

NEED/OPPORTUNITY STATEMENT & OPTION SCREENING ASSESSMENT (NOSA)



Renewables in Central Western NSW

NOSA- 000000001903 revision 2.0

Ellipse project no(s):

TRIM file: [TRIM No]

Project reason: Reliability and Market Benefits - To meet connection point reliability requirements and Realise

Project category: Prescribed - Connection

Approvals

Author	Jay Esson	Network Planning Engineer
Endorsed	Jahan Peiris	Main Grid Planning Manager
Approved	Andrew Kingsmill	Manager/Network Planning
Date submitted for approval	1 December 2017	

Change history

Revision	Date	Amendment
0	November 2017	Initial issue
1	December 2017	Project triggers updated

1. Background

On 14 July 2017, COAG adopted the majority of recommendations of the Independent Review into the Future Security of the National Electricity Market. The adopted recommendations include the development of an integrated grid plan and identification of priority projects to facilitate the efficient development and connection of renewable energy zones.

It is probable that the integrated grid plan will identify renewable energy zones and priority projects in New South Wales. However, the location and scope of the renewable energy zones is not sufficiently certain to be included in the ex-ante capital expenditure forecast in the revenue proposal.

TransGrid has interest from renewable energy proponents seeking to connect to its network in Central Western New South Wales. Therefore, it is probable that Central Western New South Wales may be identified as a renewable energy zone in the integrated grid plan.

2. Need/opportunity

The local network in the Wellington area is a parallel network of 132 kV and 330 kV lines connecting to the 500 kV substations at Mt Piper and Wollar (see Figure 1).

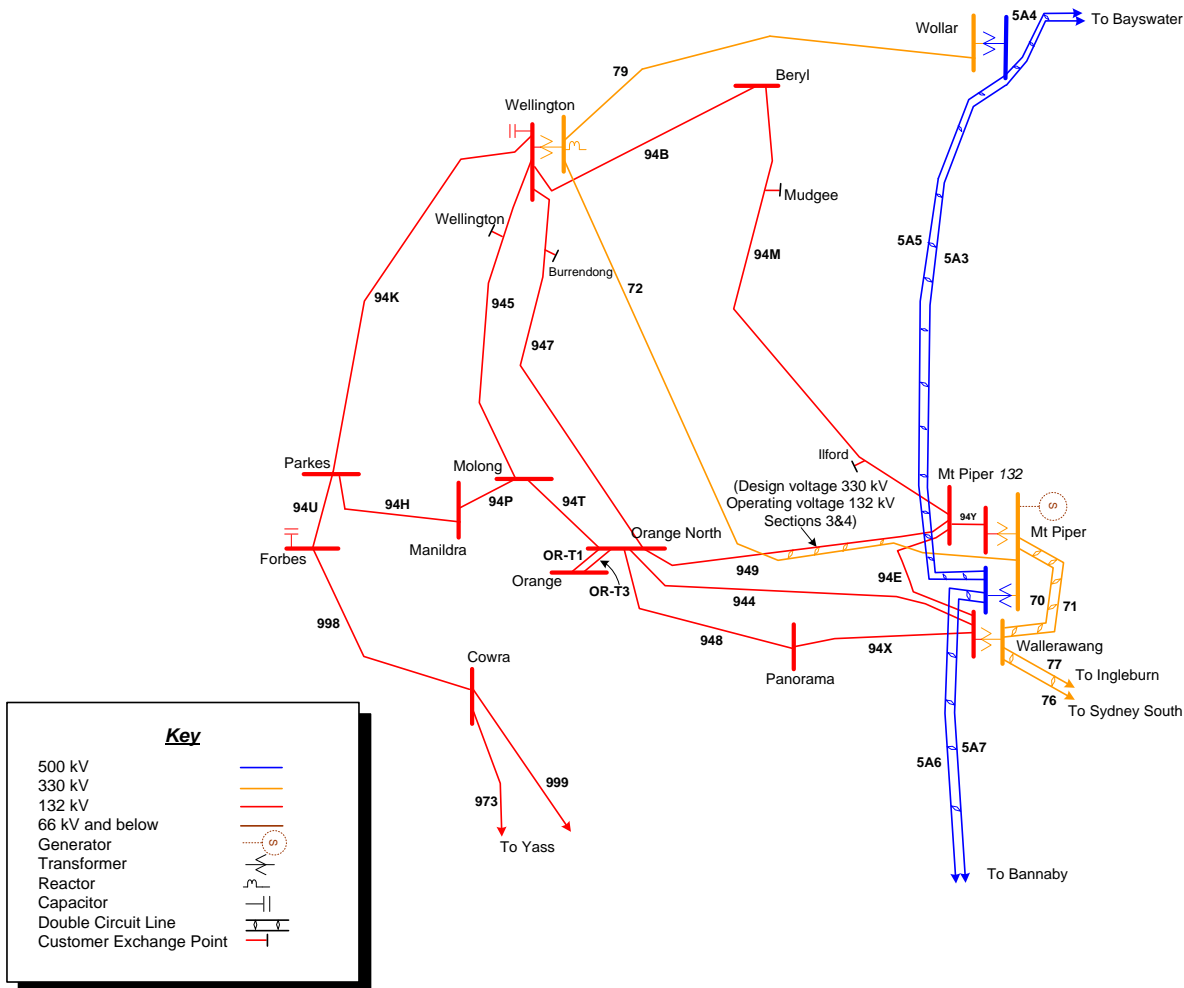


Figure 1: Network Diagram

TransGrid has received applications for a number of generator connections to the Wellington area of the Western NSW transmission system. These projects are proposed to connect to the 132 kV and 66 kV network and will result

in the flow of power from the local 132 kV network to 330 kV network. If no network augmentations are undertaken with these additional renewable generation developments, it's possible that these new generators would need to be curtailed to manage system security. Curtailment of cheap renewable generation would result in higher prices in National Electricity Market.

Table 1: Existing Generator Connections in the Central Western Area

Station	Nameplate Capacity (MW)	Generation Type	Approximate Year Commissioned
Nyngan (feeds to Wellington 132 kV)	102	Solar	2015
Hampton	1	Wind	2001
Blayney (feeds to Orange and Panorama 66 kV)	9	Wind	2000
Burrendong (tee onto 947)	19	Hydro	1990s
Wyangala	20	Hydro	1990s

The tables 2 and 3 below summarise the currently proposed projects (these are geographically indicated in Figure 2).

Table 2: Generation connection interests – 132 kV or below

Project	Capacity (MW)	Connection Point	Project Stage
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This equates to 132 kV or 66 kV connections of:

- 231 MW of committed generation;
- 441 MW of advanced generation;



- 512 MW of additional enquiries;
- 2 sites with multiple parties competing for capacity:
 - [REDACTED]
 - [REDACTED]
- Plus 220 MW that require significant augmentation to increase capacity to sufficient levels to cater for these connections.

Table 3: Generation connection interests – 330 kV

Project	Capacity (MW)	Connection Point	Project Stage
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

This equates to 330 kV connections of:

- 1508 MW of competing generation connection enquiries along 79 line and at Wollar 330 kV
- Currently an additional 250 MW of enquiries

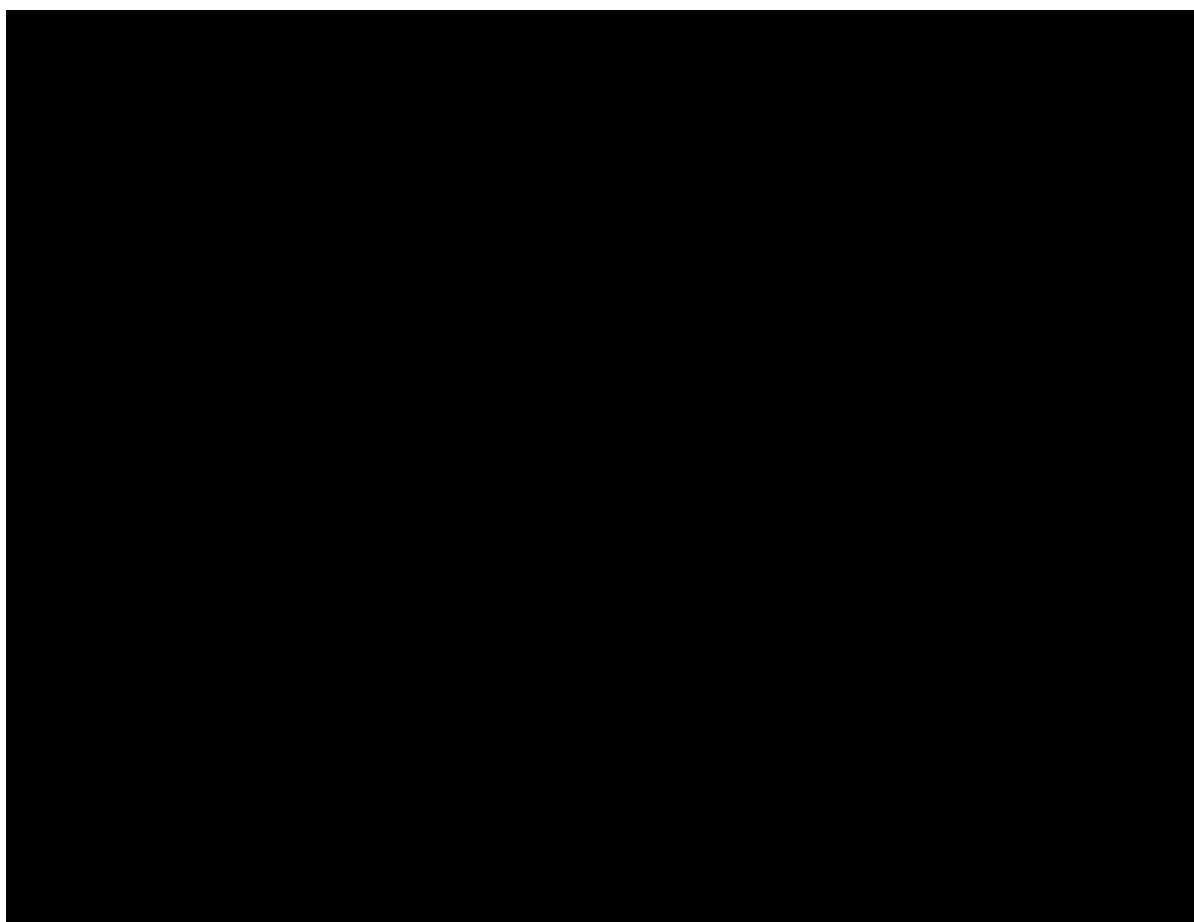


Figure 2: Network Diagram showing potential generator connections

It is anticipated that new generator connections in Central Western NSW may deliver market benefits with additional augmentations to allow these new connections to generate without constraints placed upon them. The market benefits would be from the following key sources:

- Lower costs associated with meeting the supply reliability standard in New South Wales, through facilitating access to the output from these additional generation connections; and
- Lower market dispatch costs (and hence lower prices for consumers) resulting from the additional output from these additional generator connections.

Subject to commitment of over 900 MW of generation in Central Western NSW, there may be an opportunity to expand the transmission network to realise the market and economic benefits of increased transmission capacity from the new generator connections in Central Western NSW to the rest of the NEM.

3. Related needs/opportunities

Connections of new generation in Central West New South Wales will continue to be monitored.

4. Options Summary

Table 4 — Options

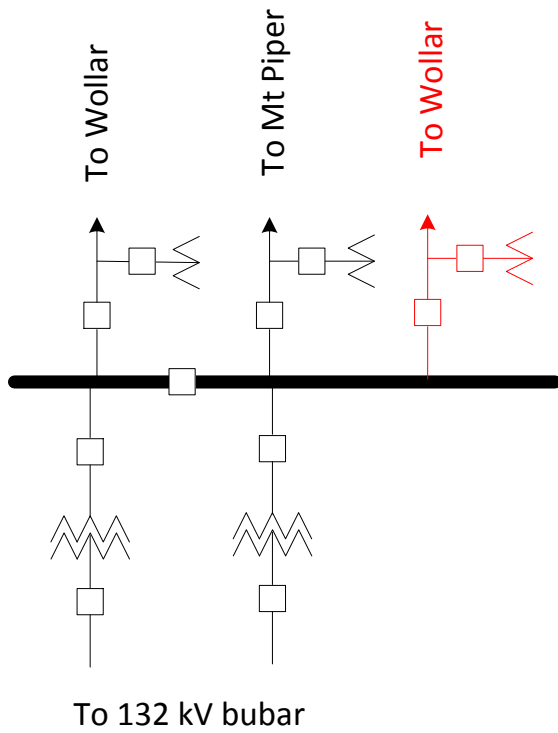
Option	Short description	OFS required	Technically feasible	Estimated cost	Program duration
A	Additional Wollar – Wellington 330 kV S/C line	Yes	Yes	Being calculated, not currently available	
B	Bayswater – Liverpool Ranges - Wellington 330 kV S/C line	Yes	Yes	Being calculated, not currently available	
C	330 kV S/C line west of Wellington to renewable zone	Yes	Yes	Being calculated, not currently available	
D	Bayswater – Liverpool Ranges - Wellington 330 kV D/C line	Yes	Yes	Being calculated, not currently available	
E	330 kV D/C line west of Wellington to renewable zone	Yes	Yes	Being calculated, not currently available	
F	Generation runback schemes	No	No	NA	NA

NP&O/Project Development shall undertake Options Feasibility Studies for the options as indicated in Table 4 above. The assessments shall include consideration of the cost, timing of activities, risk analysis and practicality of being able to carry out the works.

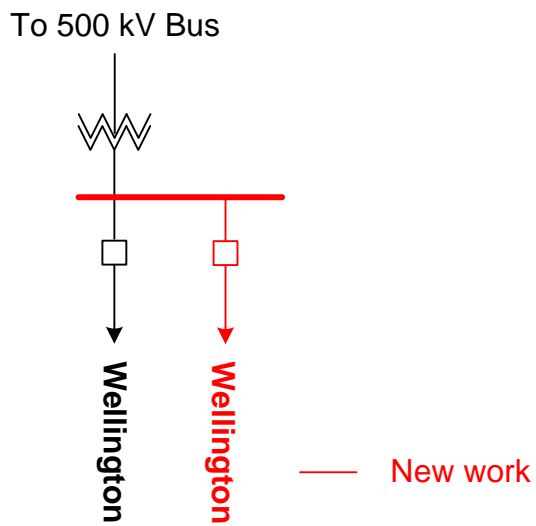
The Option Feasibility Study for Option E is required by 31 October 2017. The studies for the other options are required 30 April 2018, and high level costings to be provided by February 2018.

Substation works:

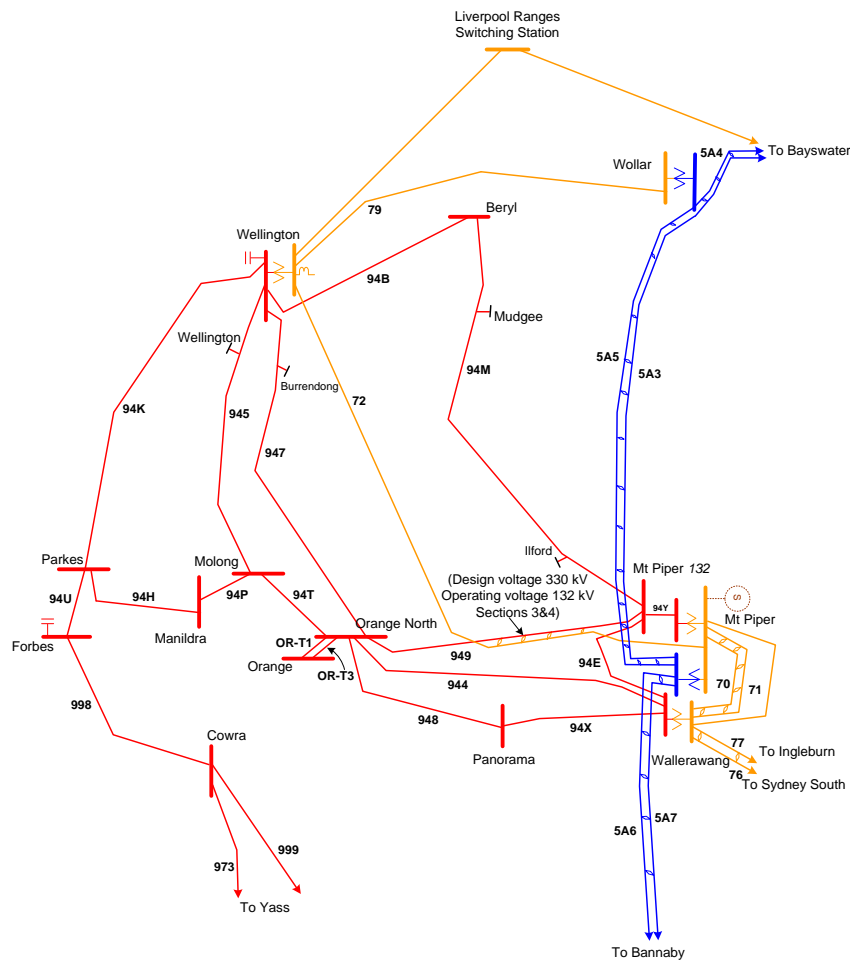
Wellington 330/132 kV Substation



Wollar 500/330 kV Substation



5.2 Option B – Bayswater – Liverpool Ranges - Wellington 330 kV S/C line, 3rd Mt Piper – Wallerawang 330 kV S/C line

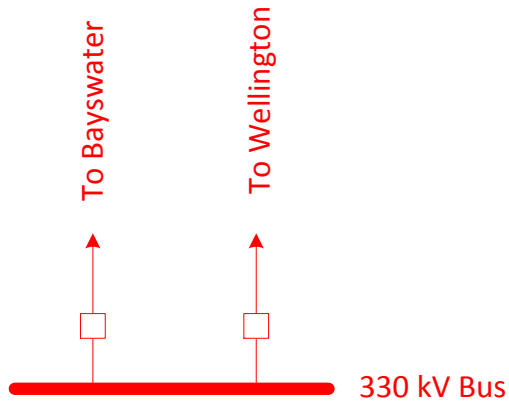


Transmission line works:

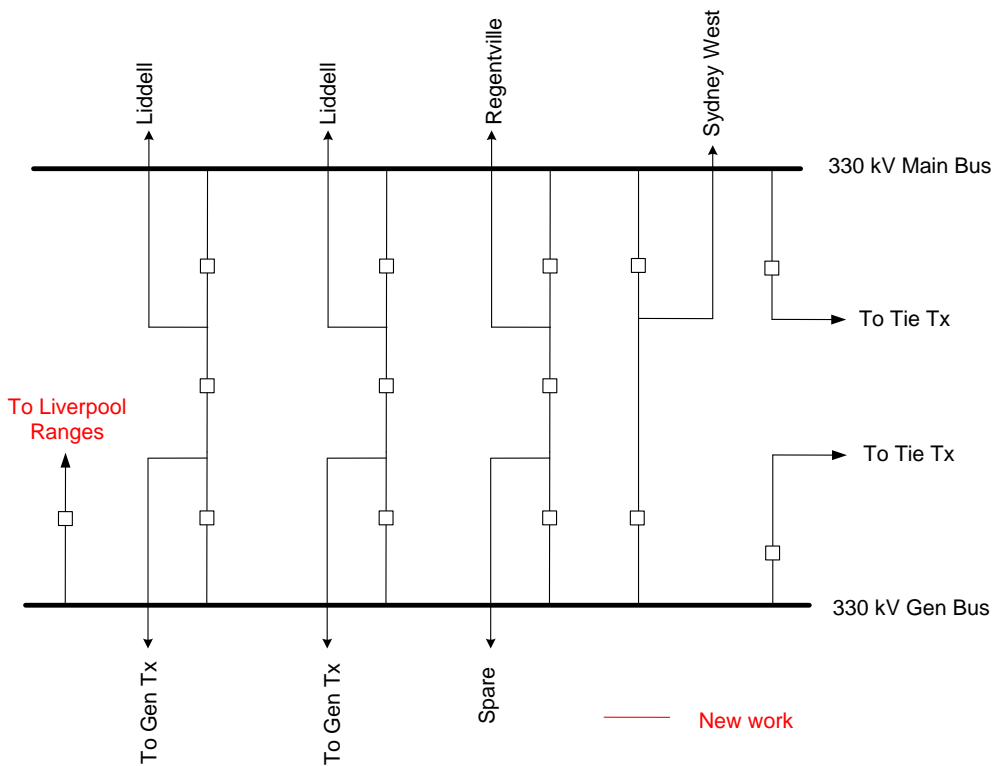
- Approximately 220 km 330 kV single circuit transmission line from Bayswater – Liverpool Ranges – Wellington
- 8km 330 kV single circuit transmission line from Mt Piper - Wallerawang

Substation works:

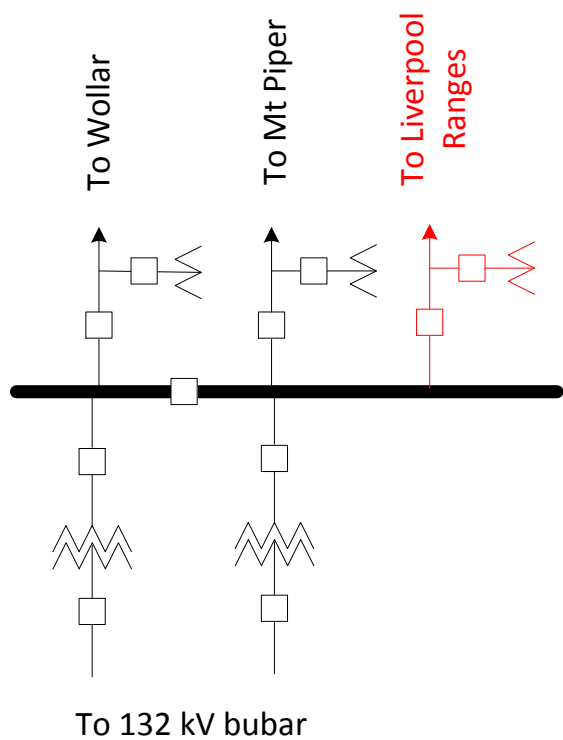
Liverpool Ranges Switching Station



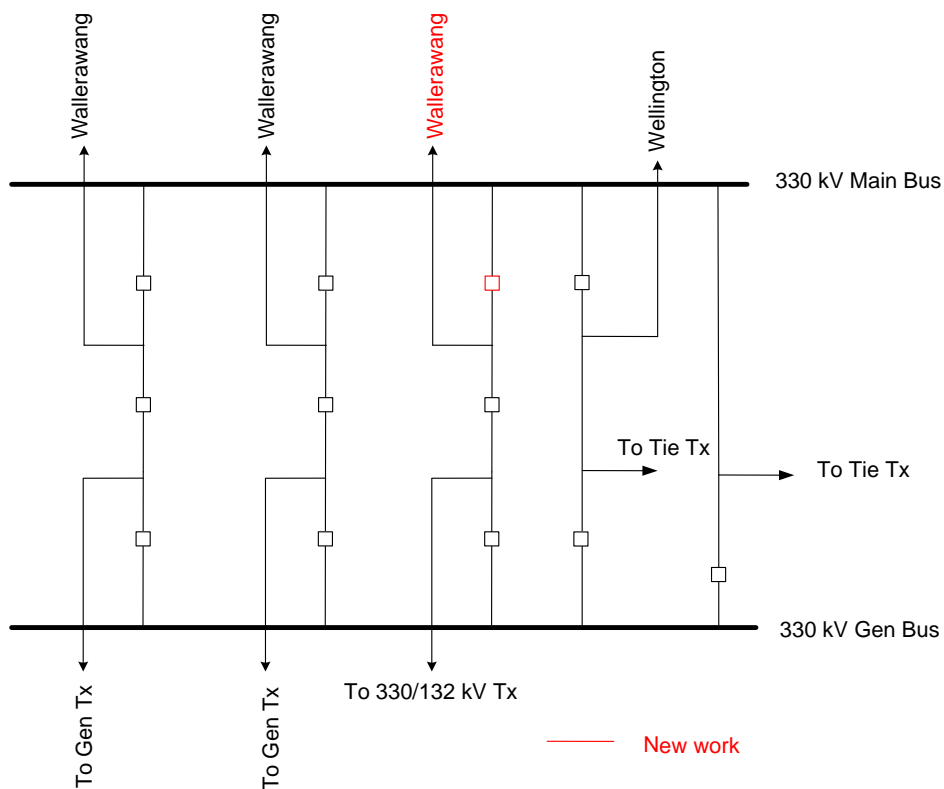
Bayswater 500/330 kV Substation



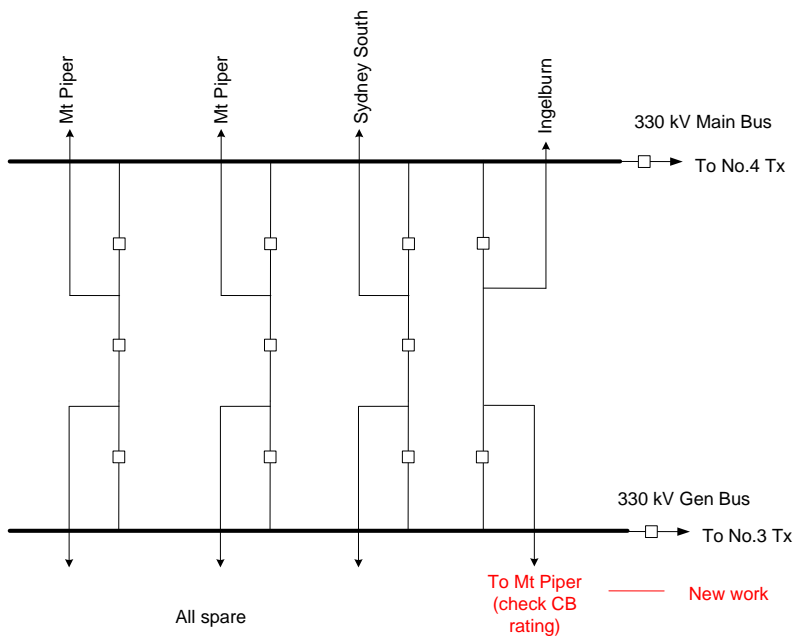
Wellington 330/132 kV Substation



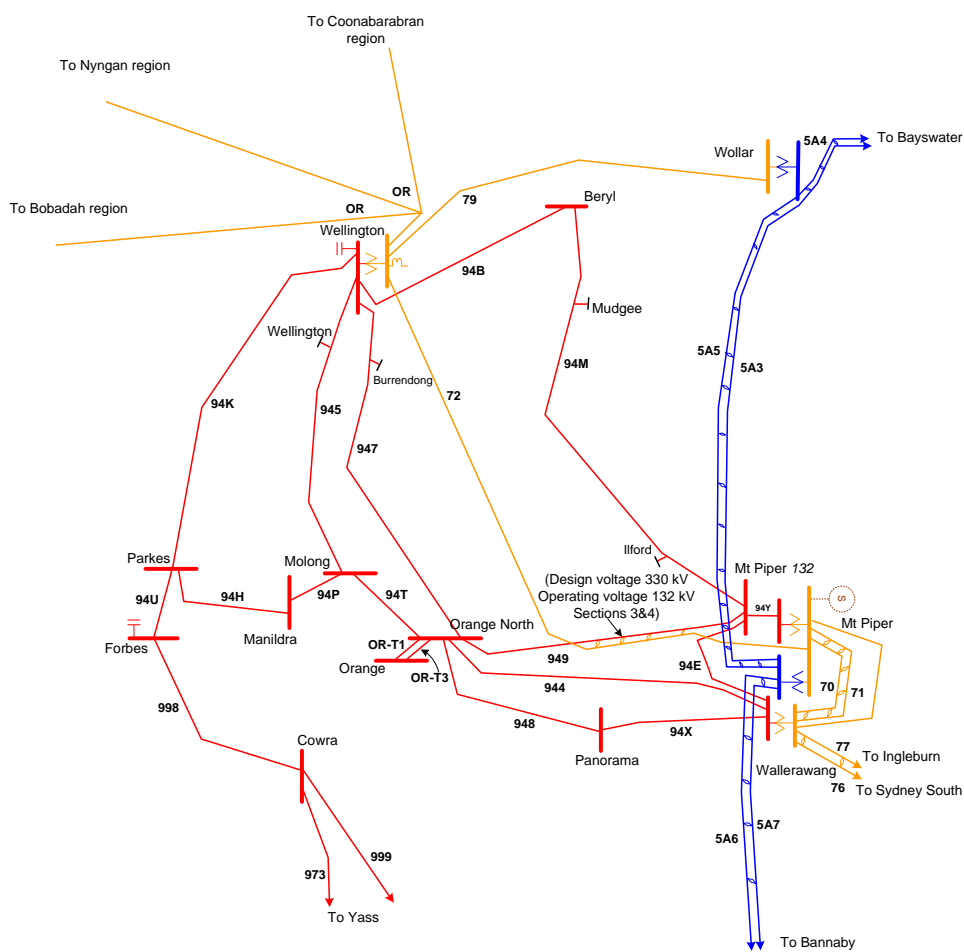
Mt Piper 330/132 kV Substation



Wallerawang 330/132 kV Substation



5.3 Option C –330 kV S/C line west of Wellington to renewable zone



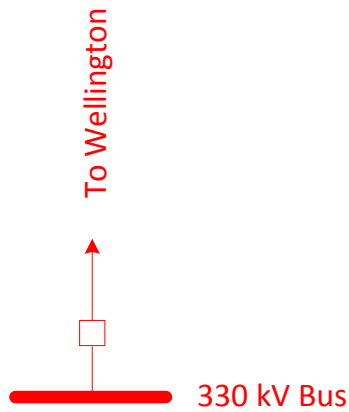
Future possible works: duplicate 79 line, turn 5A3 into Wollar, additional 500/330 kV transformer at Wollar

Transmission line works:

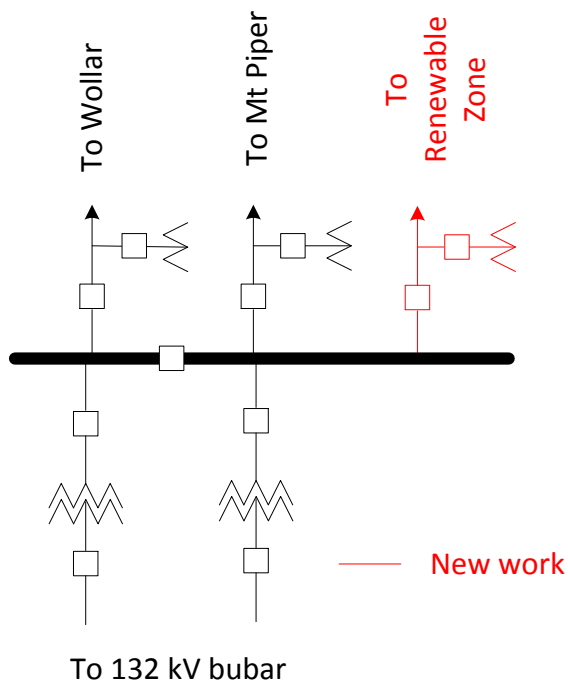
- Approximately 200km 330 kV single circuit transmission line from Wellington to west – depending on location of renewable zone, possible areas include Nyngan, Coonabarabran or Bobadah
- 3rd 330 kV Mt Piper – Wallerawang transmission line

Substation works:

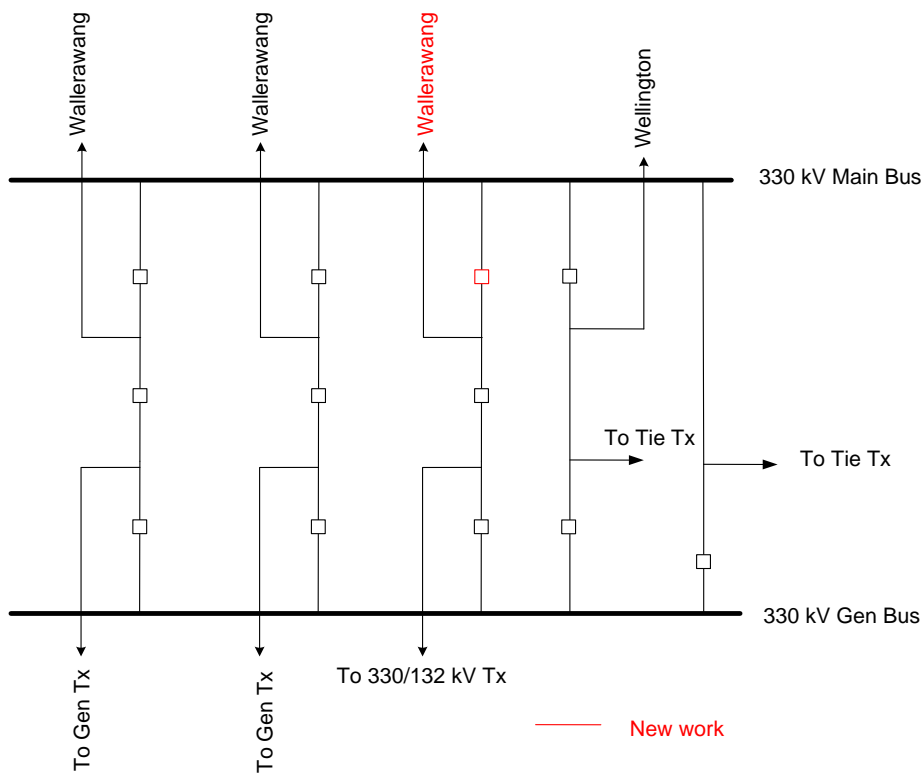
Renewable Zone 330 kV Switching Station



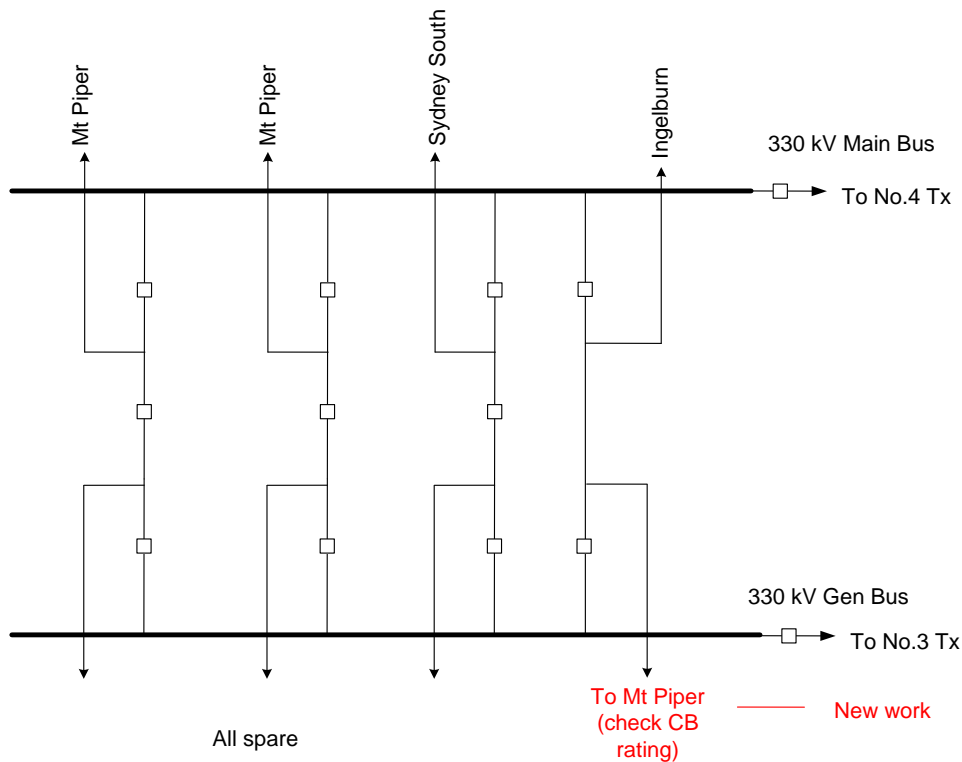
Wellington 330/132 kV Substation



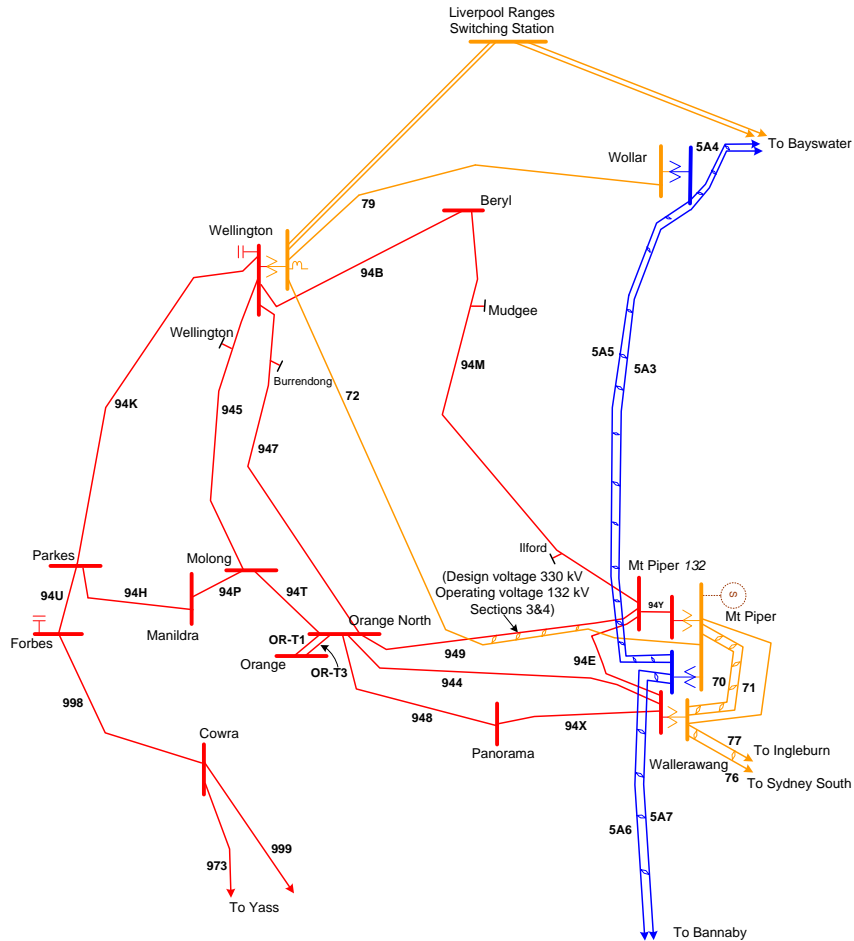
Mt Piper 330/132 kV Substation



Wallerawang 330/132 kV Substation



5.4 Option D – Bayswater – Wellington 330 kV D/C line



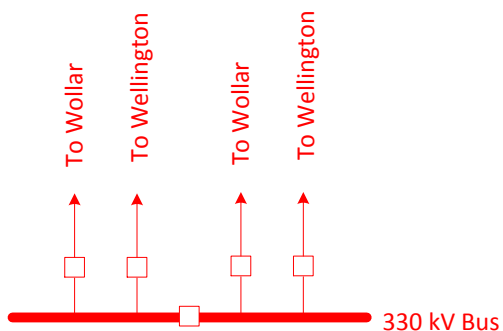
Future possible works: duplicate 79 line, turn 5A3 into Wollar, additional 500/330 kV transformer at Wollar.

Transmission line works:

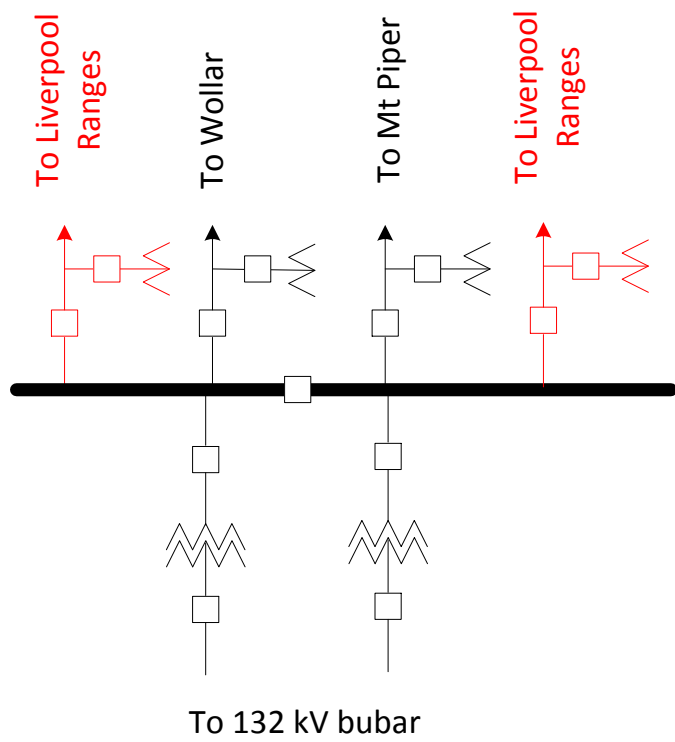
- 220 km 330 kV double circuit transmission line from Bayswater – Liverpool Ranges – Wellington
- 3rd 330 kV Mt Piper – Wallerawang single circuit transmission line

Substation works:

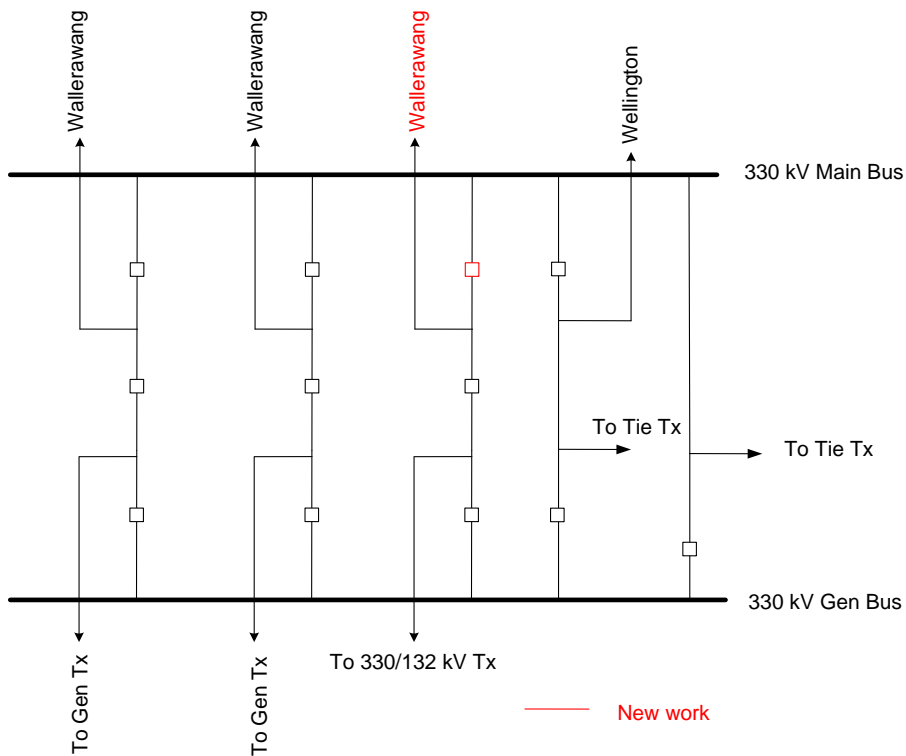
Liverpool Ranges 330 kV Switching Substation



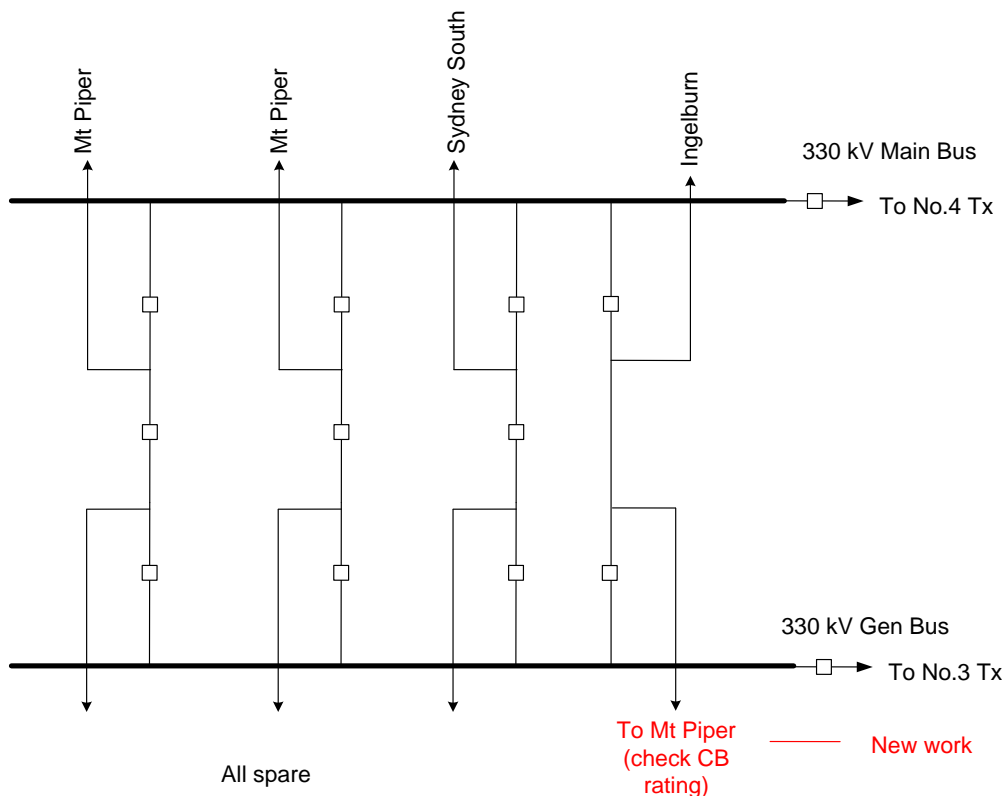
Wellington 330/132 kV Substation



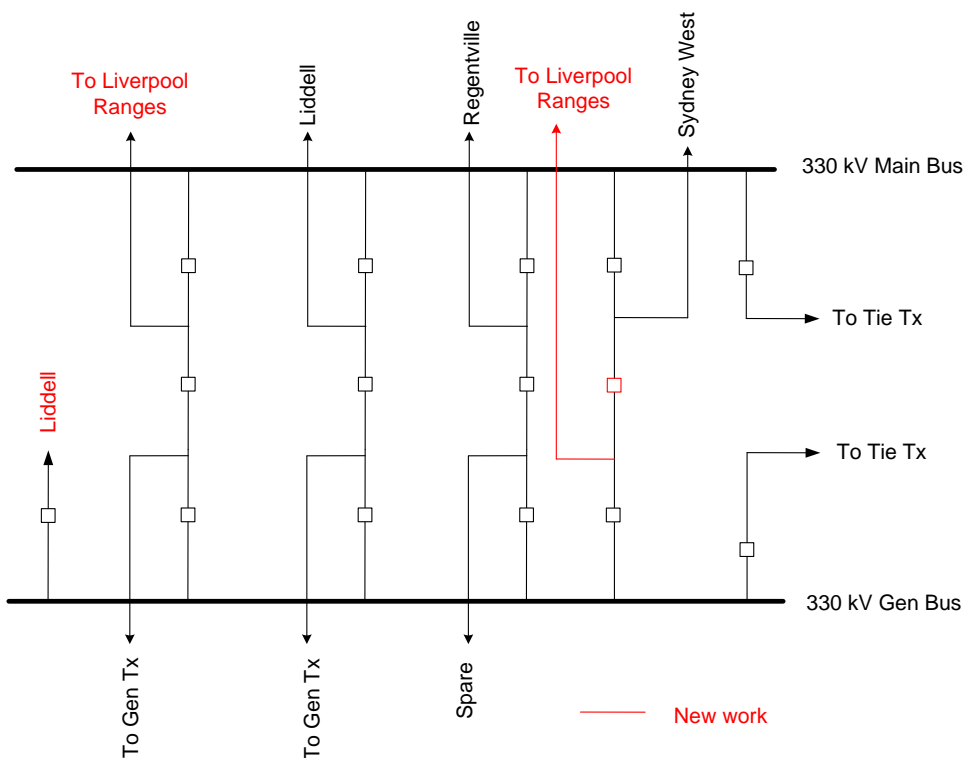
Mt Piper 330/132 kV Substation



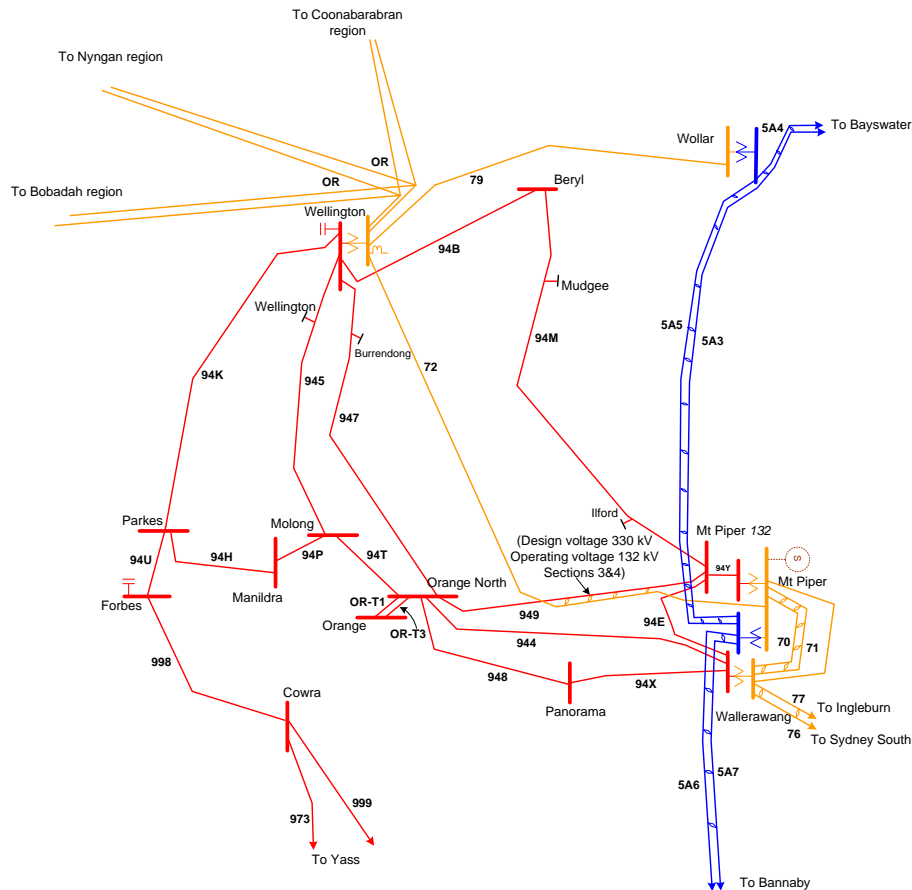
Wallerawang 330/132 kV Substation



Bayswater 500/330 kV Substation



5.5 Option E – 330 kV D/C line west of Wellington to renewable zone



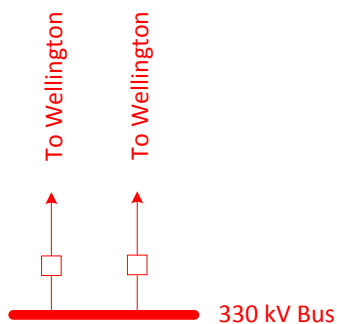
Future possible works: duplicate 79 line, turn 5A3 into Wollar, additional 500/330 kV transformer at Wollar.

Transmission line works:

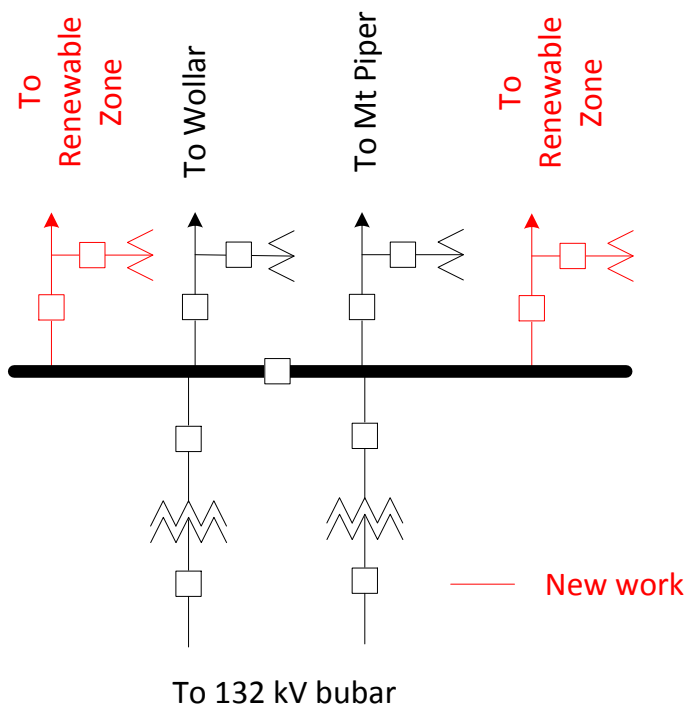
- Approximately 200km 330 kV double circuit transmission line from Wellington to west – depending on location of renewable zone, possible areas include Nyngan, Coonabarabran or Bobadah
- 3rd 330 kV Mt Piper – Wallerawang single circuit transmission line

Substation works:

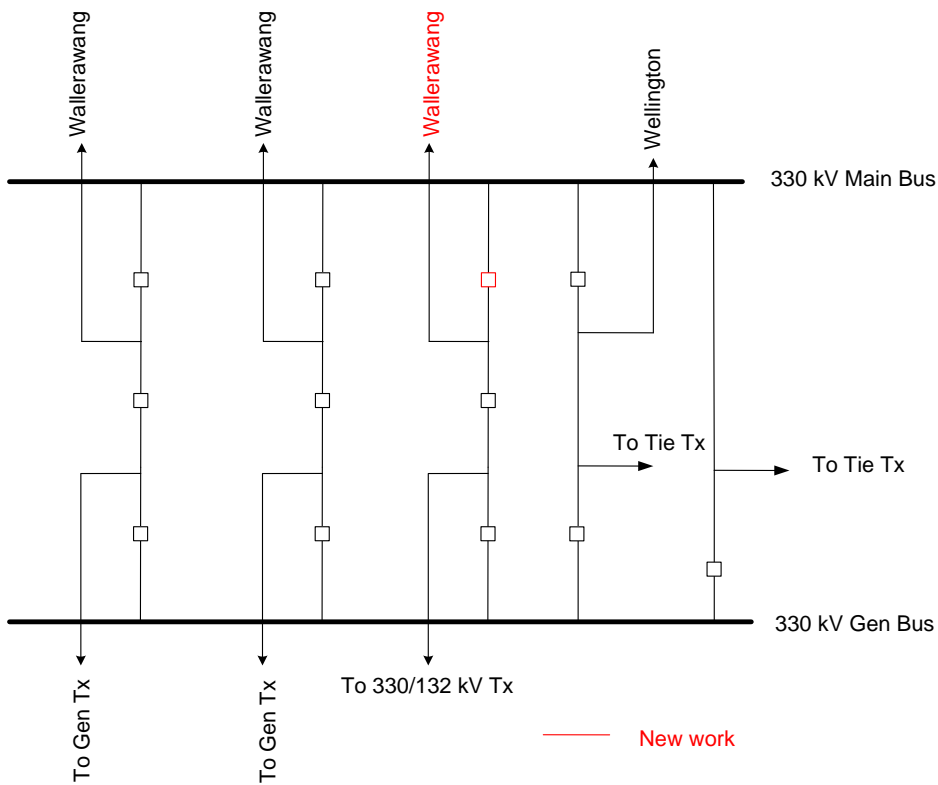
Renewable Zone 330 kV Switching Station



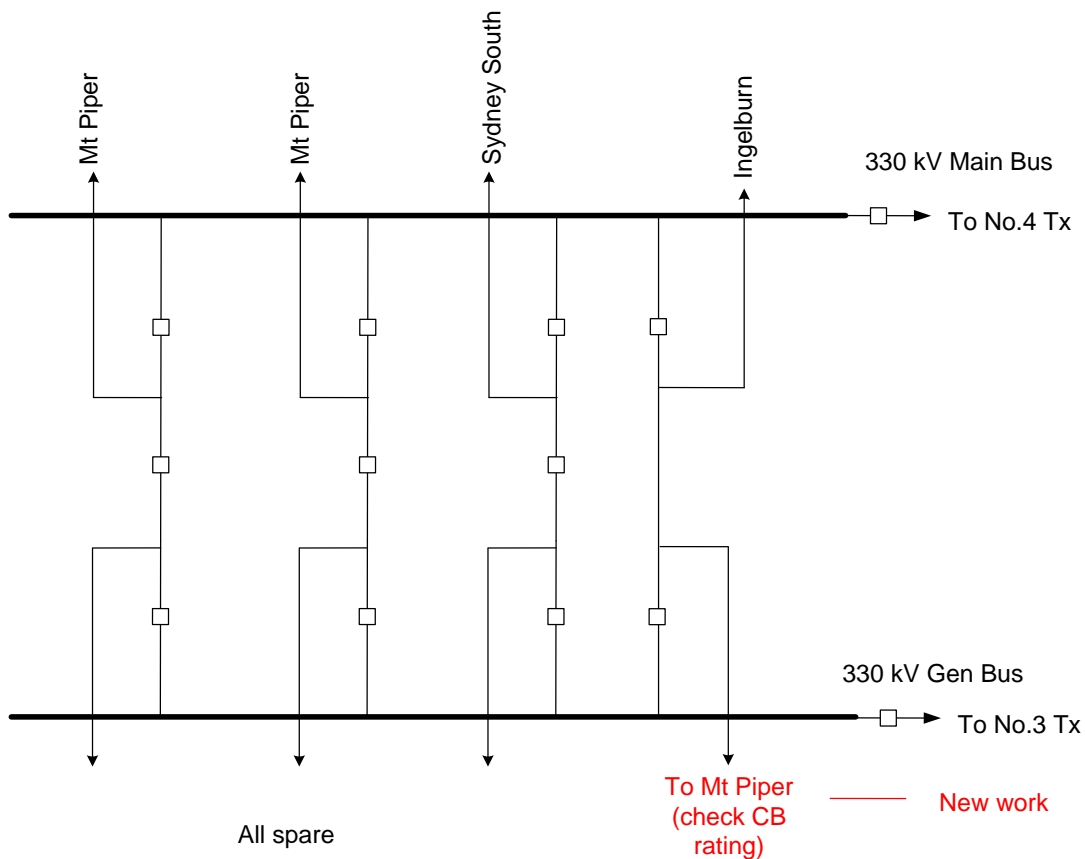
Wellington 330/132 kV Substation



Mt Piper 330/132 kV Substation



Wallerawang 330/132 kV Substation



5.6 Option F – Runback or Fast Tripping Scheme

Most of the generator proponents will have runback schemes. However, as many of the proposed connections will share connection locations (same busbar or same transmission line), putting all local generation on runbacks for the same contingency might cause frequency issues if the contingency eventuates. As this might cause additional FCAS and other frequency constraints, runback schemes for all generation interest are considered to be a less likely solution.

6. Recommendation

It is recommended that options be considered to address the identified need/opportunity and further progressed to undertake Option Feasibility Studies.

It is also recommended that TransGrid propose a contingent project for the transmission network developments in New South Wales central western area in the revised revenue proposal for 2018-2023. The contingent project would have the following triggers:

- (a) New generation more than 900 MW is committed in Central Western NSW (west of Wollar and Mt Piper) ¹
- (b) Two or more of the following:

¹ Based on the expected limitations due to central western NSW network capability

- (i) Inclusion of renewable energy zones in Central Western NSW in AEMO's Integrated Grid Plan or similar plan as recommended by the Independent Review in to the Future Security of the National Electricity Market by Professor Alan Finkel and accepted by the COAG Energy Council
 - (ii) Notification to TransGrid by the Federal Government, COAG Energy Council, NSW Government or the Energy Security Board that it considers that augmentation of the transmission network to deliver increased capacity from Central Western NSW is required in order to meet or manage the expected demand for prescribed transmission services or comply with an applicable regulatory obligation or requirement associated with the provision of prescribed transmission services
 - (iii) Successful completion of a RIT-T or alternate framework introduced in response to the recommendation of the Independent Review in to the Future Security of the National Electricity Market by Professor Alan Finkel and accepted by the COAG Energy Council (including comprehensive assessment of credible options) demonstrating that increasing capacity of the network in Central Western NSW at 330/132kV or other voltages used in future is the option that maximises the positive net economic benefits
 - (iv) Determination by the AER that the proposed investment satisfies the RIT-T or above mentioned alternate framework
- (c) TransGrid Board commitment to proceed with the project subject to the AER amending the revenue determination pursuant to the Rules.

The trigger is specific and capable of objective verification, relates to a specific location or locations, and is probable but too uncertain to include the proposed contingent project in the forecast capital expenditure in this proposal.