NEED/OPPORTUNITY STATEMENT (NOS)

Making the Grid Smarter - Deniliquin 66kV Full SCADA Capacity Augmentation

NOS- 000000001499 revision 2.0

Ellipse project description:
TRIM file: [TRIM No]

Project reason: Imposed Standards - Control Systems to meet NER requirements
Project category: Prescribed - NCIPAP

Approvals

Author	Paul Davis Brad Sichter	Operational Technology Manager Senior Engineer/Operations Analysis
Reviewed/Endorsed	Hoang Tong	Operations Analysis Manager
	Jahan Peiris	Manager/Network Operations
Approved	Nalin Pahalawaththa	Manager/Power System Analysis
Date submitted for approval	28 October 2016	

1. Background

This proposal forms part of the Network Capability Incentive Parameter Action Plan (NCIPAP), for the 2018/19 to 2022/23 regulatory control period. The NCIPAP portion of the STPIS described in section 5 of the STPIS guideline[1] is a plan consisting of a suite of small projects aimed at improving the capability of transmission assets through operational expenditure and minor capital expenditure on the transmission network which results in:

- Improved capability of those elements of the transmission system most important to determining spot prices;

  OR

- Improved capability of the transmission system at times when Transmission Network Users place greatest value on the reliability of the transmission system.

This project proposes a *priority project* to improve the limit of the injection point for the benefit of the Transmission Network Users. This *priority project* is consistent with the requirements of the clause 5.2(a)(2) in section 5 of the STPIS guideline and is consistent with the objectives of the NCIPAP scheme[2].

The SCADA/EMS (Supervisory Control and Data Acquisition/Energy Management System) is a critical power system management tool which enables TransGrid to fulfil its objectives to safely, securely and reliably operate the NSW high voltage transmission network.

SCADA is a system that operates with coded signals over communication channels so as to provide control of remote equipment. The control system may be combined with a data acquisition system by adding the use of coded signals over communication channels to acquire information about the status of the remote equipment for display or for recording functions. The SCADA system allows TransGrid control rooms to monitor the transmission system, respond to system incidents and remotely operate equipment in the various substations throughout NSW.

The **energy management system (EMS)** is a system of computer-aided tools used to monitor, control, and optimize the performance of the generation and/or transmission systems. EMS is used to identify system elements that could reach operating limits following a system incident such as a line or transformer fault and undertake contingency analysis before such incidents occur. EMS also allows effective "what if" analysis of the real time system.

SCADA/EMS system enables TransGrid to collect, store and analyse data from many data points in the network, perform network modelling, simulate power operation, pinpoint faults, pre-empt outages, and participate in energy trading markets.

There are some 80,000 data points in the system and more than 2000 data pages (screen pictures), all of which provide live data on the status of the transmission system. Information such as circuit breaker status (open or closed), generator outputs, transmission line flows etc are all available on-line. An increasing number of control schemes used to manage the reliability of the network are also programmed into the system. The system also provides data to AEMO, generators and distributors within NSW consistent with obligations under the National Electricity Rules. To enable this functionality, it is necessary for SCADA to be connected to a substation and the correct data points wired which will allow both the control of plant and equipment as well as the ability to monitor the status of vital elements.

[1] AER, Final Electricity Transmission Network Service Providers Service Target Performance Incentive Scheme, Version 5 October 2015.

[2] Explanatory statement section 5.3.1 - AER, Draft Electricity Transmission Network Service Providers Service Target Performance Incentive Scheme, Version 5 June 2015.

2. Need/opportunity

Full SCADA control of all aspects of a substation represents the most efficient and practical way to manage high voltage plant and equipment. Without this control and metering, network control centre staffs are unable to see the state of equipment and are unable to operate the equipment. It is necessary to send staff to site to both ascertain the current equipment state and perform any necessary equipment operations.

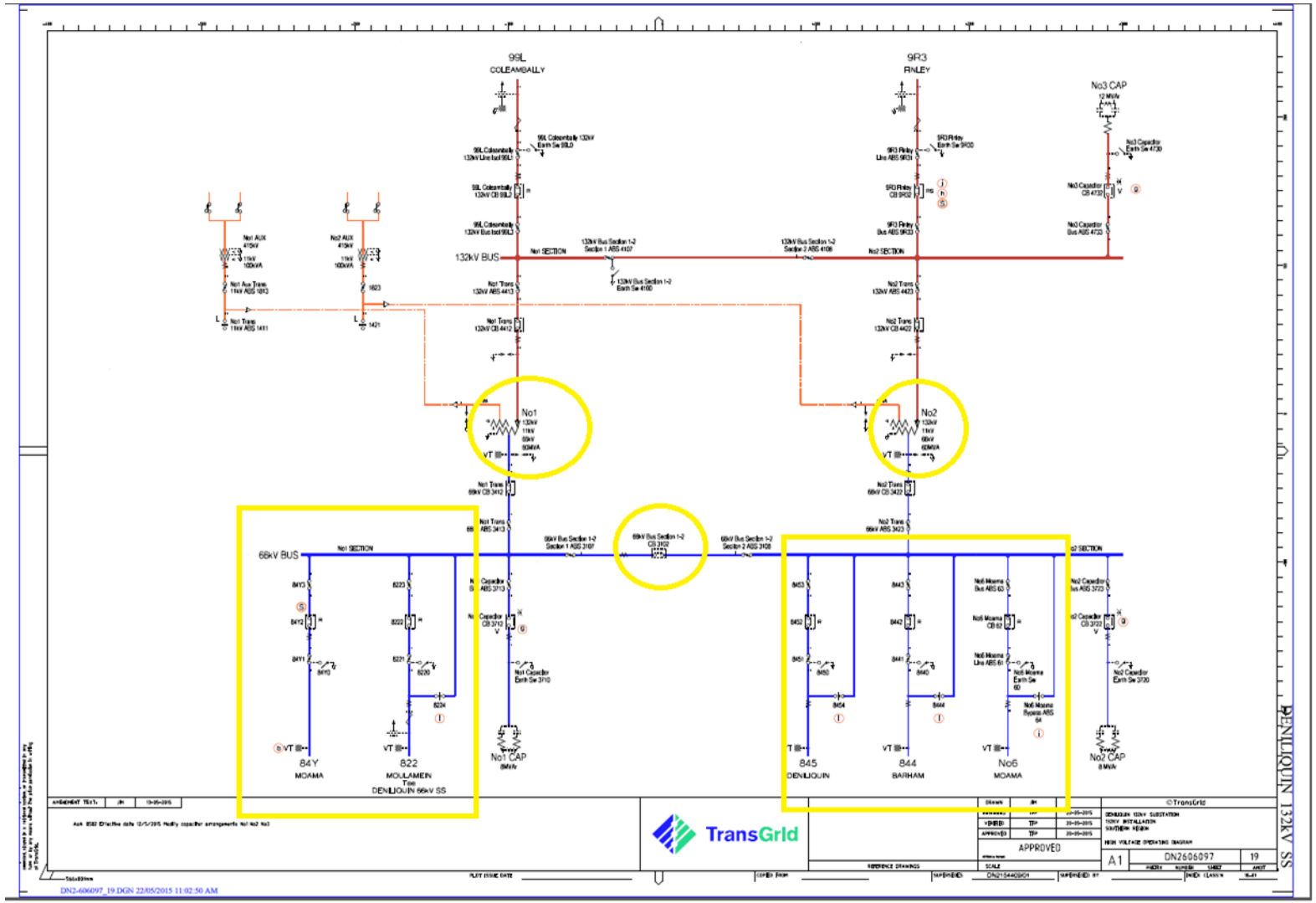
Having visibility of the status of the sub-station provides a greater level of situational awareness for the control room operator which, when combined with the ability to control active plant, means that loss of load situations can be minimised.

The sub-station at Deniliquin currently does not have full SCADA connectivity. The attached (Figure 1) High Voltage Operating Diagram show the plant which is not able to be controlled remotely.

Therefore, with this proposed *priority project*, the post contingency capacity at the supply point can be improved as follows:

Option	Post contingency (feeders and bus faults) capacity	Duration
Do nothing	0 MW	3 hours
Installation of full SCADA control	23 MW average demand	2.5 hours

Figure 1 – Deniliquin High Voltage Operating Diagram



3. Related needs/opportunities

NOS 1463 Finley full SCADA connectivity.

4. Recommendation

It is recommended that SCADA connectivity at Deniliquin be increased to provide full operating and monitoring capabilities.

Attachment 1 Risk costs summary

Current Option Assessment - Risk Summary

Project Name: Deliniquin 66kV Full SCADA Capacity Augmentation

Option Name: 1499 - Base Case

Option Assessment Name: 1499 - Base Case - Assessment 1

Rev Reset Period: Next (2018-23)

Major Component	No.	Minor Component	Sel. Hazardous Event	LoC x CoF ($M)	Failure Mechanism	NoxLoC xCoF ($M)	PoF (Yr 1)	Total Risk ($M)	Risk ($M) (Rel)	Risk ($M) (Op)	Risk ($M) (Fin)	Risk ($M) (Peo)	Risk ($M) (Env)	Risk ($M) (Rep)
Busbar	2	Busbar	Unplanned Outage - HV (Busbar Failure)	$1.39	Structural Failure	$2.79	5.00%	$0.14	$0.13		$0.00			$0.00
Conductor	4	Conductor (inc Joints)	Unplanned Outage - HV (Feeder failure)	$0.66	Break	$2.65	21.80%	$0.58	$0.58					
				$2.06		$5.44		$0.72	$0.71		$0.00			$0.00

Total VCR Risk: $0.71 Total ENS Risk:

Printed by: p85755 on 12/06/2016 at 2:56:10 PM Page 1 of 1