AusNet

Transmission Revenue Reset 2027 to 2032 (TRR 2027-32)

Project Planning Report: Ballarat Terminal Station B2 Transformer Replacement Project

Date: October 2025

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1. Executive summary

One of the two 150MVA 220/66 kV power transformers at Ballarat Terminal Station (BATS) is in a very poor condition. The B2 transformer has a high likelihood of failure should a close-in network fault occur, due to a design issue affecting the structural strength of its 66 kV winding.

The risk of a failure of this B2 transformer is forecast to increase over time, and an investment of $45.5 M to replace this transformer is economically justified by 2025.

The project delivery lead time is estimated to be four years. AusNet plans to complete the RIT-T by 2027 and commence the project by 2028, with all forecast expenditure falling into the 2027 to 2032 TRR period.

2. Background

Ballarat Terminal Station (BATS) is in Western Victoria and serves as the supply point for the large regional city of Ballarat. BATS has two 150 MVA 220/66 kV transformers (B1 and B2). BATS is also part of the 220 kV regional network supplying northwestern Victoria with 220 kV line connections to Waubra, Berrybank, Elaine, Moorabool and Bendigo.

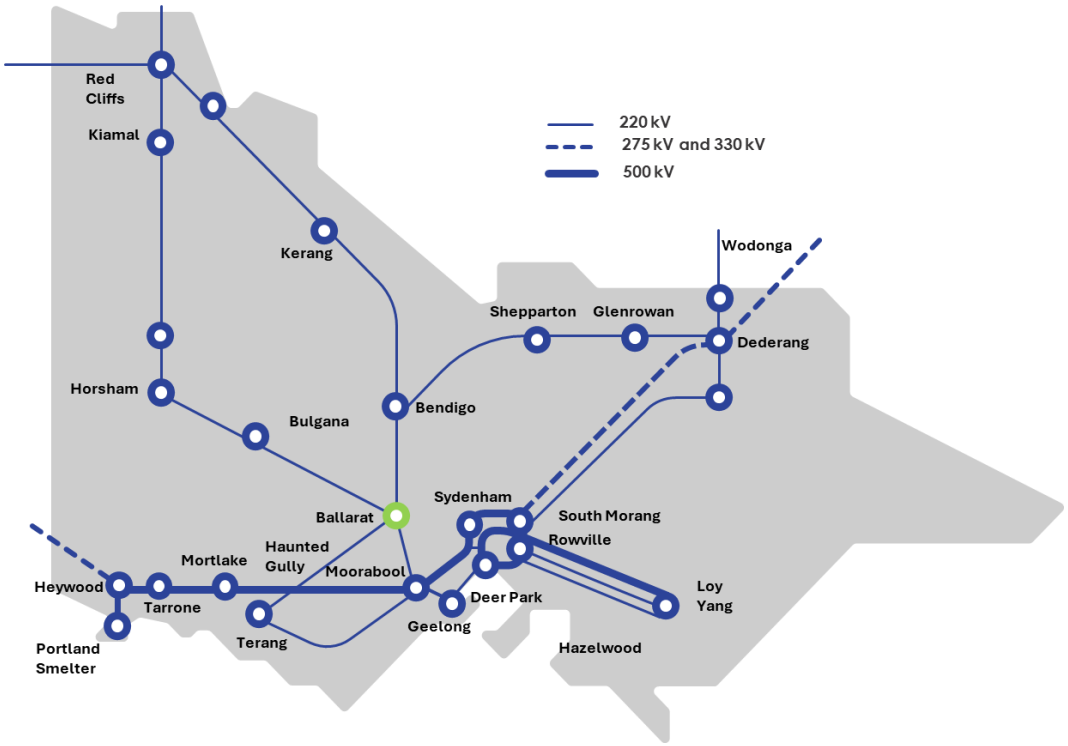

Figure 1: Victorian main transmission system

Asset Health

Commissioned in 1969, the B2 transformer is now 56 years old and is in very poor condition.

Forensic analysis of similar 150 MVA 220/66 kV transformer failures at BATS and RWTS (with the same manufacturer, design, construction and specification) indicated a fleet based latent 'end of life' defect in the winding structural support system.

Condition monitoring data for the BATS B2 transformer shows significant deterioration of the winding insulated support structures, as indicated by sustained high levels of phenolic and furan compounds in the insulating oil. The combination of an 'end of life' defect and advanced deterioration of the BATS B2 transformer's cellulose support structures means it is highly likely to fail during a close-in downstream system short circuit.

Refer to the BATS B2 Transformer Replacement - Asset Condition Report for detailed health review of this asset.

Table 1 shows the forecast failure rates for B2 transformers at BATS.

Transformer Failure Rates	2025	2026	2027	2028	2029	2030	2031	2032
BATS B2 TR	0.05243	0.05383	0.05524	0.05667	0.05812	0.05958	0.06107	0.06258

Table 1: BATS B2 transformer forecast failure rates

3. Identified need

BATS is a key terminal station on Victoria's main transmission network. AusNet Services expects that the BATS transmission services will continue to be required given the developments that are foreshadowed in AEMO's Integrated System Plan (ISP), Victorian Annual Planning Report (VAPR), and VicGrid's Victorian Transmission Plan (VTP).

The BATS B2 transformer is in a very poor condition, posing a significant risk of failure if not addressed in a timely manner. A simultaneous outage of both 220/66 kV transformers would result in prolonged outages and significant amounts of involuntary load shedding.

Without remedial action, other than ongoing maintenance practice, the B2 transformer is expected to deteriorate further and more rapidly. Further increases in the probability of asset failure will result in a higher likelihood of an impact on transmission network users and in particular to the town of Ballarat, along with heightened safety risks due to potential explosive failure, environmental risks, collateral damage risks, and the risk of increased costs resulting from emergency asset replacements and reactive repairs. Therefore, the 'identified need' this project intends to address is to maintain reliable transmission network services at BATS and to mitigate risks from asset failures.

AusNet Services calculated the present value of the baseline risk to be about $117 million over the forty-five-year period from 2025. The key risks are shown in Figure 2 with the largest components being the supply risk that will impact network users because of involuntary load shedding, and reactive asset replacement risk from increased cost when responding to an asset failure.

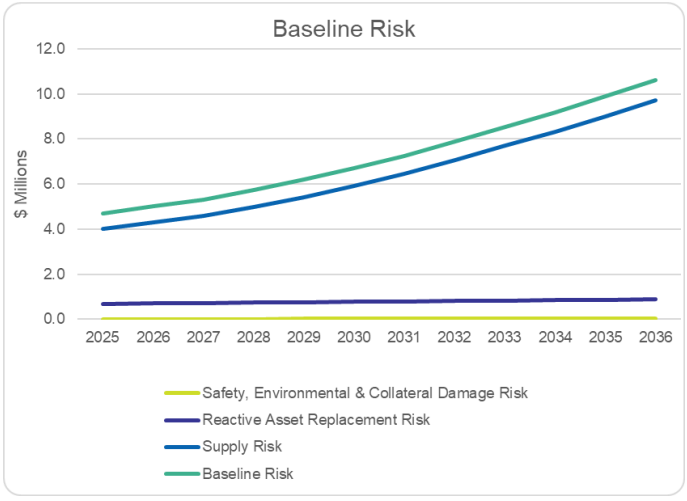

Figure 2: Baseline risk

By undertaking the preferred option identified, AusNet Services will be able to maintain reliable transmission network services at BATS and mitigate safety and environmental risks as required by the NER and Electricity Safety Act 1998[1].

3.1. Key inputs and assumptions

Aside from the failure rates (determined by the condition of the assets) and the likelihood of relevant consequences, AusNet Services also adopted the following assumptions to quantify the risks associated with asset failure.

[1] Victorian State Government, Victorian Legislation and Parliamentary Documents, "Electricity Safe Act 1998"

Market impact and supply risk costs

AusNet Services calculated the market impact cost, which consist of involuntary load shedding resulting from a failure or simultaneous failure of the BATS B1 and B2 transformer based on the Value of Customer Reliability (VCR)[2] for the load composition at BATS 66 kV.

Safety risk costs

The Electricity Safety Act 1998[3] requires AusNet Services to design, construct, operate, maintain, and decommission its network to minimize hazards and risks to the safety of any person as far as reasonably practicable or until the costs become disproportionate to the benefits from managing those risks. By implementing this principle for assessing safety risks from asset failures, AusNet Services uses:

- a value of statistical life[4] to estimate the benefits of reducing the risk of death;
- a value of lost time injury[5]; and
- a disproportionality factor[6].

AusNet Services notes this approach, including the use of a disproportionality factor, is consistent with the practice notes[7] provided by the AER.

Financial risk costs

As there is a lasting need for the services that BATS provides, the failure rate-weighted cost of replacing failed assets (or undertaking reactive maintenance) is included in the assessment.[8]

Environmental risk costs

Environmental risks from plant that could impact the environment when it fails and where cleanup cost could be in the order of $30,000 per event.

4. Options assessed

AusNet Services considered both network and non-network options to address the identified need but did not find any suitable non-network solution. The two network options are presented below.

4.1. Option 1: Replace B2 transformer

Option 1 involves the replacement of the B2 transformer with a new transformer in 2031 or sooner. The existing B2 transformer will be disposed of in accordance with AusNet policies and EPA legislation.

The estimated capital cost of this option is $45.5 million (direct expenditure with overheads and finance charges) and the change in operating and maintenance costs is negligible. The estimated project delivery time is three to four years.

4.2. Option 2 Deferred replacement

Option 2 is the same as Option 1, except the replacement of the B2 transformer is deferred to 2036.

The estimated capital cost of this option is $45.5 million (direct expenditure with overheads and finance charges) and the change in operating and maintenance costs is negligible. The estimated project delivery time is three to four years.

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2 In dollar terms, the Value of Customer Reliability (VCR) represents a customer's willingness to pay for the reliable supply of electricity. The values produced are used as a proxy, and can be applied for use in revenue regulation, planning, and operational purposes in the National Electricity Market (NEM).
3 Victorian State Government, Victorian Legislation and Parliamentary Documents, "Electricity Safe Act 1998"
4 Department of the Prime Minister and Cabinet, Australian Government, "Best Practice Regulation Guidance Note: Value of statistical life"
5 Safe Work Australia, "The Cost of Work-related Injury and Illness for Australian Employers, Workers and the Community: 2012-13"
6 Health and Safety Executive's submission to the1987 Sizewell B Inquiry suggesting that a factor of up to 3 (i.e. costs three times larger than benefits) would apply for risks to workers; for low risks to members of the public a factor of 2, for high risks a factor of 10. The Sizewell B Inquiry was public inquiry conducted between January 1983 and March 1985 into a proposal to construct a nuclear power station in the UK.
7 Australian Energy Regulator, "Industry practice application note for asset replacement planning"
8 The assets are assumed to have survived and their condition-based age increases throughout the analysis period.

4.3. Material inter-regional network impact

The proposed asset replacements at BATS will not change the transmission network configuration and none of the network options considered are likely to have a material inter-regional network impact. A 'material inter- regional network impact' is defined in the NER as:

"A material impact on another Transmission Network Service Provider's network, which may include (without limitation): (a) the imposition of power transfer constraints within another Transmission Network Service Provider's network; or (b) an adverse impact on the quality of supply in another Transmission Network Service Provider's network."

5. Assessment approach

Consistent with the RIT-T requirements and practice notes on risk-cost assessment methodology, AusNet Services undertook a cost-benefit analysis to evaluate and rank the net economic benefits of the credible options over a 45-year period.

All options considered have been assessed against a business-as-usual case where no proactive capital investment to reduce the increasing baseline risks is made.

Optimal timing of an investment option is the year when the annual benefits from implementing the option become greater than the annualised investment cost.

5.1. Proposed scenarios and input assumptions

The robustness of the investment decision is tested using the range of input assumptions and scenarios described in the table below. This analysis involves variation of assumptions around the most likely values as per the IASR, AEMO's connection point forecast, AER latest VCR rates, and AusNet Service's best estimate of project cost and forecast asset failure rates.

Parameter	Lower Bound	Most likely (central) assumption or scenario	Upper Bound
VCR	75% of central assumption	Published VCR	125% of central assumption
Asset failure rate	75% of central assumption	Assessed failure rate	125% of central assumption
Demand Growth	85% of central assumption	Connection Point Forecast provided with AEMO 2024 VAPR	115% of central assumption
Discount rate[9]	WACC rate of a network business (3.0%)	Latest commercial discount rate from IASR (7%)	Upper Bound (10%)
Project Capital Cost	85% of estimated cost	Estimated cost	115% of estimated cost

Table 21 - Summary of input assumptions for range of scenarios

5.2. Material classes of market benefits

NER clause 5.16.1(c)(4) formally sets out the classes of market benefits that must be considered in a RIT-T. AusNet Services estimates that the classes of market benefits that are likely to be material include changes in involuntary load shedding, and changes in fuel consumption arising through different patterns of generation dispatch.

[9]Discount rates as recommended in the AEMO Inputs, Assumptions and Scenarios Report (IASR)

5.3. Other classes of benefits

Although not formally classified as classes of market benefits under the NER, AusNet Services expects material reduction in: safety risks from potential failure of deteriorated assets, environmental risks, collateral damage risks to adjacent plant, and the risk of increased costs resulting from the need for emergency asset replacements and reactive repairs by implementing any of the options.

5.4. Classes of market benefits that are not material

AusNet Services estimates that the following classes of market benefits are unlikely to be material for any of the options considered:

- Changes in costs for parties, other than the RIT-T proponent – there is no other known investment, either generation or transmission, that will be affected by any option considered.
- Changes in ancillary services costs – the options are not expected to impact on the demand for and supply of ancillary services.
- Competition benefits – there is no competing generation affected by the limitations and risks being addressed by the options considered.
- Option value – as the need for and timing of the investment options are driven by asset deterioration; there is no need to incorporate flexibility in response to uncertainty around any other factor.

6. Options assessment

This section presents the results of the economic cost benefit analysis that has been conducted to determine the preferred option and its economic timing.

All the options considered will deliver a reduction in market impact risk (including supply risk), safety risk, environmental risk, collateral risk and risk cost of emergency replacement in the event of asset failure.

Presented in Figure 3, the total risk cost reduction or project benefits outweighs the investment cost for all options for all sensitivities where input variables are varied one at a time.

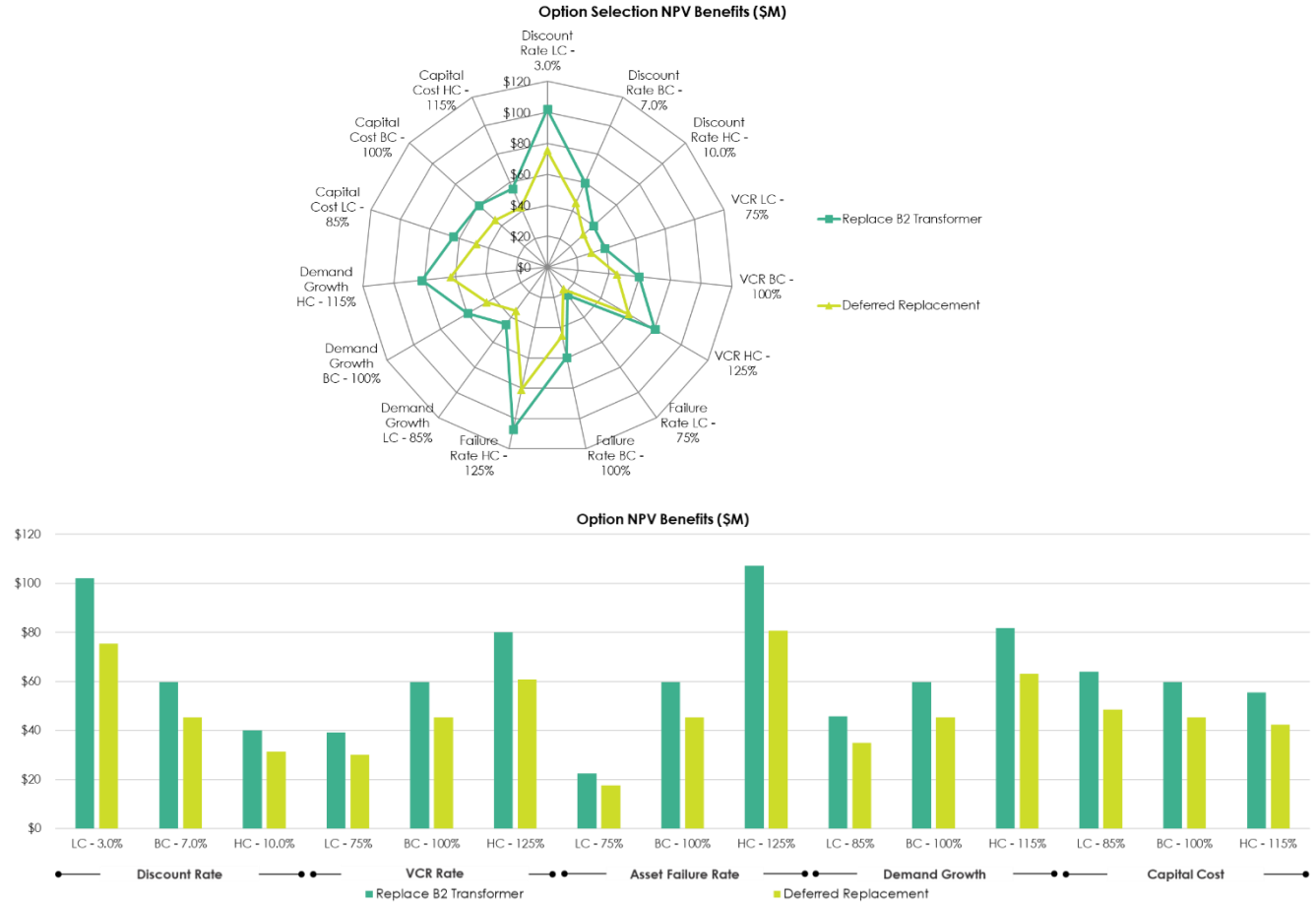

Figure 3 – Option selection, scenario and sensitivity study

6.1. Preferred Option

Option 1 (Replace B2 transformer) has the highest net economic benefit for all the scenarios and sensitivities considered and is therefore the preferred option. Scenario weighting will not make a difference to the preferred option as Option 1 has the highest net benefits for all 15 sensitivity studies considered.

6.2. Optimal timing of the preferred option

This section describes the optimal investment timing of the preferred option for different assumptions of key variables. Figure 4 shows that the optimal timing of the preferred option (Option 1) is 2025 or earlier and that investment is needed within the 2027 to 2032 regulatory control period. AusNet is proposing to complete project by 2031 in order to achieve a more smoothened capital expenditure profile over the 2027 to 2032 regulatory control period.

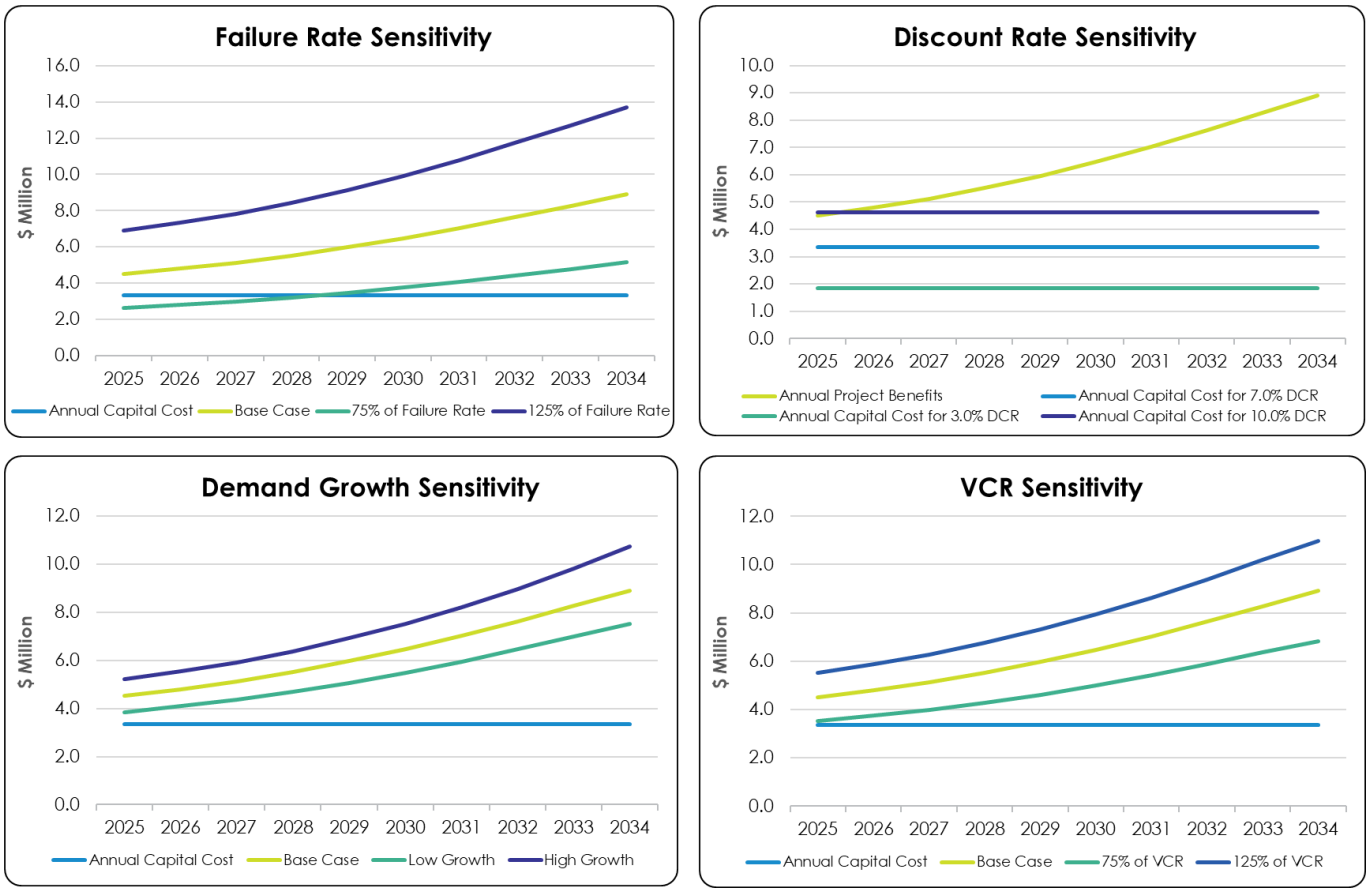

Figure 4 - Optimal investment timing sensitivity study

Figure 5 shows that the investment economic timing remains prior to 2025 for a 15% increase in investment cost.

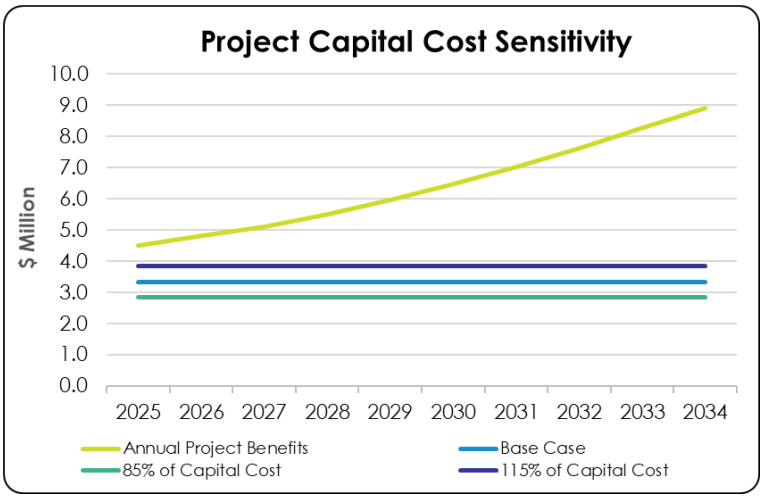

Figure 5 – Project capital cost sensitivity

7. Conclusion

Amongst the options considered, Option 1 is the most economical option to maintain reliable transmission network services at BATS and manage safety, environmental, collateral and emergency replacement risks. The preferred option involves the replacement of the B2 transformer at BATS by 2031 and the disposal of the existing B2 transformer in accordance with AusNet policies and EPA legislation.

The estimated capital cost of this option is $45.5 million (excluding management reserve) with no material change in operating and maintenance costs. The project is economically justified before 2025, and AusNet Services is targeting commissioning in 2031, with all cost falling within the 2027 to 2032 regulatory control period.

8. Appendix 1: Cost Estimate

PROJECT COST SUMMARY	**UNCERTAINTY ADJUSTED ESTIMATE**
Project Number:	**TD-0015756**
Project Title:	**BATS B2 Replacement**
Estimate Type:	**Indicative P50 Estimate**
Revision:	**Rev 1**
Issued Date:	**17/09/2025**

	PROJECT EXPENDITURE FORECASTS	RY29	RY30	RY31	RY32	TOTAL
1	DESIGN & STUDIES	$ 1,655,033	$ 827,517	$ -	$ -	$ 2,482,550
2	INTERNAL LABOUR	$ 478,176	$ 478,176	$ 478,176	$ 478,176	$ 1,912,705
3	MATERIALS (AusNet Free Issue Materials)	$ 2,396,267	$ 9,375,894	$ 6,327,458		$ 18,099,618
4	PLANT & EQUIPMENT		$ 79,290	$ 79,290	$ 79,290	$ 237,870
5	CONTRACTS (Including incentives and insurance)		$ 6,753,909	$ 6,753,909	$ 5,021,822	$ 18,529,640
6	**PROJECT DIRECT EXPENDITURE P(50)**	**$ 4,529,476**	**$ 17,514,785**	**$ 13,638,833**	**$ 5,579,288**	**$ 41,262,383**
7	MANAGEMENT RESERVE [P(90)-P(50)]					$ 1,807,506
8	**PROJECT DIRECT EXPENDITURE (SAP)**	**$ 4,529,476**	**$ 17,514,785**	**$ 13,638,833**	**$ 5,579,288**	**$ 43,069,889**
9	OVERHEADS	$ 909,519	$ 788,412	$ 373,440	$ 280,080	$ 2,351,452
10	FINANCE CHARGES (IDC)	$ 631,490	$ 707,521	$ 308,209	$ 267,187	$ 1,914,407
11	**TOTAL EXPENDITURE FOR APPROVAL (Including P(90))**	**$ 6,070,485**	**$ 19,010,719**	**$ 14,320,482**	**$ 6,126,556**	**$ 47,335,748**

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