note the AER's view that appropriate identification of credible options and reasonable scenarios captures any option value, thereby meeting the NER requirement to consider option value as a class of market benefit under the RIT-T.

For this RIT-T assessment, the estimation of any option value benefit over and above that already captured via the scenario analysis in the RIT-T would require a significant modelling assessment, which would be disproportionate to any additional option value benefit that may be identified for this specific RIT-T assessment. TransGrid and Country Energy therefore do not propose to estimate any additional option value market benefit for this RIT-T assessment.

5.2.4. Changes in the Timing of Transmission Investment

If other credible options that may allow deferral of non-related transmission investment are proposed, this may be material.

5.2.5. Changes in Involuntary Load Shedding

All credible options must result in no involuntary load shedding for an outage of a single network element, in order to meet the identified need. Thus the benefit of reduced involuntary load shedding will be the same for all credible options and will not affect their assessment under the RIT-T. Therefore changes in involuntary load shedding are not material.

The benefits that any option may provide for more onerous events (such as concurrent outages of two or more network elements) are not considered to be material due to the low probability of those events occurring and the consequent low expected value of the benefits, compared to the costs of the investment.

6. Contact Details for Submissions and Enquiries

TransGrid and Country Energy invite written submissions on this Report. Submissions are particularly sought on the credible options presented.

Submissions are due on or before the 3rd June 2011.

Submissions and other queries should be emailed to:

regulatory.consultation@transgrid.com.au

TransGrid and Country Energy have obligations under a number of Acts[20] to divulge information, including under:

- the NER to summarise submissions received; and
- the Government Information (Public Access) Act 2009.

Parties making submissions should note that their submissions may be required to be made publicly available.

[20] Refer to www.legislation.nsw.gov.au for NSW Acts.