Glenrowan Terminal Station Redevelopment

2008/09-2013/14 Capital Works Revised Proposal

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1 Executive Summary

SP AusNet's original capital works proposal for redevelopment of Glenrowan Terminal Station[1] (GNTS) commencing in 2011/12: integrated the 66 kV circuit breaker replacements, current transformer replacements and associated secondary equipment replacements with the replacement of 220 kV circuit breakers and the #1 transformer bank at an estimated cost of $20.8 M.

The AER's proposal to defer replacement of 66 kV circuit breakers, current transformers and associated secondary equipment at GNTS is:

- Not prudent because Victorian consumers will be disadvantaged by increasing unsupplied energy risks, and
- Not efficient because it's Net Present Value is significantly lower than that of the proposed integrated re-development.

On the basis of the above considerations, it is SP AusNet's view that the level of expenditure recommended by the AER in relation to the GNTS re-development project is:

- insufficient to enable SP AusNet to recover the efficient costs of achieving the capital expenditure objectives set out in clause 6A6.7(a) of the NER; and is
- below the costs that a prudent operator in the circumstances of SP AusNet would require to achieve the capital expenditure objectives.

In particular, in regard to the capital expenditure objectives set out in the NER, the level of expenditure recommended by AER is, in SP AusNet's view:

- insufficient to enable SP AusNet to comply with all applicable regulatory obligations associated with the provision of prescribed transmission services (clause 6A6.7(a)(2)); and
- insufficient to enable SP AusNet to maintain the reliability, safety and security of the transmission system (clause 6A6.7(a)(4)).

SP AusNet therefore considers that the AER must, pursuant to clause 6A6.7(c) accept the inclusion of the allowance for 66 kV circuit breakers, current transformers and associated secondary equipment replacement costs in the capital expenditure forecast, as detailed below:

- Reinstate the $4.92 M funding removed from the GNTS re-development project for the replacement of 6 x 66kV LG4C circuit breakers and 1 x 66 kV S&S type 509 circuit breaker and the associated secondary equipment.
- Include a risk allowance of $1.5M in the project forecast for the financial risk as estimated by Evan and Peck.

	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Total
SP AusNet's revised proposal	$ 0.0	$ 0.0	$ 0.0	$ 0.43	$ 6.82	$ 14.07	$ 21.32

[1] Glenrowan Terminal Station Redevelopment – Capital Works Project Description, October 2006

2 Project Summary

PROJECT TITLE	GLENROWAN TERMINAL STATION REDEVELOPMENT
ESTIMATE	$20,784,000
TIMING	2011–2013
CUSTOMER	SPIE AND VENCORP CONSULTED
LOCATION	GLENROWAN TERMINAL STATION

The GNTS redevelopment project[2] provides for the replacement of 220 kV air blast circuit breakers, the number one 220/66 kV transformer bank, 66 kV bulk oil and minimum oil circuit breakers, associated secondary equipment and auxiliary power supply systems.

The scope of work includes:

- Replacement of 8 x 220 kV switch bays, associated with existing air blast circuit breakers
- Replacement of the 6 single phase ASEA transformers which form the number one 125 MVA 220/66 kV transformer bank with a three-phase 220/66 kV 125 MVA transformer.
- The replacement of 6 x 66 kV LG4C bulk oil circuit breakers and associated switchgear.
- The replacement of 1 x 66 kV S&S 509 minimum oil circuit breakers and associated switchgear.
- Replacement of protection and control equipment associated with the circuit breakers and transformer above.
- Upgrading of fire fighting facilities
- Replacement of station service supplies and DC supplies.

The possible integration of this asset replacement project with the replacement of transformers at Bendigo terminal station, the future needs of the Distribution Company to augment transformer capacity[3] at Glenrowan and of VENCorp to switch the DDTS-SHTS 220 kV line at Glenrowan was identified.

3 Consultants Reviews

Parson Brinckerhoff (PB) were engaged by the Australian Energy Regulator (AER) to assist in the evaluation of SP AusNet's 2008 - 2014 electricity transmission revenue proposal. However the GNTS redevelopment project was not included for a detailed review by PB. There was virtually no discussion on the project or requests for clarification or additional information with SP AusNet staff and PB did not comment in their report[4].

Nuttall Consulting was also engaged by the AER to review the SP AusNet documentation and the AER proposals; however there was no discussion with or requests for clarification or additional information from SP AusNet regarding this additional review of the GNTS redevelopment.

[2] Glenrowan Terminal Station Redevelopment – Capital Works Project Description, October 2006
[3] Transmission Connection Planning Report 2006 – Jointly prepared by Victorian Distribution Companies
[4] SP AusNet 2008 Revenue Reset Submission – An independent review – SPA2008Reset_v5_0.doc 3 August 2007 - PB

SP AusNet acknowledges that the AER has accepted the proposed replacement of 220 kV switch bays associated with eight air blast circuit breakers and the replacement of six single-phase ASEA transformers which form the number one 125 MVA 220/66 kV transformer bank at GNTS during the forthcoming regulatory period[5] . These decisions are not discussed further in this paper.

3.1 66 kV Circuit Breaker Replacement

The following points are extracted from the AER detailed discussion on pages 306 – 308 of Appendix B.2.4 of the Draft Decision.

- All six of the 66 kV CBs (LG4C type) have been assigned a 'Medium/Low' risk ranking.
- The primary driver for replacement of the 66 kV CBs at GNTS appears to be SP AusNet's strategic objective to phase out of all 'LG4C;' units over the next fifteen years.
- SP AusNet has not presented an economic analysis justifying the redevelopment of the 66 kV switchyard at GNTS
- On this basis the AER made a downward adjustment of $4.92m to SP AusNet's proposed forecast capex allowance for works at GNTS to remove the cost associated with redevelopment of the 66 kV switchyard, as set out in Figure 1, below.

	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Total
SP AusNet's Proposal	0.00	0.00	0.00	0.43	6.82	14.07	21.30
AER's adjustment	0.00	0.00	0.00	0.00	-2.46	-2.46	-4.92
AER's conclusion	0.00	0.00	0.00	0.43	4.37	11.62	16.41

Figure 1 - Table B.2.13: AER's conclusion – Refurbishment of GNTS ($m, 2007-08), Page 308

4 SP AusNet Response

This paper provides clarification regarding the information already supplied and additional information to assist the AER and its consultants in the review of the replacement of six LG4C type 66 kV circuit breakers and one S&S type 509 66 kV circuit breaker and associated secondary equipment at GNTS. Reference should be made to the 66kV CB Replacement Program[6] for further discussion and analysis of the 66kV circuit breakers.

4.1.1 GEC Type LG4C 66 kV Circuit Breakers

These bulk oil type CBs which employ a separate tank for each phase, with a separate interrupter system and integral current transformers. They employ a solenoid-close, spring-open mode of operation with the closing solenoid located in a single common mechanism cubicle. Tripping springs are located within the interphase linkage system. Current transformers are mounted on the bushing stems inside each phase tank.

[5] Appendix B.2.4 Page 307, AER Draft Decision, SP AusNet transmission determination 2008-09 to 2013-14, 31 August 2007
[6] 66kV CB Replacement Program, 2008/9-2013/14 Capital Works Revised Proposal, October 2007

Figure 2 - GEC type LG4C 66kV circuit breaker

The LG4C CB fleet numbers approximately 208 units and is the largest in the Victorian electricity transmission network. In 2008, the LG4C CBs will range in service age from 34 to 43 years. A typical LG4C is in the medium range in terms of overall per unit cost of ownership (planned and unplanned maintenance costs combined). At present they are quite reliable with the ratio of planned to unplanned maintenance activities being approximately two to one in terms of both cost and work orders.

However, the size of the LG4C fleet and simple averages of performance and costs effectively hide smaller cohorts of underperforming LG4C units[7]. Examination of work orders for LG4C circuit breakers over the period 2002 to 2006 reveals that there is a cohort of CBs which is requiring break down maintenance at intervals of seven years (MTBF = 7 years) and an even smaller cohort of 6 units which is averaging unplanned maintenance on an annual basis. (MTBF = 1). The principle drivers of these relatively high levels of breakdown maintenance are auto-points accumulation (number of operations at loadings or fault level close to CB rating) and low oil levels in the bushings.

The bushing oil levels are of most concern as thermal runaway and explosive failure is likely if oil levels fall rapidly.

Bulk oil type circuit breakers are inherently maintenance intensive and LG4C CBs have limited fault ratings. A number within the Melbourne metropolitan area are operating at or very near their design fault level rating. The LG4C CBs typically exhibit the following age/duty related deterioration:

- Corrosion - evident on mechanism cubicles, tanks and support structures
- Erosion of Arc Control Devices - The arc control chambers exhibit burning and erosion dependent upon their duty and number of operations. Depending upon the initial design parameters this may have an adverse impact upon their ultimate fault rating
- Mechanism and Drive System Wear - Depending upon their number of operations, environment and quality of previous maintenance typically wear will be evident throughout the mechanism and drive system, particularly within latch systems, bearings and dashpots

[7] 66kV CB Replacement Program, 2008/9-2013/14 Capital Works Revised Proposal, October 2007

The following asset management strategies[8] are relevant for LG4C circuit breakers:

- CBs will be progressively retired with those operating at or near their fault rating being allocated highest priority.
- Routine maintenance scopes will be amended to incorporate additional work scope to diagnose and address areas of typical age related deterioration.
- Essential spares to support the balance of the fleet will be sourced from those CBs removed from service.

4.1.2 Sprecher & Schuh Type HPF 509 66 kV Circuit Breakers

There are 32 x S&S Type HPF 509 minimum oil 66 kV circuit breakers in the Victorian electricity transmission network. They range in service age from 25 to 40 years. Predominantly they have been employed on capacitor bank switching and thus operate more frequently with commensurate deterioration within interrupters and operating mechanisms.

S&S Type 509 CBs incur relatively high maintenance costs and more frequent outages are required to overhaul interrupter and oil every 250 operations as they are not fitted with nor are capable of being adapted for point on wave control.

By comparison, modern SF6 circuit breakers fitted with point on wave control, can successfully switch in excess of 2500 operations before requiring an overhaul. A reduction in unplanned repairs, duty based maintenance costs and outages as well as improved power quality and electrical stress on adjacent equipment are benefits and drivers for replacement.

Figure 3 – S&S Type 509 circuit breaker

S&S 509 typically exhibit the following age/duty related deterioration:

- Interrupter Compartments:
  - Oil Leakage - There are increasing incidences of oil leakage from the interrupters which may be indicative of age related deterioration of the sealing systems
  - Age and Duty Related Issues - Age related defects typically occur in contact actuating linkages and within the arc control devices
- Mechanisms and Drive Systems:
  - Wear within mechanism resulting in difficulty in adjustment and discrete component failures (typically latches, striker pins etc.)

[8] Asset Management Strategy documents AMS 10-54 and AMS 10-106

- Age related deterioration of dashpot seals and drive systems results in deterioration in damping of the moving contact and drive system
- The external, rotating porcelain insulators which transmit drive from the linkage system in the base of the CB up to the interrupter external drive system experience age related deterioration which typically manifests as cracking of the porcelains

- Spares - SP AusNet holds very limited spares. Spares are no longer available from the manufacturer

The following asset management strategies[9] are relevant for S&S 509 circuit breakers:

- CBs will be progressively retired as part of the Terminal Station redevelopment program and also as the opportunity presents.
- Routine maintenance scopes will be amended to incorporate additional work scope to diagnose and address areas of typical age related deterioration.
- Essential spares to support the balance of the fleet will be sourced from those CBs removed from service.
- Targeted replacement of highly operated CBs that switch reactive plant.

4.1.3 CB Age

The LG4C and S&S 509 circuit breakers at GNTS will have delivered 44 years service by 2011/12 making them amongst the oldest in the Victorian electricity transmission 66 kV fleet as illustrated in Figure 4 below.

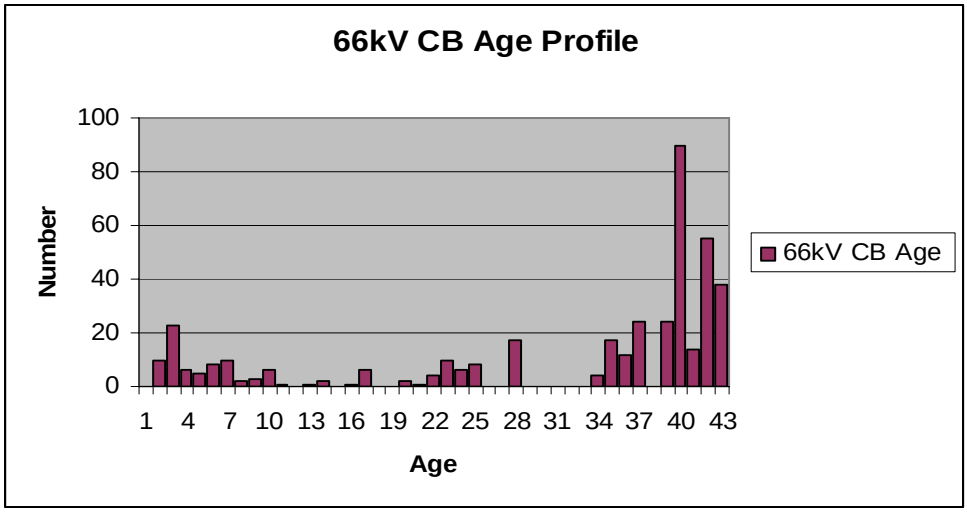

Figure 4 – 66kV Circuit Breaker Age Profile[10]

4.1.4 CB Condition

Figure 5 below, shows that the LG4C CBs at GNTS do not have an MTBF between 19 and 29 years, as stated on page 307 of the draft determination[11] but are in fact part of a smaller cohort which have a maintenance frequency almost 3 times higher than that of a new circuit breaker.

[9] Asset Management Strategy documents AMS 10-54 and AMS 10-106
[10] 66kV CB Replacement Program, 2008/9-2013/14 Capital Works Revised Proposal, October 2007
[11] AER Draft Decision, SP AusNet transmission determination 2008-09 to 2013-14, 31 August 2007

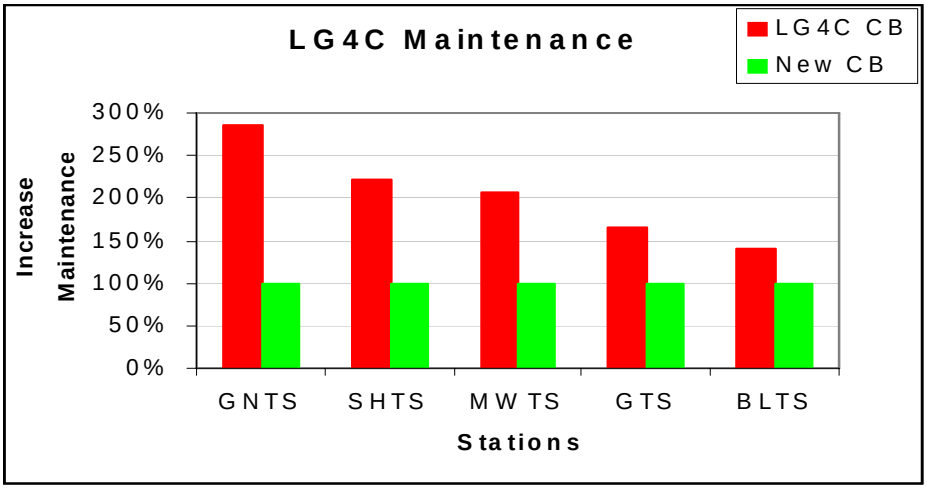

Figure 5 – LG4C CB maintenance by station[12]

Examination of maintenance work orders over the period 2003 - 2006 show that GNTS LG4C circuit breakers require significantly more maintenance than their peers. This maintenance requirement indicates a MTBF of 7 years for GNTS circuit breakers. The principle drivers for this breakdown maintenance are auto points accumulation and low oil levels in the HV bushings.

Examination of maintenance work orders for S&S type 509 circuit breakers over the period 2003 – 2006 shows they average 0.62 unplanned work orders per CB per annum. This indicates a mean time between failures of less than 2 years. The principle driver of this high level of unplanned maintenance is auto-points accumulation related to the number of switching operations associated with capacitor banks.

Figure 6 below shows that the #1 66 kV capacitor bank CB at GNTS has the second highest requirement for unplanned maintenance of the S&S 509 fleet; more than 3 times the requirement for a modern equivalent CB.

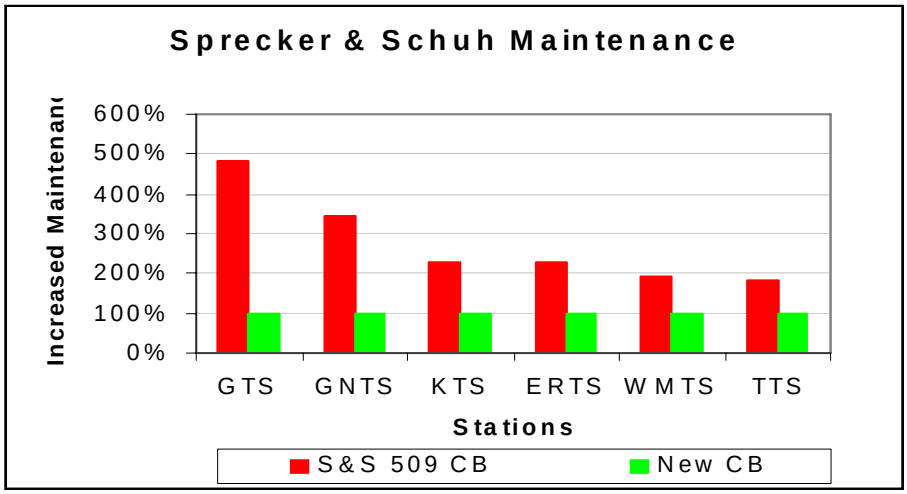

Figure 6 – LG4C CB maintenance by station[13]

[12] 66kV CB Replacement Program, 2008/9-2013/14 Capital Works Revised Proposal, October 2007
[13] 66kV CB Replacement Program, 2008/9-2013/14 Capital Works Revised Proposal, October 2007

Figure 7 below[14], illustrates that the optimum timing for replacement of LG4C circuit breakers from the poorer performance cohort, such as those CBs at GNTS, is in the period from 45 to 55 years service life.

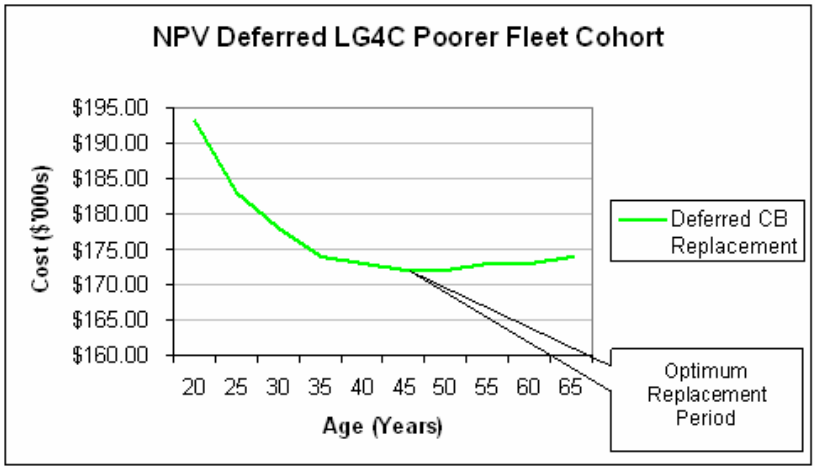

Figure 7 – NPV Deferred replacement of poor performing LG4C CBs

4.1.5 CT Condition

There are six post type current transformers (CTs) associated with the Sprecher & Schuh Type HPF 509 66 kV circuit breaker protecting the number one 66 kV capacitor bank at GNTS. The CT risk model[15] indicates that these CTs have 6 years remaining life @ 2011/12 and accordingly have relatively high failure risks.

SP AusNet, PB and the AER agree[16] *that there is a clear need to replace high-risk CTs due to the unacceptable risk associated with explosive CT failure……* and that the……..*Costs of replacement in the aftermath of an explosive CT failure clearly outweigh the costs of planned replacement.*

Net Present Value studies on current transformer replacement[17] also demonstrate that the optimum time for replacement is when CTs are assessed to have between 5 years and 10 years of remaining life as is the case at GNTS. These NPV studies confirm that deferring replacement of CTs (with less than 5 years remaining life) is not efficient.

4.1.6 Secondary Equipment Condition

The Duo Bias, D21SE2 and D22SE2 transformer protection relays at GNTS will be replaced in conjunction replacement of the #1 transformer bank. There are seven other types of protection relays associated with the GNTS 66 kV bus tie, HV line and capacitor bank circuit breakers; including, CAG36, CDG11, CDG14, LH1C, RYZOE and TS relays. A full description of these relays, their known problems and proposed remedial strategies can be found in the Asset Management Strategy[18]. For convenience a brief summary follows.

[14] 66kV CB Replacement Program, 2008/9-2013/14 Capital Works Revised Proposal, October 2007
[15] 2007 CT Risk Model.xls
[16] P290 – AER Draft decision – SP AusNet Transmission Determination 2008-09 to 2014-14
[17] Part 1 and Part 2 of NPV Current Transformer Replacement Options.xls
[18] Asset Management Strategy AMS 10–68 Protection Systems

4.1.6.1. HV Line protection

Of some concern are the electro-mechanical distance relays (LH1C, RXAP, RYZOE, L3WYS) that are over 30 years old where stiction and corrosion have been experienced. Also of concern are the older electronic distance relays (TS, THIA, RAZOG) that are more than 20 years old where routine testing has found some calibration errors, indicative of electronic component ageing. Failure may be found during maintenance or by incorrect or non-operation for a feeder fault. This requires an immediate temporary replacement, followed by a later permanent replacement. Failure may also be detected by non-action or over-action during a feeder fault. Manufacturers no longer support these relays and there are no spares held. In addition, there is no internal supervision or monitoring in the relay, or fault location or recording facilities. Principal management strategies for HV feeder protection are:

- Progressively replace electro-mechanical relays, based on condition and risk of failure.
- Progressively standardise relay types and configurations.
- Progressively introduce microprocessor-based relays integrating protection, control and instrumentation functions that can communicate serially to a Station Controls and Information Management System (SCIMS).

4.1.6.2. Capacitor Banks

Capacitor banks are protected with over-current and balance (current) protection schemes which include older electro-mechanical relays and more modern microprocessor relays that range from five to 15 years of service. At GNTS the CDG14 electromechanical relays will have delivered 38 years service by 2011/12 and thus are at the end of their technical life.

5 Options

Acknowledging that the AER has accepted the proposed replacement of 220 kV switch bays associated with eight air blast circuit breakers and the replacement of six single-phase ASEA transformers which form the number one 125 MVA 220/66 kV transformer bank at GNTS during the forthcoming regulatory period[19]; the options for 66 kV circuit breaker and associated current transformer and secondary relay replacement are:

- Defer replacement of all 66 kV circuit breakers, current transformers and associated secondary equipment.
- Replace 66 KV CBs directly involved with the replacement of the #1 220/66 kV transformer bank, the 1-2 66 kV bus tie CB (single contingency failure point with high lost load consequences) and the #1 66 kV capacitor bank CB and its associated high risk current transformers.
- Integrate 66 kV circuit breakers, current transformers and associated secondary equipment replacements with that of the 220 kV circuit breakers and the #1 220/66 kV transformer bank in a single project commencing in 2011/12.

5.1 Defer 66 kV Switchyard replacements

In its detailed discussion on pages 306 – 308 of Appendix B.2.4 of the Draft Decision the AER argued that: *SP AusNet has not presented an economic analysis justifying the redevelopment of the 66 kV switchyard at GNTS* and on this basis the AER made a downward adjustment of $4.92m to the

[19] Appendix B.2.4 Page 307, AER Draft Decision, SP AusNet transmission determination 2008-09 to 2013-14, 31 August 2007

proposed forecast capex allowance for works at GNTS to remove the cost associated with redevelopment of the 66 kV switchyard.

5.1.1 Construction Sequencing

This option overlooks the practicalities of connecting the new GNTS #3 transformer and disconnecting the existing GNTS #1 transformer bank from 66 kV busses. New bus work and a new circuit breaker are required. The existing #1 transformer group 66 kV CB becomes redundant.

5.1.2 High Failure Risks

This option does not mitigate the relatively high (and increasing) failure risks associated with 66 kV CBs and 66 kV CTs at GNTS for a decade.

5.1.3 Hybrid Secondary Architecture

The deferral of 66 kV switchyard and associated secondary equipment replacement will create a unique hybrid architecture for secondary systems at GNTS. Unique architectures are less efficient because they require additional design, construction, testing and commissioning effort to ensure reliable operation.

5.2 Defer HV Line CB replacements

5.2.1 Construction Sequencing

From a network security perspective, the most effective construction sequence is the establishment and commissioning of a new GNTS #3 transformer followed by the decommissioning and dismantling of the existing GNTS #1 transformer bank. Such sequencing will involve establishing new bus bars, a new #3 transformer 66 kV circuit breaker and the retirement of existing #1 transformer group 66 kV circuit breaker.

5.2.2 High Failure Risks

The 1-2 66 kV bus tie circuit breaker forms a single contingency failure point with high lost load consequences. Failure of this circuit breaker will involve the loss of both 66 kV busses and hence all load supplied from GNTS. Based on the consequences observed at BATS in November 2006[20], following the failure of a 66 kV current transformer in a similar location, this is likely to involve the loss of more than 60 MW of load for at least 15 minutes prior to restoration of supplies via one bus and SCADA controls. Based on the customer value of $34,158 / MWHr for GNTS[21], Victorian consumers would value this unsupplied energy at more than $510,000.

As previously discussed, the #1 capacitor bank CB has a high probability of failure, In addition, the six current transformers associated with this CB also have high probabilities of failure due to their low remaining life estimates.

[20] System Incident Report 10254696 – 30 November 2006
[21] Transmission Connection Planning Report 2006 – Jointly prepared by Victorian Distribution Companies

5.2.3 Defer replacement of Line CBs

There is thus an option to replace those 66 kV CBs directly involved in the 220 kV and transformer works and those 66 kV CBs at higher risk of failure or having high consequences of failure and their associated secondary works at an estimated equivalent cost of $1.74 M. Such a case would involve the deferral of the replacement of the remaining four 66 kV line circuit breakers and capital expenditure of $2.82 M.

Whilst addressing the highest risk assets, this option will require additional design, construction, testing and commissioning effort to ensure reliable operation of a unique hybrid secondary architecture.

5.3 Integrated Project

As outlined in SP AusNet's original capital works proposal[22], integration of 66 kV circuit breaker replacement, current transformer replacement and associated secondary equipment replacement with the replacement of 220 kV circuit breakers and number 1 transformer bank is estimated to cost $20.8 M. The 66 kV switchyard and associated secondary works are estimated to cost $4.0 M if undertaken as part of an integrated project with efficiencies attained though detailed design, procurement, and project establishment and management.

As an independent project the 66 kV switchyard and associated secondary equipment replacements are estimated to cost $4.9 M. The distance of GNTS from a major design and construction resource centre such as Melbourne is a significant factor in efficiency of an integrated project.

This option efficiently delivers standard secondary system architecture with full functionality and low risk.

6 Economic Analysis

6.1 Integrated Project

The integration of 66 kV circuit breaker and associated secondary works with the replacement of the 220 kV switchyard works and transformer works has a Net Present Value of $5.34 M[23].

6.2 Defer replacement of four 66 kV Line CBs

The deferred replacement of four 66 kV line circuit breakers for a period up to 4 years has a NPV ranging from 101 % to 97 % of that of the integrated project[24]. Considering the accuracy of costs, failure probabilities and consequences used in the analysis, this option does not deliver any meaningful savings for deferral periods up to 5 years.

[22] Glenrowan Terminal Station Redevelopment – Capital Works Project Description, October 2006
[23] Part 1 – NPV GNTS 66 kV Switchyard Replacements.xls
[24] Part 4 – NPV GNTS 66 kV Switchyard Replacements.xls

6.3 Defer 66 kV Switchyard replacements

The NPV of deferring all 66 kV switchyard and associated secondary works[25] exceeds that of an integrated project ($5.34M) by up to 16 % for a period of 9 years. Thus, within the accuracy of the analysis, this option does not deliver any meaningful savings for the 2008-2014 regulatory period or the following regulatory period.

6.4 Least Cost

As illustrated in Figure 8 below, the integration of 66 kV circuit breaker and associated secondary works with the replacement of 220 kV circuit breakers and #1 transformer bank at GNTS, commencing in 2011/12, is the least cost proposal for the 2008-2014 regulatory period and the following regulatory period.

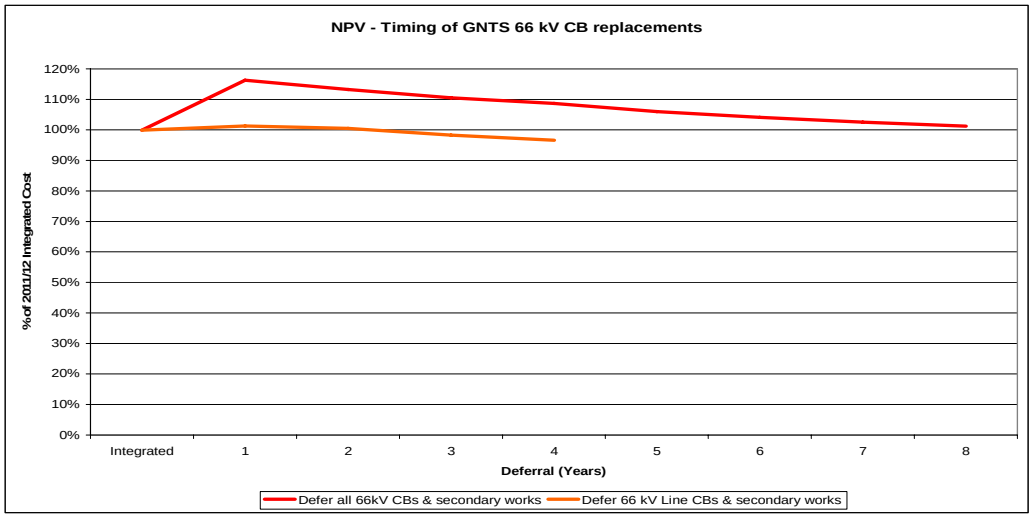

Figure 8 – NPV Deferral of 66 kV switchyard & secondary works[26]

7 Contingency

SP AusNet, in its submission for the refurbishment of Glenrowan Terminal Station, included a contingency amount of $1.5M to cater for additional projects costs that occur in a project of this complexity that are not related to labour and materials costs escalation.

The AER removed the contingency amount of $1.5m, that SP AusNet had assessed was required to cover the scope increases that will occur in a complex station redevelopment project.

SP AusNet maintains that this contingency is required and this is supported by the Evans and Peck[27] analysis for the major station refurbishments.

[25] Parts 2 & 3 NPV GNTS 66 kV Switchyard Replacements.xls
[26] Chart – NPV GNTS 66 kV switchyard replacements.xls
[27] Risk Review of Capital Replacement Program, Oct 2007, Evans & Peck.

8 Recommendation

The AER's proposal to defer replacement of 66 kV circuit breakers, current transformers and associated secondary equipment at GNTS is not prudent because 66 kV equipment failure risks will increase over the period 2008-2020 to levels which will disadvantage Victorian consumers through unsupplied energy.

The AER's proposal to defer replacement is not efficient because its Net Present Value is significantly lower than that of SP AusNet's proposed integrated re-development of Glenrowan Terminal Station.

On the basis of the above considerations, it is SP AusNet's view that the level of expenditure recommended by the AER in relation to the GNTS re-development project is:

- insufficient to enable SP AusNet to recover the efficient costs of achieving the capital expenditure objectives set out in clause 6A6.7(a) of the NER; and is
- below the costs that a prudent operator in the circumstances of SP AusNet would require to achieve the capital expenditure objectives.

In particular, in regard to the capital expenditure objectives set out in the NER, the level of expenditure recommended by AER is, in SP AusNet's view:

- insufficient to enable SP AusNet to comply with all applicable regulatory obligations associated with the provision of prescribed transmission services (clause 6A6.7(a)(2)); and
- insufficient to enable SP AusNet to maintain the reliability, safety and security of the transmission system (clause 6A6.7(a)(4)).

SP AusNet therefore considers that the AER must, pursuant to clause 6A6.7(c) accept the inclusion of the allowance for 66 kV circuit breakers, current transformers and associated secondary equipment replacement costs in the capital expenditure forecast, as detailed below:

- Reinstate the $4.92 M funding removed from the GNTS re-development project for the replacement of 6 x 66kV LG4C circuit breakers and 1 x 66 kV S&S type 509 circuit breaker and the associated secondary equipment.
- Include a risk allowance of $1.5 M in the project forecast for the financial risk as estimated by Evan and Peck.

	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Total
SP AusNet's revised proposal	$ 0.0	$ 0.0	$ 0.0	$ 0.43	$ 6.82	$ 14.07	$ 21.32

9 APPENDIX A – Supporting Documentation

- Asset Management Strategy Victorian Electricity Transmission Network – AMS 10-01
- AMS - Circuit Breakers – AMS 10-54
- AMS – Circuit Breakers – Summary of Issues and Strategies – AMS 10-106
- AMS Protection Systems – AMS 10–68
- Glenrowan Terminal Station Redevelopment 2008/9-20013/14 Capital Works project description Oct 2006
- Parts 1, 2, 3 & 4 NPV GNTS 66 kV switchyard replacements.xls
- Chart - NPV GNTS 66 kV switchyard replacements.xls

- Part 1 and Part 2 of NPV Current Transformer Replacement Options.xls
- 66kV CB Replacement Program, 2008/9-2013/14 Capital Works, Revised Proposal Oct 2007
- Current Transformer Replacements, 2007/8-20134/14 Capital Works, Revised Proposal Oct 2007
- Risk Review of Capital Replacement Program, Oct 2007, Evans & Peck
- Transmission Connection Planning Report 2006 – Jointly prepared by Victorian Distribution Companies
- 2007 CT Risk Model.xls
- System Incident Report 10254696 – 30 November 2006