



**Notice**

**of**

**Determination under clause  
5.17.4(c) of the National  
Electricity Rules**

**North Richmond (NR) Zone  
Substation  
2015-2017**

December 2014

## **1 Summary**

CitiPower Pty (**CitiPower**) has made a determination under clause 5.17.4(c) of the National Electricity Rules (**NER**) that there will not be a non-network option that is a potential credible option, or that forms a significant part of a credible option, for the Regulatory Investment Test for Distribution (**RIT-D**) project to address the need for corrective action to address fault level constraints at the North Richmond (**NR**) zone substation.

CitiPower therefore publishes a Notice under clause 5.17.4(d) of the NER to notify interested parties of this determination. This Notice sets out the reasons for making the determination, including any methodologies and assumptions used in making the determination.

## **2 The identified need**

The North Richmond (**NR**) substation is served by sub-transmission lines from the Richmond terminal station (**RTS**). It supplies the Richmond and Abbotsford areas.

Currently, the NR zone substation has a summer N-1 rating of 56.1 MVA comprised of two 23/28 MVA transformers and one 20/27 MVA transformer operating at 66/11 kV. Due to the lower than normal impedance of two of the three transformers at NR, one of the NR transformers is on hot standby with the 11 kV transformer circuit breaker (**CB**) opened.

CitiPower estimates the prospective fault current to ensure it is within allowable limits of the electrical equipment installed, and to select and set the protective devices that can detect a fault condition. The following fault level limits apply for connection of embedded generation to CitiPower:

<b>Voltage</b>	<b>Fault limit (kiloamps, kA)</b>
66kV	21.9kA
22kV	13.1kA for HV/LV distribution lines
	26.2kA for sub-transmission lines
11kV	18.4kA
6.6kV	21.9kA

**Table 2.1 Fault level limits**

The combination of load customers and distributed generation connected to NR has resulted in the high fault levels. By 2017, the 11 kV fault level at NR is forecast to reach 18.7kA. Therefore, CitiPower must undertake a fault level mitigation project.

## **3 Credible options assessed**

It was determined that the high level options available to address the identified need were:

- Install fault reactors;
- Take one transformer out of service; or
- Take both transformers out of service.

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The latter two options were not considered to be credible options as CitiPower does not have the capacity to transfer the required load.

In terms of fault reactors, the following credible options were assessed:

1. Bring forward the two transformer replacements, one 66 kV reactor, one capacitor bank and a new 11 kV bus. Construct and commission by April 2017. The cost is estimated at \$10.2 million.
2. Bring forward the one transformer replacements, one 66 kV reactor, one 11kV reactor, one capacitor bank and a new 11 kV bus. Construct and commission by April 2017. The cost is estimated at \$8.5 million.
3. Install two 11 kV reactors, one 66 kV reactor, one capacitor bank and a new 11 kV bus. Construct and commission by April 2017. The cost is estimated at \$6.3 million.

### **3.1 Preferred network solution**

CitiPower's preferred network option is to establish fault limiting reactors at NR zone substation (Option 3). The proposed project includes the installation of a:

- reactor onto the RTS-NR 66 kV sub-transmission line;
- 11 kV reactor for Transformers No.1 and No.2;
- new No.4 11 kV bus that has one 11 kV bus-tie CB, two feeder CBs, one dual-gland transformer CB and one capacitor bank CB;
- 9 MVAr 11 kV capacitor bank with controller

The total estimated direct capital cost of the project is \$5.2 million. Design is planned to be completed by 2015 and construction by 2016 and 2017.

## **4 Non-network solution options**

CitiPower has determined that no non-network options are technically feasible to meet the identified need. This is because there are currently only two transformers in operation at NR zone substation, and given the forecast load and embedded generation growth, the resultant increase in fault current to at or above the Distribution Code thresholds will trigger CitiPower to either:

- take one transformer off-line at NR, which would require 38 MVA (based on the forecast at 10 per cent probability of exceedance (10% PoE)) of load to be transferred away permanently from NR or;
- transfer the load way from NR without taking transformers off-line, which would require 66 MVA (based on 10% PoE forecast) of load to be transferred away permanently from NR.

That is, given that the identified need is not linked to peak capacity, any non-network option would need to address at least 38 MVA of capacity without adding to fault level above existing, which is the capacity of one of the operating transformers at NR.

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After considering a range of potential non-network solutions, including those outlined in section 3.2 of the Demand Side Engagement Strategy, CitiPower does not consider that any non-network option is able to reduce demand by 38 MVA at NR. As such, CitiPower has determined that no non-network option is, or forms a significant part of, a potential credible solution to address the identified need.

## **5 Next steps**

As the preferred network option is less than \$10 million, CitiPower does not intend to publish a draft project assessment report, per clause 5.17.4(n) of the NER. Furthermore, as the preferred option is less than \$20 million, CitiPower will publish its final project assessment report as part of its Distribution Annual Planning Report.

Should interested parties have any queries about this Notice, please contact:

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