

APPLICATION NOTICE

2 OCTOBER 2007



>> *Maintaining a reliable electricity supply to the north-eastern Brisbane area*

Disclaimer

While care was taken in preparation of the information in this document, and it is provided in good faith, ENERGEX Limited and Powerlink Queensland accept no responsibility or liability (including without limitation, liability to any person by reason of negligence or negligent misstatement) for any loss or damage that may be incurred by any person acting in reliance on this information or assumptions drawn from it, except to the extent that liability under any applicable Queensland or Commonwealth of Australia statute cannot be excluded.

This document has been prepared for the purpose of inviting information, comment and discussion from interested parties. The document has been prepared using information provided by a number of third parties. It contains assumptions regarding, among other things, economic growth and load forecasts which may or may not prove to be correct. ENERGEX and Powerlink make no representation or warranty as to the accuracy, reliability, completeness or suitability for particular purposes, of the information in this document. All information should be independently verified before assessing any investment proposals.

DOCUMENT PURPOSE

For the benefit of those not familiar with the National Electricity Rules (Rules) and the National Electricity Market (NEM), ENERGEX and Powerlink offer the following clarifications on the purpose and intent of this document:

1. The Rules require ENERGEX and Powerlink to carry out forward planning to identify future reliability of supply requirements and to issue this type of document for “proposed new large network assets”.
2. The Rules require ENERGEX and Powerlink to identify, evaluate and compare both network and non-network options (including generation and demand side management) to determine which can address the future supply requirements at the lowest cost to the market and hence to electricity consumers.
3. This document contains the results of this evaluation and a draft recommended solution to address future supply requirements in summer 2009/10. Registered Participants and interested parties are invited to comment on the draft recommendation.

What the document does NOT mean:

- A. It does NOT mean that the lights are about to go out. The identified supply requirements are expected to arise some years into the future, assuming that demand for electricity continues to grow. There is enough time between now and then to implement a solution.
- B. It does NOT mean that ENERGEX and Powerlink have been surprised, or that anything is “out of the ordinary”. On the contrary, it is part of the normal, routine planning processes in the NEM.

CONTENTS

EXECUTIVE SUMMARY	4
1. INTRODUCTION	6
2. BACKGROUND: EXISTING SUPPLY SYSTEM	7
2.1 Geographical Area	7
2.2 Existing Supply Arrangements	7
2.3 Committed and Proposed Distribution Network Augmentations	8
2.4 Committed Future Generation and Demand Side Developments	8
3. BACKGROUND: ELECTRICITY DEMAND	9
3.1 Overview	9
3.2 Load Forecast	9
3.3 Pattern of Use	9
4. FORECAST RELIABILITY OF SUPPLY REQUIREMENTS	11
4.1 Planning Criteria for Network Development	11
4.2 Network Capability and Future Supply Requirements	11
4.2.1 Forecast transformer limitations	11
4.2.2 Forecast line limitations	12
5. OPTIONS CONSIDERED	13
5.1 Option 1 – Myrtletown 110/33kV Substation establishment, Nudgee-Myrtletown 110kV supply, Sandgate and South Pine Substation upgrades and South Pine-Sandgate 275kV supply (initial operation at 110kV)	14
5.2 Option 2 – Myrtletown 110/33kV Substation establishment, Nudgee-Myrtletown 110kV supply, Sandgate and South Pine Substation upgrades and South Pine-Sandgate 110kV supply	16
5.3 Option 3 – Meeandah 110/33kV Substation upgrade, Murarrie-Meeandah-Myrtletown supply and Sandgate Substation upgrade	18
5.4 Option 4 – Myrtletown 110/33kV Substation establishment, Murarrie-Meeandah-Myrtletown 110kV supply and Sandgate Substation upgrade	19
5.5 Option 5 – Myrtletown 110/33kV Substation establishment, Nudgee-Myrtletown 110kV supply, South Pine-Sandgate 275kV (initial operation at 110kV) and Nudgee Substation upgrade	21
6. SCENARIOS CONSIDERED	23
6.1 Context for Evaluation of Options	23
6.2 Assumed Market Development Scenarios	23
6.2.1 Existing Network and Future Transmission Developments	23
6.2.2 Variations in Demand Growth	24
6.2.3 Existing and Committed Generators and Demand Side Developments	24
6.2.4 Potential New Generation	24
7. FORMAT AND INPUTS TO ANALYSIS	25
7.1 Regulatory Test Requirements	25
7.2 Inputs to Analysis	25
7.3 Cost of Network Augmentations	25
7.4 Other Inputs to Analysis	26
8. FINANCIAL ANALYSIS	27
8.1 Present Value Analysis	27
8.2 Sensitivity Analysis	27
8.3 Inter-Network Impact	28
9. CONCLUSIONS	29
10. DRAFT RECOMMENDATION	30
11. CONSULTATION	30
APPENDIX 1: TECHNICAL DETAILS OF OPTION 1	31
APPENDIX 2: ECONOMIC ANALYSIS	32

EXECUTIVE SUMMARY

Introduction

The north-eastern Brisbane area referred to in this document includes the area adjacent to and north east of the Brisbane CBD. The area is bounded by the Pine River to the north, Moreton Bay to the east, the Brisbane River to the south and by Lutwyche and Gympie Roads to the west.

Electricity demand in this area is expected to increase an average of approximately 5% per annum (or approximately 20MW per annum) over the next ten years, due to population growth, new water pumping load and extensive commercial and industrial developments.

This forecast growth in electricity demand will increase loadings on the electricity networks supplying the north-eastern Brisbane area. This is expected to result in the need for action by summer 2009/10 to ensure customers continue to receive a reliable electricity supply.

ENERGEX and Powerlink recognise the importance of maintaining a reliable electricity supply to their customers. Routine joint planning investigations have been carried out to identify the most appropriate course of action to meet future supply requirements in north-eastern Brisbane.

This Application Notice has been prepared as part of the prescribed National Electricity Rules process for the approval of proposed new large network assets. It contains the results of the planning investigation and economic assessment of feasible supply options. In accordance with the Australian Energy Regulator (AER) Regulatory Test, the supply solution that meets the reliability requirements at the lowest present value cost is recommended for implementation.

Options Considered

The forecast limitations in reliable supply capacity to the north-eastern Brisbane area were identified in the Powerlink Annual Planning Reports published in 2005, 2006 and 2007 and in ENERGEX's Annual Network Management Plan 2006/07 to 2010/11. No responses were received from potential providers of non-network solutions. There were no proposed demand side options, either from individual providers or aggregators.

ENERGEX and Powerlink carried out joint planning studies to evaluate network augmentation options to meet future supply requirements.

The following five feasible network options were evaluated in detail to compare the present value of the costs to Registered Participants, in accordance with the Regulatory Test:

Option 1	Myrtletown 110/33kV Substation establishment, Nudgee-Myrtletown 110kV supply, Sandgate and South Pine Substation upgrades and South Pine-Sandgate 275kV supply (initial operation at 110kV)
Option 2	Myrtletown 110/33kV Substation establishment, Nudgee-Myrtletown 110kV supply, Sandgate and South Pine Substation upgrades and South Pine-Sandgate 110kV supply
Option 3	Meeandah 110/33kV Substation upgrade, Murarrie-Meeandah-Myrtletown supply and Sandgate Substation upgrade
Option 4	Myrtletown 110/33kV Substation establishment, Murarrie-Meeandah-Myrtletown 110kV supply and Sandgate Substation upgrade
Option 5	Myrtletown 110/33kV Substation establishment, Nudgee-Meeandah-Myrtletown 110kV supply, South Pine-Sandgate 275kV (initial operation at 110kV) and Nudgee Substation upgrade

Evaluation and Conclusion

The AER Regulatory Test requires that, for reliability augmentations, the recommended option minimises the present value of costs in a majority of reasonable scenarios.

To allow comparison of options on an equivalent basis, the economic analysis was carried out over fifteen years and included consideration of anticipated/modelled projects that are expected to be required in this period to meet forecast growth in electricity demand in the north-eastern Brisbane area. Market development scenarios and other analytical techniques were used to check the sensitivity of the outcome to changes in underlying assumptions.

The economic analysis in this Application Notice identifies Option 1 as the least cost solution for all credible scenarios considered over the fifteen-year analysis timeframe. Sensitivity analysis shows Option 1 to be a robust, preferred solution under a range of assumptions.

Consequently, this Application Notice contains a draft recommendation to implement Option 1, comprising the following works, by summer 2009/10:

- Establishment by ENERGEX of Myrtletown 110/33kV substation;
- Construction by ENERGEX of a double circuit 110kV line between Myrtletown and Nudgee Substations;
- Upgrade by ENERGEX of Sandgate 110/33kV Substation;
- Upgrade by ENERGEX of 33kV network between Sandgate and Zillmere 33/11kV Substations;
- Construction by Powerlink of a double circuit 275kV line between South Pine and Sandgate Substations (initial operation at 110kV); and
- Increase by Powerlink of transformer capacity at South Pine Substation and splitting of the 110kV bus to provide two 275/110kV substations.

The estimated capital cost of these works is \$140.2 million in 2007/08 prices.

ENERGEX and Powerlink invite submissions from Registered Participants and interested parties on this Application Notice. The closing date for submissions is Tuesday 13 November 2007.

1. INTRODUCTION

Electricity demand in the north-eastern Brisbane area is increasing strongly due to population growth, new water pumping load and extensive commercial and industrial developments. To ensure an ongoing reliable electricity supply to customers in this area, ENERGEX and Powerlink have undertaken routine joint planning studies to identify future supply requirements.

Based on the forecast growth for the north-eastern Brisbane area, ENERGEX and Powerlink have identified that action will be required by summer 2009/10 to ensure a continued reliable electricity supply, consistent with Powerlink's and ENERGEX's reliability of supply obligations.

Where Network Service Providers (NSPs), such as ENERGEX and Powerlink, propose to establish new large network assets to address such requirements, they are required to issue an "Application Notice" under clause 5.6.6 of the National Electricity Rules (NER). Clause 5.6.6 requires that an Application Notice must contain information regarding:

- The reasons the augmentation is required including, if relevant, why it is considered a 'reliability augmentation' as defined in the Rules;
- Feasible options available to address the future supply requirements, including non-network alternatives;
- The recommended solution, including the timetable for implementation; and
- Why the solution satisfies the Regulatory Test prescribed by the Australian Energy Regulator (AER).

This document contains a draft recommendation for works to be undertaken to meet the reliability of electricity supply obligations for the 2009/10 summer peak loads. This draft recommendation is based on:

- The assessment that a decision is now required on action to be taken to ensure a reliable power supply in the north-eastern Brisbane area for the 2009/10 summer peak load period; and
- Analysis of feasible options in accordance with the AER Regulatory Test.

The recommended option minimises the present value of the costs to Registered Participants in the NEM while meeting the reliability standards in the National Electricity Rules, Powerlink's Transmission Authority and ENERGEX's Distribution Authority. It will allow ENERGEX and Powerlink to ensure a reliable supply during single network contingencies at the least cost to the market and therefore to end-use customers.

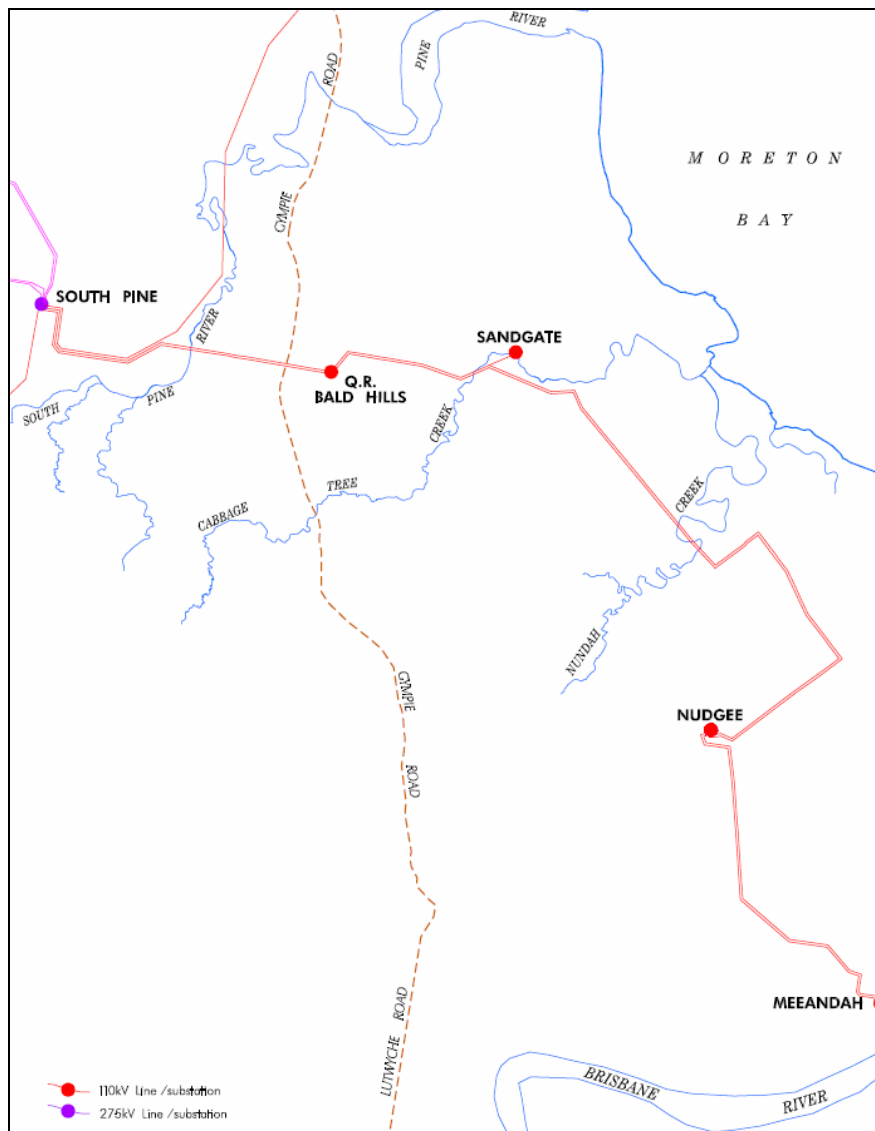
2. BACKGROUND: EXISTING SUPPLY SYSTEM

2.1 Geographical Area

The north-eastern Brisbane area referred to in this document includes the area adjacent to and north east of the Brisbane CBD. The area is bounded by the Pine River to the north, Moreton Bay to the east, the Brisbane River to the south and by Lutwyche and Gympie Roads to the west.

Figure 1 below depicts the electricity networks supplying north-eastern Brisbane.

Figure 1: Electricity transmission network supplying the north-eastern Brisbane area



2.2 Existing Supply Arrangements

Primary supply to north-eastern Brisbane is provided via Powerlink's 275/110kV substation at South Pine. From South Pine Substation, electricity is transferred over ENERGEX's 110kV network to its 110/33kV substations at Sandgate, Nudgee and Meeandah Substations, and from there to a number of 33/11kV zone substations in the area.

2.3 Committed and Proposed Distribution Network Augmentations

ENERGEX has an extensive program of works planned for the north-eastern Brisbane area. These works are detailed in its Annual Network Management Plan, which can be obtained from ENERGEX's website at www.energex.com.au. As part of these works, ENERGEX has a committed project underway to increase the capacity of its South Pine-Nudgee 110kV lines by retensioning critical spans. These works will address a range of forecast distribution limitations and generally strengthen the electricity system in the north-eastern Brisbane area.

2.4 Committed Future Generation and Demand Side Developments

ENERGEX and Powerlink are not aware of any committed generation or demand side management initiatives expected to have a significant impact on the supply requirements in north-eastern Brisbane. All existing ENERGEX demand side management programs have been considered in the planning studies for the area, including future growth in demand management capability as part of these existing programs.

3. BACKGROUND: ELECTRICITY DEMAND

3.1 Overview

Powerlink coordinates a statewide electricity demand forecast on an annual basis. Electricity demand forecasts over a ten-year period are obtained from Distribution Network Service Providers (that is ENERGEX, Ergon Energy and Country Energy), and customers at each connection point in Powerlink's transmission system. These forecasts take account of demand management programmes in place or foreseen by DNSPs, and also the presence of embedded generation which may reduce the forecast demand which needs to be supplied via each transmission connection point.

Finalisation of the annual demand forecast includes comparing the local DNSP forecasts with an independent assessment of energy and demand forecasts for the Queensland region carried out by the National Institute of Economic and Industrial Research (NIEIR). This independent assessment includes a review of the impact of new embedded generation.

3.2 Load Forecast

Electricity demand in the north-eastern Brisbane area is continuing to grow strongly in line with South Eastern Queensland's economic and population growth. Peak electricity demand under average summer conditions (50% Probability of Exceedence) in north-eastern Brisbane is forecast to grow at an average of approximately 5% per annum (or approximately 20MW per annum) over the next ten years due to continued population growth and significant airport, industrial, commercial, water pumping and residential development.

The electricity demand forecast for north-eastern Brisbane is shown in Table 2 below.

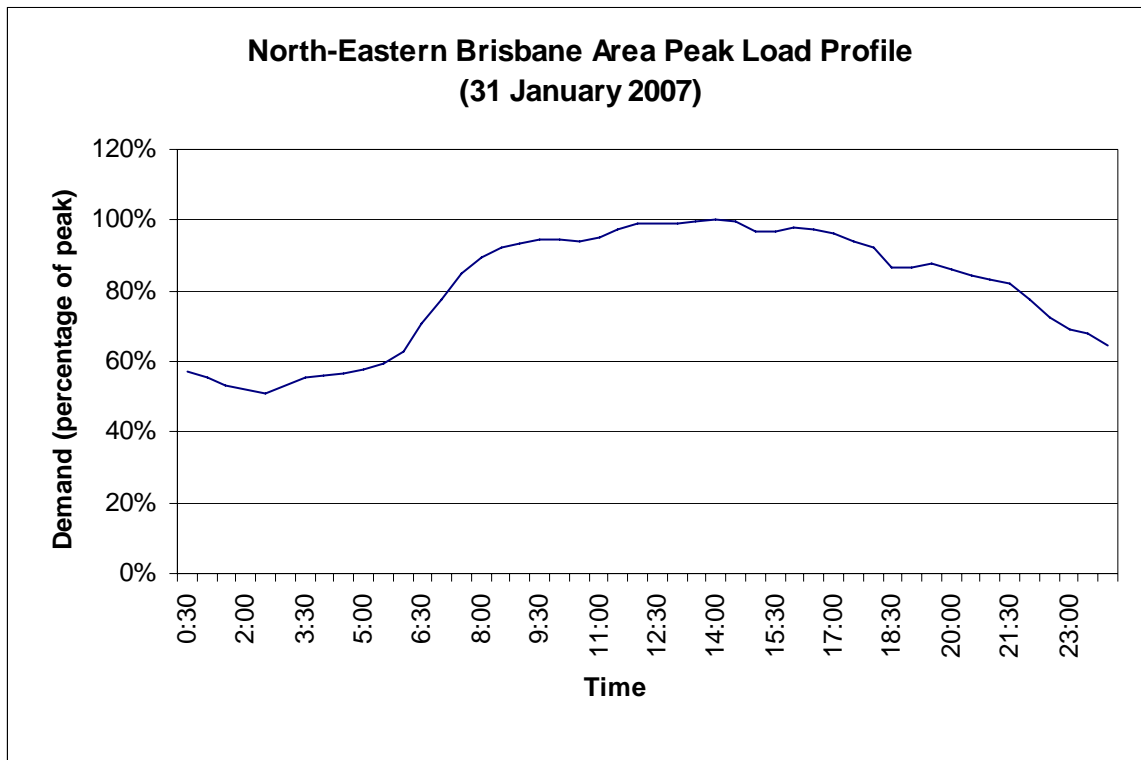
Table 2: Forecast summer peak demand (Medium Economic Growth, 50% PoE weather)

YEAR	DEMAND (MW)
2007/08	315
2008/09	346
2009/10	386
2010/11	393
2011/12	404
2012/13	424
2013/14	434
2014/15	448
2015/16	463
2016/17	478

3.3 Pattern of Use

During summer, high temperatures, industrial, commercial and air-conditioning load means the daily load remains high throughout the day as shown in Figure 2 below.

Figure 2: North-eastern Brisbane area peak daily load curve – summer 2006/07



4. FORECAST RELIABILITY OF SUPPLY REQUIREMENTS

4.1 Planning Criteria for Network Development

Powerlink has reliability and quality of supply obligations under the National Electricity Rules, its Transmission Authority and connection agreements with customers. In particular, Powerlink must plan and develop its transmission system in accordance with good electricity industry practice, such that its network is able to meet forecast electricity demand during an outage of the most critical single network element, what is commonly known as an N-1 situation, unless otherwise agreed with affected parties.

In line with its Annual Network Management Plan, ENERGEX is implementing new planning criteria, as recommended by the State Government review (Somerville Report, 2004) of the electricity distribution networks. This requires that N-1 security levels are maintained at all bulk supply substations, major zone substations and subtransmission feeders.

ENERGEX and Powerlink assess the future capability of their networks and take action as necessary to ensure these network performance requirements continue to be met. Consequently, ENERGEX and Powerlink have identified that action is required to ensure that the network supplying north-eastern Brisbane will be able to meet these obligations for the forecast peak demand of the summer of 2009/10. A solution to address the forecast requirements is therefore classified as a reliability augmentation¹.

4.2 Network Capability and Future Supply Requirements

The forecast growth in electricity demand outlined in Section 3.2 will increase loadings on the network supplying the north-eastern Brisbane area. The existing capacity will be sufficient until summer 2009/10, at which time thermal limitations are forecast to arise in the event of single contingencies if action is not undertaken.

4.2.1 Forecast transformer limitations

Transformer capacity limitations are forecast to occur from summer 2009/10 at ENERGEX's Sandgate², Nudgee and Meeandah 110/33kV Substations during single contingencies if action is not taken. Operational switching arrangements are currently used to prevent loadings on these transformers from exceeding their emergency cyclic ratings, however by summer 2009/10, these operational arrangements will no longer be satisfactory.

The 110kV switchyard of the South Pine 275/110kV Substation was established in 1963 and the original equipment is over 40 years old. The 110kV bus and other equipment, including the 275/110kV 200MVA transformers, have been determined to be approaching the end of their technical life. It is also forecast that 275/110kV transformer capacity limitations will occur at South Pine Substation within the next five years if action is not undertaken.

Fault levels associated with the 110kV network in the north-eastern Brisbane area are such that it is not possible to simply add extra transformer capacity at South Pine Substation. Forecast transformer capacity limitations, fault level considerations and 110kV equipment

¹ A transmission network augmentation that is necessitated solely by inability to meet the minimum network performance requirements set out in schedule 5.1 or in relevant legislation, regulations or any statutory instrument of a participating jurisdiction.

² Transformer capacity limitation will occur at Sandgate 110/33kV Substation if Zillmere 33/11kV Zone Substation is transferred from Nudgee 110/33kV Substation to Sandgate to alleviate the capacity limitation at Nudgee.

condition therefore need to be addressed as part of this investigation to ensure north-eastern Brisbane customers continue to receive a reliable electricity supply.

4.2.2 Forecast line limitations

Thermal capacity limitations are forecast to arise on the 33kV lines between Meeandah and Myrtle town Substations during single contingencies, without action to augment supply. Operational switching arrangements are currently used to prevent loadings on these lines from exceeding their emergency cyclic ratings, however by summer 2009/10, these operational arrangements will no longer be satisfactory.

Thermal capacity limitations are also forecast to occur on 33kV lines between Nudgee and Sandgate Substations in the event of an outage of the single Sandgate 110/33kV transformer from summer 2009/10 unless action is undertaken.

Thermal capacity limitations are also forecast to occur in the event of an outage of either South Pine-Nudgee 110kV circuit from summer 2009/10 if action is not undertaken. These lines are currently being upgraded by retensioning critical spans. There is no scope to further increase the capacity of these circuits.

Without action to augment supply, thermal overloading of lines in service could result in their sagging below statutory clearances (presenting a possible electrical safety hazard) and thermal overloading of other items of electricity infrastructure could result in permanent damage to the equipment.

Action is required by summer 2009/10 to meet the forecast demand and to ensure that north-eastern Brisbane customers continue to receive a reliable electricity supply during critical single network outages.

5. OPTIONS CONSIDERED

Powerlink identified in its Annual Planning Reports published in 2005, 2006 and 2007, and ENERGEX identified in its Annual Network Management Plan 2006/07 to 2010/11 an expectation that action would be required to address future reliability of supply requirements in the north-eastern Brisbane area. Powerlink and ENERGEX also undertook direct consultation with possible non-network solution providers.

Demand and energy forecasts used already consider all existing Demand Side Management (DSM) initiatives (such as routine hot water switching), which are incorporated in the demand forecasts provided by ENERGEX. The forecasts also include an allowance for existing cogeneration and renewable energy developments embedded³ in the distribution network. Generation above these levels would be required if local generation is to reduce demand on the transmission and distribution networks and defer the need for other forms of action.

ENERGEX and Powerlink have received no information relating to non-network solutions from industry participants in response to the requirements highlighted in Powerlink's Annual Planning Reports or ENERGEX's Annual Network Management Plan. Discussions with relevant stakeholders did not identify any non-network solutions that could address the forecast supply requirements by summer 2009/10. Therefore no non-network options have been included in the comparison of options below.

ENERGEX and Powerlink have carried out detailed joint planning studies to consider potential network options. These studies included load flow analysis, fault level studies and other technical assessment to determine the capability of potential options to supply future customer electricity needs in north-eastern Brisbane.

From this, ENERGEX and Powerlink identified five feasible options to address the future supply requirements in South Eastern Queensland. These options are as follows:

Option 1	Myrtletown 110/33kV Substation establishment, Nudgee-Myrtletown 110kV supply, Sandgate and South Pine Substation upgrades and South Pine-Sandgate 275kV supply (initial operation at 110kV)
Option 2	Myrtletown 110/33kV Substation establishment, Nudgee-Myrtletown 110kV supply, Sandgate and South Pine Substation upgrades and South Pine-Sandgate 110kV supply
Option 3	Meeandah 110/33kV Substation upgrade, Murarrie-Meeandah-Myrtletown supply and Sandgate Substation upgrade
Option 4	Myrtletown 110/33kV Substation establishment, Murarrie-Meeandah-Myrtletown 110kV supply and Sandgate Substation upgrade
Option 5	Myrtletown 110/33kV Substation establishment, Nudgee-Meeandah-Myrtletown 110kV supply, South Pine-Sandgate 275kV and Nudgee Substation upgrade

In developing options to meet supply requirements in the north-eastern Brisbane area, studies and financial analysis considered expanding 275/110kV transformer capacity at existing substations at South Pine and Murarrie, as well as development of a new 275/110kV substation at Nudgee. The present value cost of establishing a new 275/110kV substation at Nudgee to meet the initial needs is substantially greater than the present value cost of any of the options presented in this report and is not considered further.

³ An embedded generator connects directly to the low voltage distribution network. Output from such generators therefore reduced the expected energy that the transmission grid is required to deliver. Embedded generators may also reduce the demand the transmission grid is required to deliver, depending on their mode of operation.

It should be noted that the five feasible options described above deliver different increments in supply capacity to north-eastern Brisbane. Some options provide a larger increment in network capability, and therefore provide for forecast load growth further into the future before additional action would be required. These differences are taken into account in the economic comparison by including for each option the additional “anticipated” and “modelled” projects that are expected to be required to continue to meet reliability obligations during the 15 year planning horizon.

These anticipated and modelled projects are not recommended for approval in this Application Notice but are included in the economic analysis to ensure that all feasible options are compared on an equivalent basis in accordance with the AER Regulatory Test. The sensitivity of the analysis to these assumptions is tested through the use of market development scenarios. However, it should be noted that projects which are common (in both scope and timing) to all feasible options are excluded from the economic analysis as they have no impact on the ranking of results.

Each of the five feasible options is described below, together with the relevant anticipated/modelled projects⁴. Full details of the economic analysis are contained in Appendix 2.

5.1 Option 1 – Myrtletown 110/33kV Substation establishment, Nudgee-Myrtletown 110kV supply, Sandgate and South Pine Substation upgrades and South Pine-Sandgate 275kV supply (initial operation at 110kV)

The proposed scope of works for Option 1 is contained in the following table.

Table 5: Option 1 Proposed Augmentations

Date Required	Proposed Augmentations	Cost (\$M, 07/08)
Summer 2009/10	Establishment by ENERGEX of Myrtletown 110/33kV substation	10.0
	Construction by ENERGEX of a double circuit 110kV line between Myrtletown and Nudgee Substations	39.4
	Upgrade by ENERGEX of Sandgate 110/33kV Substation including 2 nd 110/33kV transformer, 33kV GIS bus and 110kV GIS bus establishment	13.7
	Upgrade by ENERGEX of 33kV network between Sandgate and Zillmere 33/11kV Substations	1.0
	Construction by Powerlink of a double circuit 275kV connection between South Pine and Sandgate Substations (initial operation at 110kV)	51.8
	Increase by Powerlink of transformer capacity at South Pine Substation and conversion of the 110kV bus into two separate 275/110kV substations	24.3
	Total	\$140.2M

Option 1 meets future supply requirements in the north-eastern Brisbane area by establishing Myrtletown 110/33kV Substation and 110kV lines between Myrtletown and Nudgee Substations to address the forecast limitations on transformers at Nudgee and Meeandah 110/33kV substations.

⁴ The AER Regulatory Test defines ‘anticipated projects’ as “projects ... which have expected commissioning dates within five years” and ‘modelled projects’ as “other investments which are likely to be commissioned in response to growing demand...”.

Under this option, the construction of a double circuit 275kV connection between South Pine and Sandgate substations, initially operated at 110kV⁵, together with related works at Sandgate Substation, would address the forecast limitations on the 110kV lines between South Pine and Nudgee. A short section of this line would need to be installed underground where there is not enough space for another overhead line.

As outlined in Powerlink's 2007 Annual Planning Report, there is a committed project underway to replace 110kV equipment at South Pine Substation. This project includes replacement of the 110kV bus. Under Option 1, the 110kV bus would be replaced as two separate 275/110kV substations, which would allow the connection of an additional transformer to address forecast transformer capacity limitations at South Pine Substation and improve distribution network fault levels.

The replacement works planned for South Pine Substation also include the replacement of a 275/110kV transformer assessed to be close to the end of its technical life. Under Option 1, this transformer would be replaced with a transformer of higher capacity to assist in addressing forecast transformer limitations at South Pine Substation.

It is important to note that as South Pine 110kV replacement works are required due to the condition of the equipment, that work is common across all options and doesn't affect the ranking of options. It is the incremental cost of splitting the 110kV bus to provide two 275/110kV substations and the cost of the additional transformer capacity to be connected that are included in this option.

The total cost of the proposed works under this option has been estimated at \$140.2 million in \$07/08, with the cost of ENERGEX works being \$64.1 million and the cost of Powerlink works being \$76.1 million.

Anticipated/modelled projects likely to be required beyond summer 2009/10 under Option 1 are listed below in Table 6.

⁵ Although initial operation of the line between South Pine and Sandgate would be at 110kV, Powerlink believes it is prudent to construct the line at 275kV as it will be the last transmission line possible in this area. Forecast demand growth is such that a new 275kV supply point will be required in the north-eastern Brisbane area within the 15 year modelling horizon. Construction of the South Pine-Sandgate line at 275kV would provide for the future establishment of a new 275/110kV supply point in this area at the lowest possible cost.

Table 6: Option 1 Anticipated/Modelled Projects⁶

Date Required	Proposed Augmentations	Cost (\$M, 07/08)
Summer 2012/13	Nudgee 110/33kV Substation transformer uprate	6.6
	Geebung 33kV fault level uprate	1.9
	Bundamba-Goodna 275kV augmentation	50.0
Summer 2013/14	Goodna-Larapinta 275kV augmentation	94.4
	Murarrie 3 rd 275/110 transformer and 275kV bus extension	17.0
Summer 2014/15	Nudgee 275/110kV Substation establishment	24.0
	Sandgate-Nudgee 275kV double circuit line construction (double circuit 110kV bypass during rebuild) and re-energisation of South Pine-Sandgate at 275kV	39.9
Summer 2019/20	Nudgee-Victoria Park 110kV double circuit line construction and Victoria Park 110kV GIS bus establishment	59.1
Summer 2022/23	Hendra 110/33kV Substation establishment & Hendra-Meeandah 110kV line construction	48.9
	Meeandah 33kV GIS bus establishment	2.7

5.2 Option 2 – Myrtletown 110/33kV Substation establishment, Nudgee-Myrtletown 110kV supply, Sandgate and South Pine Substation upgrades and South Pine-Sandgate 110kV supply

The proposed scope of works for Option 2 is contained in the following table.

Table 7: Option 2 Proposed Augmentations

Date Required	Proposed Augmentations	Cost (\$M, 07/08)
Summer 2009/10	Establishment by ENERGEX of Myrtletown 110/33kV substation	10.0
	Construction by ENERGEX of a double circuit 110kV line between Myrtletown and Nudgee Substations	39.4
	Upgrade by ENERGEX of Sandgate 110/33kV Substation including 2 nd 110/33kV transformer and 33kV GIS bus establishment	7.5
	Upgrade by ENERGEX of 33kV network between Sandgate and Zillmere 33/11kV Substations	1.0
	Construction by ENERGEX of a double circuit 110kV connection between South Pine and Sandgate Substations	35.5
	Increase by Powerlink of transformer capacity at South Pine Substation and conversion of the 110kV bus into two separate 275/110kV substations	24.3
	Total	\$117.7M

Option 2 addresses future supply requirements in the north-eastern Brisbane area by establishing the same substation at Myrtletown and lines between Myrtletown and Nudgee as contemplated under Option 1 to address forecast 110/33kV transformer and 33kV line limitations.

Option 2 also provides for the construction of a double circuit 110kV connection between South Pine and Sandgate substations, together with related works at Sandgate Substation,

⁶ Of the anticipated/modelled projects under Option 1, five would be completed by ENERGEX and five would be completed by Powerlink.

to address forecast 110kV line limitations. Again, one section of this line would need to be installed underground where there is not enough space for another overhead line.

Similar to Option 1, replacement of the South Pine 110kV bus to provide two separate 275/110kV substations, replacement of a poorly conditioned transformer with a transformer of higher capacity and connection of a new transformer, are also considered under Option 2 to address forecast transformer capacity limitations and improve distribution network fault levels.

Again, given the committed project underway to replace 110kV equipment at South Pine Substation, it is the incremental cost of splitting the 110kV bus to provide two 275/110kV substations, the incremental cost of the higher capacity replacement transformer and the cost of the additional transformer to be connected that are included in this option.

The total cost of works proposed under this option has been estimated at \$117.7 million in \$07/08, with the cost of ENERGEX works being \$93.4 million and the cost of Powerlink works being \$24.3 million.

Anticipated/modelled projects likely to be required beyond summer 2009/10 under Option 2 are listed below in Table 8.

Table 8: Option 2 Anticipated/Modelled Projects⁷

Date Required	Proposed Augmentations	Cost (\$M, 07/08)
Summer 2012/13	Nudgee 110/33kV Substation transformer uprate	6.6
	Geebung 33kV fault level uprate	1.9
	Bundamba-Goodna 275kV augmentation	50.0
Summer 2013/14	Goodna-Larapinta 275kV augmentation	94.4
	Murarie 3 rd 275/110 transformer and 275kV bus extension	17.0
	Myrtletown 110kV GIS bus establishment	5.0
	Murarie-Meeandah 110kV double circuit line construction (under the Brisbane River)	51.4
	Meeandah-Myrtletown 110kV double circuit line construction	21.6
Summer 2019/20	Upper Kedron 275/110kV Substation establishment	42.3
	Upper Kedron-Victoria Park 110kV double circuit line construction and Victoria Park 110kV bus establishment	74.5
	Hendra 110/33kV Substation establishment & Victoria Park-Hendra 110kV line construction	44.7
Summer 2022/23	Meeandah 33kV GIS bus establishment	2.7
	Meeandah 110kV GIS bus establishment	11.3

⁷ Of the anticipated/modelled projects under Option 2, nine would be completed by ENERGEX and four would be completed by Powerlink.

5.3 Option 3 – Meeandah 110/33kV Substation upgrade, Murarrie-Meeandah-Myrtle town supply and Sandgate Substation upgrade

The proposed scope of works for Option 3 is contained in the following table.

Table 9: Option 3 Proposed Augmentations

Date Required	Proposed Augmentations	Cost (\$M, 07/08)
Summer 2009/10	Installation by ENERGEX of Meeandah 3 rd 110/33kV transformer	2.2
	Meeandah 33kV GIS bus establishment by ENERGEX	2.7
	Meeandah 110kV GIS bus establishment by ENERGEX	11.3
	Construction by ENERGEX of a double circuit 110kV line between Murarrie and Meeandah Substations (under the Brisbane River)	51.4
	Construction by ENERGEX of a double circuit 110kV line between Meeandah and Myrtle town Substations (initial operation 33kV)	21.6
	Upgrade by ENERGEX of Sandgate 110/33kV Substation including 2 nd 110/33kV transformer and 33kV GIS bus establishment	7.5
	Upgrade by ENERGEX of 33kV network between Sandgate and Zillmere 33/11kV Substations	1.0
	Total	\$97.7M

Option 3 addresses future supply requirements in the north-eastern Brisbane area by expanding Meeandah 110/33kV Substation and constructing 110kV lines between Murarrie, Meeandah and Myrtle town Substations to address forecast 110/33kV transformer and 33kV line limitations.

This option would also increase the capacity of Sandgate 110/33kV Substation to assist with 33kV line limitations.

The total cost of works proposed under this option has been estimated at \$97.7 million in \$07/08.

Anticipated/modelled projects likely to be required beyond summer 2009/10 under Option 3 are listed below in Table 10.

Table 10: Option 3 Anticipated/Modelled Projects⁸

Date Required	Proposed Augmentations	Cost (\$M, 07/08)
Summer 2010/11	Bundamba-Goodna 275kV augmentation	50.0
Summer 2011/12	Goodna-Larapinta 275kV augmentation	94.4
	Myrtletown 110/33kV substation establishment	10.0
Summer 2012/13	South Pine-Sandgate double circuit 275kV connection construction (initial operation at 110kV)	51.8
	South Pine Substation transformer augmentation and conversion of the 110kV bus into two separate 275/110kV substations (Powerlink)	24.3
	Sandgate Substation 110kV bus establishment	6.2
	Nudgee 110/33kV Substation transformer uprate	6.6
	Geebung 33kV fault level uprate	1.9
	Murarrie 3 rd 275/110 transformer and 275kV bus extension	17.0
Summer 2019/20	Nudgee 275/110kV Substation establishment	24.0
	Sandgate-Nudgee 275kV double circuit line construction (single circuit 110kV bypass during rebuild) and re-energisation of South Pine-Sandgate at 275kV	34.9
	Nudgee-Victoria Park 110kV double circuit line construction and Victoria Park 110kV GIS bus establishment	59.1
Summer 2022/23	Hendra 110/33kV Substation establishment and Hendra-Meeandah 110kV line construction	48.9

5.4 Option 4 – Myrtletown 110/33kV Substation establishment, Murarrie-Meeandah-Myrtletown 110kV supply and Sandgate Substation upgrade

The proposed scope of works for Option 4 is contained in the following table.

Table 11: Option 4 Proposed Augmentations

Date Required	Proposed Augmentations	Cost (\$M, 07/08)
Summer 2009/10	Establishment by ENERGEX of Myrtletown 110/33kV substation	10.0
	Construction by ENERGEX of a 110kV double circuit line between Murarrie and Meeandah Substations (under the Brisbane River)	51.4
	Construction by ENERGEX of a 110kV double circuit line between Meeandah and Myrtletown Substations	21.6
	Upgrade by ENERGEX of Sandgate 110/33kV Substation including 2 nd 110/33kV transformer and 33kV GIS bus establishment	7.5
	Upgrade by ENERGEX of 33kV network between Sandgate and Zillmere 33/11kV Substations	1.0
	Total	\$91.5M

Option 4 meets future supply requirements in the north-eastern Brisbane area by establishing Myrtletown 110/33kV Substation and constructing the same 110kV lines between Murarrie, Meeandah and Myrtletown Substations considered under Option 3 to address forecast 110/33kV transformer and 33kV line limitations.

⁸ Of the anticipated/modelled projects under Option 3, six would be completed by ENERGEX and seven would be completed by Powerlink.

Similarly to the previous option, Option 4 would also increase the capacity of Sandgate 110/33kV Substation to assist with 33kV line limitations.

The total cost of works proposed under this option has been estimated at \$91.5 million in \$07/08.

Anticipated/modelled projects likely to be required beyond summer 2009/10 under Option 4 are listed below in Table 12.

Table 12: Option 4 Anticipated/Modelled Projects⁹

Date Required	Proposed Augmentations	Cost (\$M, 07/08)
Summer 2010/11	Bundamba-Goodna 275kV augmentation	50.0
Summer 2011/12	Goodna-Larapinta 275kV augmentation	94.4
Summer 2012/13	South Pine-Sandgate double circuit 275kV connection construction (initial operation at 110kV)	50.4
	South Pine Substation transformer augmentation and conversion of the 110kV bus into two separate 275/110kV substations	24.3
	Sandgate Substation 110kV bus establishment	6.2
	Nudgee 110/33kV Substation transformer uprate	6.6
	Geebung 33kV fault level uprate	1.9
	Murarrie 3 rd 275/110 transformer and 275kV bus extension	17.0
Summer 2019/20	Nudgee 275/110kV Substation establishment and new South Pine Substation bays	24.0
	Sandgate-Nudgee 275kV double circuit line construction (double circuit 110kV bypass during rebuild) and re-energisation of South Pine-Sandgate at 275kV	39.9
	Nudgee-Victoria Park 110kV double circuit line construction and Victoria Park 110kV GIS bus establishment	59.1
Summer 2022/23	Hendra 110/33kV Substation establishment and Hendra-Meeandah 110kV line construction	48.9
	Meeandah 33kV GIS bus establishment	2.7
	Meeandah 110kV GIS bus establishment	11.3

⁹ Of the anticipated/modelled projects under Option 4, seven would be completed by ENERGEX and seven would be completed by Powerlink.

5.5 Option 5 – Myrtle town 110/33kV Substation establishment, Nudgee-Myrtle town 110kV supply, South Pine-Sandgate 275kV (initial operation at 110kV) and Nudgee Substation upgrade

The proposed scope of works for Option 5 is contained in the following table.

Table 13: Option 5 Proposed Augmentations

Date Required	Proposed Augmentations	Cost (\$M, 07/08)
Summer 2009/10	Establishment by ENERGEX of Myrtle town 110/33kV substation	10.0
	Upgrading by ENERGEX of Nudgee 110/33kV Substation transformers	6.6
	Construction by ENERGEX of a double circuit 110kV line between Myrtle town and Nudgee Substations	39.4
	Upgrading by ENERGEX of Geebung 33kV fault level	1.9
	Construction by ENERGEX of a 33kV double circuit line between Nudgee and Geebung Substations	5.4
	Upgrade by ENERGEX of Sandgate 110/33kV Substation including 33kV GIS bus and 110kV GIS bus establishment	11.9
	Upgrade by ENERGEX of 33kV network connecting Zillmere and Sandgate 33/11kV Substations to Geebung 33/11kV Substation	3.6
	Construction by Powerlink of a double circuit 275kV connection between South Pine and Sandgate Substations (initial operation at 110kV)	51.8
	Increase by Powerlink of transformer capacity at South Pine Substation and conversion of the 110kV bus into two separate 275/110kV substations	24.3
	Total	\$154.9M

Option 5 meets future supply requirements in the north-eastern Brisbane area by establishing Myrtle town 110/33kV Substation, increasing transformer capacity at Nudgee 110/33kV Substation and constructing lines between Myrtle town and Nudgee Substations to address forecast 110/33kV transformer and 33kV line limitations.

Under this option, works at Geebung 33/11kV Substation and construction of a 33kV double circuit line between Nudgee and Geebung Substations will assist in reducing 33kV line limitations and improve distribution network fault levels.

Similar to Option 1, this option also provides for the construction of a double circuit 275kV line between South Pine and Sandgate substations, initially operated at 110kV¹⁰, together with related works at Sandgate Substation, to address forecast 110kV line limitations. One section of this line would need to be installed underground where there is not enough space for another overhead line.

As with Options 1 and 2, Option 5 would include replacement of the South Pine 110kV bus to provide two separate 275/110kV substations. Option 5 would also include the replacement of

¹⁰ Although initial operation of the line between South Pine and Sandgate would be at 110kV, Powerlink believes it is prudent to construct the line at 275kV as it will be the last transmission line possible in this area. Forecast demand growth is such that a further 275kV supply point will be required in the north-eastern Brisbane area within the 15 year modelling horizon. Construction of the South Pine-Nudgee line at 275kV would provide for the future establishment of a second 275/110kV supply point in this area at the lowest possible cost.

a 275/110kV transformer assessed to be close to the end of its technical life with a transformer of higher capacity.

Again, given the committed project underway to replace 110kV equipment at South Pine Substation, it is only the incremental cost of splitting the 110kV bus to provide two 275/110kV substations, the incremental cost of the higher capacity replacement transformer and the cost of the additional transformer to be connected that are considered under this option.

The total cost of works proposed under this option has been estimated at \$154.9 million in \$07/08, with the cost of ENERGEX works being \$78.8 million and the cost of Powerlink works being \$76.1 million.

Anticipated/modelled projects likely to be required beyond summer 2009/10 under Option 5 are listed below in Table 14.

Table 14: Option 5 Anticipated/Modelled Projects¹¹

Date Required	Proposed Augmentations	Cost (\$M, 07/08)
Summer 2012/13	Bundamba-Goodna 275kV augmentation	50.0
Summer 2013/14	Goodna-Larapinta 275kV augmentation	94.4
	Murarrie 3 rd 275/110 transformer and 275kV bus extension	17.0
Summer 2014/15	Nudgee 275/110kV Substation establishment and new South Pine Substation bays	24.0
	Sandgate-Nudgee 275kV double circuit line construction (double circuit 110kV bypass during rebuild) and re-energisation of South Pine-Sandgate at 275kV	39.9
Summer 2016/17	Sandgate 2 nd 110/33kV transformer (existing bus)	1.8
Summer 2019/20	Nudgee-Victoria Park 110kV double circuit line construction and Victoria Park 110kV GIS bus establishment	59.1
Summer 2022/23	Hendra 110/33kV Substation establishment and Hendra-Meeandah 110kV line construction	48.9
	Meeandah 33kV GIS bus establishment	2.7

¹¹ Of the anticipated/modelled projects under Option 5, four would be completed by ENERGEX and five would be completed by Powerlink.

6. SCENARIOS CONSIDERED

6.1 Context for Evaluation of Options

All feasible options to the identified supply requirements must be viewed in the context of wider developments in the National Electricity Market:

- Queensland legislation has been in effect since 1 January 2005 requiring Queensland energy retailers to source 13% of their energy from gas-fired generation. The 13% Gas Scheme is designed to deliver on the government policy objectives of diversifying the State's energy mix towards a greater use of gas and encouraging new gas infrastructure in Queensland, while reducing the growth in greenhouse gas emissions. The Queensland government has recently announced a policy to increase the requirement for gas fired generation from 13% to 18% by 2020. This policy announcement also includes an increase in generation from renewable energy sources to 10% of generation by 2020;
- Commonwealth legislation has been in effect since 1 January 2001 to encourage increased generation from renewable energy sources. ENERGEX and Powerlink have incorporated independent forecasts of additional renewable energy generation into the forecasts of demand and energy used in assessing future supply requirements; and
- NEMMCO's Statement of Opportunities (SOO) issued in October 2006 contained information on existing and committed generation developments in Queensland. There is currently adequate margin between supply capacity and demand, with several large new generating units having been commissioned in Queensland in the past few years. Other committed plant is currently under construction. It is expected that increasing electricity demand in Queensland may lead to the commissioning of new, as-yet uncommitted generation from summer 2009/10 and beyond.

6.2 Assumed Market Development Scenarios

The AER Regulatory Test requires that options to address network requirements be assessed against a number of reasonable scenarios. These scenarios need to consider:

- The existing system;
- Future network developments;
- Variations in load growth;
- Committed generation and demand side developments; and
- Potential generation and demand side developments.

The purpose of this approach is to test the present value costs of the options being evaluated under a range of plausible scenarios.

6.2.1 Existing Network and Future Transmission Developments

No market development scenarios have been developed related to new network developments proposed by Powerlink or ENERGEX outside the north-eastern Brisbane area. These are independent of the future supply requirements that are the subject of this report and are considered to be common to all options analysed. Future network developments that are relevant to north-eastern Brisbane have been included as anticipated/modelled projects in the analysis.

6.2.2 Variations in Demand Growth

Three different levels of demand growth were examined to consider sensitivity to variations in forecast customer electricity demand:

Scenario	Forecast Electricity Demand Level
Scenario A	Medium (medium economic growth and typical weather conditions)
Scenario B	High (higher economic growth and typical weather conditions)
Scenario C	Low (lower economic growth and typical weather conditions)

The forecasts include all known information about existing and planned demand side initiatives, and include independent forecasts of existing and planned local embedded generation.

6.2.3 Existing and Committed Generators and Demand Side Developments

ENERGEX and Powerlink are not aware of any committed generators proposing establishment in the north-eastern Brisbane area prior to summer 2009/10. For this reason, no scenarios have been developed in which the output of existing and/or committed generators is increased. Similarly, there are no committed demand side management initiatives, either from individual providers or aggregators, relevant to meeting north-eastern Brisbane's reliability of supply requirements. Demand forecasts reflect existing embedded generation and existing demand side management in the north-eastern Brisbane area.

6.2.4 Potential New Generation

NEMMCO's 2006 Statement of Opportunities indicated that additional investment in major generation may be required in the medium term. However, ENERGEX and Powerlink are not aware of any well-advanced proposals for major new stand-alone generators in north-eastern Brisbane, hence no market development scenarios have been developed to consider the establishment of major new stand-alone generators in the north-eastern Brisbane area.

Smaller local generation or demand side developments may occur in north-eastern Brisbane, however ENERGEX and Powerlink are unaware of any developments likely to affect the required timing for network augmentation addressed by this Application Notice.

7. FORMAT AND INPUTS TO ANALYSIS

7.1 Regulatory Test Requirements

The requirements for the comparison of options to address future supply requirements are contained in the AER Regulatory Test¹².

The Regulatory Test requires that, for reliability augmentations to the shared network¹³, the recommended option be the option that “minimises the present value of costs, compared with a number of alternative options in a majority of reasonable scenarios”.

The Regulatory Test contains guidelines for the methodology to be used to identify the lowest cost option. For example, information to be considered includes construction, operating and maintenance costs, the cost of complying with existing and anticipated laws and regulations, and reasonable forecasts of the “efficient operating costs of competitively supplying energy to meet forecast demand”. However, the Regulatory Test specifically excludes indirect costs, and costs that cannot be measured as a cost in terms of financial transactions in the electricity market.

7.2 Inputs to Analysis

A solution to address future supply requirements in north-eastern Brisbane, as outlined in this document, is required to satisfy reliability requirements linked to Schedule 5.1 of the NER, the requirements of the Queensland Electricity Act, Powerlink’s Transmission Authority¹⁴ and ENERGEX’s Distribution Authority.

According to the AER Regulatory Test, this means that the costs of all options must be compared, and the least cost solution is considered to satisfy the Regulatory Test. The results of this evaluation, carried out using a discounted cash flow model to determine the present value (PV) cost of the various options, are shown in section 8.

Cost inputs to the economic analysis are described below.

7.3 Cost of Network Augmentations

The financial analysis considers all foreseeable cost impacts of the proposed network augmentations to market participants as defined by regulatory processes.

The capital cost to implement each of the feasible options outlined in section 5 has been estimated¹⁵ by ENERGEX and Powerlink. Sensitivity studies have been carried out using variations in the capital cost estimates of plus or minus 15%.

¹² Powerlink is required to evaluate solutions for new transmission developments under the Regulatory Test in accordance with clause 5.6 of the National Electricity Rules.

¹³ Where an option is necessitated principally by the inability to meet the minimum network performance requirements set out in schedule 5.1 of the Rules or in relevant legislation, regulations or any statutory instrument of a participating jurisdiction.

¹⁴ Refer section 4.

¹⁵ 2007/08 real dollars.

The estimated saving in the cost of network losses for each option has been included based on the assumption of a typical load factor and an average cost of losses of \$25/MWh¹⁶. Sensitivity studies have also been carried out on the assumed cost of losses.

7.4 Other Inputs to Analysis

While a solution is to be implemented by summer 2009/10 to address the identified future supply requirements, the economic analysis contains anticipated projects required to address long-term supply reliability requirements, excluding those future developments whose scope and timing is common to all options.

Timings for anticipated/modelled projects are based on meeting future electricity supply requirements for north-eastern Brisbane based on the load forecasts prepared by ENERGEX and published in Powerlink's 2007 Annual Planning Report. Load forecasts are reviewed annually. Actual timings of the anticipated/modelled projects may change as a result of the ongoing review of load forecasts and other market developments during the fifteen-year planning horizon.

The sensitivity of the timing of these anticipated projects to load growth and generation development scenarios, and therefore the incidence of the capital expenditure, has been taken into account in the economic analysis.

Capital and operating costs for some items that are common to all options were not included in the analysis. These common costs include the capital and operating costs of other future works, where these costs are independent of the identified future supply requirements or where they are independent of the proposed augmentation. As such, they have no impact on the relative ranking of options resulting from the analysis. Where the timing of common works is affected by the proposed options, the cost of the other works proposed has been included in the financial analysis.

¹⁶ Network losses are a function of the length and capacity of individual network elements, and the power being transferred through them. As electricity demand increases, network losses increase at a higher rate than the growth in demand. In heavily loaded systems, additional network elements reduce the amount of power that must be forced through the existing network, and therefore reduce total losses.

8. FINANCIAL ANALYSIS

The economic analysis undertaken considered the present value (PV) cost of alternative options over the fifteen-year period from 2007/08 to 2022/23. Full details of this analysis are contained in Appendix 2.

8.1 Present Value Analysis

Financial analysis was carried out to calculate and compare the present value of the costs to market participants of each option under the range of assumed scenarios.

A fifteen-year analysis period was selected as an appropriate period for financial analysis. A discount rate of 9% was selected as a relevant commercial discount rate and sensitivity analysis was conducted to test this assumption.

Under the Regulatory Test, it is the ranking of options that is important, rather than the actual present value results. This is because the Regulatory Test requires the recommended option to have the lowest present value compared with alternative projects.

The following table is a summary of the economic analysis contained in Appendix 2. It shows the present value cost of each alternative and identifies the best-ranked option, for the range of scenarios considered. The summary in Table 15 below shows that Option 1 has the lowest present value cost in the majority of scenarios considered.

Table 15: Summary of economic analysis for the three scenarios

Discount rate 9%		Scenario A <i>Medium Economic Growth</i>		Scenario B <i>High Economic Growth</i>		Scenario C <i>Low Economic Growth</i>	
		PV (\$M)	Rank	PV (\$M)	Rank	PV (\$M)	Rank
Option 1	South Pine-Sandgate 275kV, Nudgee-Myrtletown 110kV	\$184.83	1	\$229.34	1	\$132.78	2
Option 2	South Pine-Sandgate 110kV, Nudgee-Myrtletown 110kV	\$191.41	3	\$249.85	4	\$126.84	1
Option 3	Murrarie-Meeandah 110kV, Meeandah-Myrtletown 33kV	\$206.02	5	\$253.26	5	\$158.81	5
Option 4	Murrarie-Meeandah-Myrtletown 110kV	\$197.46	4	\$247.32	3	\$151.02	4
Option 5	South Pine-Sandgate 275kV, Nudgee-Meeandah-Myrtletown 110kV	\$191.07	2	\$235.31	2	\$140.06	3

As Option 1 has the lowest present value cost under the majority of scenarios considered, it therefore satisfies the AER Regulatory Test.

8.2 Sensitivity Analysis

In addition to examining the impact of a range of reasonable scenarios, the sensitivity of the option ranking to other critical parameters was also examined.

The effect of varying these parameters over their credible range was investigated using standard Monte Carlo techniques¹⁷. Table 16 below shows the parameters that were investigated in the sensitivity analysis, the distribution that was assumed for each parameter and the range of values.

¹⁷ Using the @Risk add-in for Microsoft Excel.

Table 16: Parameters investigated in sensitivity analysis

Parameter	Distribution
Capital cost of transmission augmentations	The capital cost of the proposed augmentations and anticipated/ modelled projects was tested for sensitivity to variations of plus or minus 15% from the expected value. The variation in each cost was modelled as a triangular distribution with the assumption that the costs are statistically independent. This means that the cost of each network component is allowed to vary within plus and minus 15% independently of the over or underspend of the other components.
Cost of losses	The sensitivity to the average cost of losses was tested by allowing this parameter to vary randomly between \$20/MWh and \$30/MWh using a triangular distribution with a mode of \$25/MWh.

The Monte Carlo analysis assigns a value to each of the above parameters according to its distribution and then ranks the options. This simulation is done many times (in this case, 10,000 times) to cover a large number of combinations of parameters. The analysis identifies which option is the best-ranked option (the option that has the lowest cost on a present value basis for the largest number of samples) and gives the frequency for which this option 'wins'.

In addition to the above sensitivity testing, the sensitivity of the ranking of options to the discount rate assumption was also investigated by repeating the above analysis with a discount rate of 7%, 9% and 11%. Table 17 below shows the 'winning option' (e.g. Option 1) and the frequency for which it 'wins' for each scenario and discount rate across the range of parameters assessed.

Table 17: Results of sensitivity analysis for varying discount rates

	Discount Rate		
	7%	9%	11%
Scenario A - Medium Economic Growth	1 (100%)	1 (98%)	1 (96%)
Scenario B - High Economic Growth	1 (100%)	1 (100%)	1 (100%)
Scenario C - Low Economic Growth	2 (98%)	2 (99%)	2 (100%)

As can be seen in this table, the results of the sensitivity analysis are consistent with the base case economic analysis, and the outcome is robust in terms of the variations in parameters assessed.

On the basis of the financial analysis and the sensitivity testing, Option 1 is the option that satisfies the AER Regulatory Test. Details of the scope of proposed works included in Option 1 are provided in Appendix 1.

8.3 Inter-Network Impact

ENERGEX and Powerlink are required under the National Electricity Rules to assess whether a proposed new large network asset is reasonably likely to have a material inter-network impact. ENERGEX and Powerlink have determined that the proposed new large network asset will not impose power transfer constraints or adversely impact on the quality of supply within adjacent networks.

9. CONCLUSIONS

The following conclusions have been drawn from the analysis presented in this report:

- There is no acceptable 'do nothing' option. Augmentation is required by the summer of 2009/10 to maintain a reliable power supply to customers in the north-eastern Brisbane area during critical network contingencies. 'Doing nothing' is not consistent with the reliability standards that Powerlink must comply with under its Transmission Authority, and as a TNSP in the NEM, and that ENERGEX must comply with under its Distribution Authority.
- ENERGEX and Powerlink must plan new works now so that construction can commence in 2007 to ensure continued reliable electricity supply to north-eastern Brisbane in the peak load period of summer 2009/10.
- As the augmentations proposed in this document are necessary to comply with network performance requirements that ENERGEX and Powerlink must meet, they are defined as 'reliability augmentations' in the National Electricity Rules.
- Powerlink identified the requirement for additional supply capacity in its Annual Planning Reports published in 2005, 2006 and 2007 and ENERGEX identified the requirement for additional capacity supply in its Annual Network Management Plan 2006/07 to 2010/11. Early identification and publication of these forecast constraints allowed time for any non-network solutions to be identified to meet the north-eastern Brisbane area supply requirements. No non-network solutions have been identified to meet these requirements.
- Joint planning studies were undertaken to evaluate potential network options to address the future supply requirements in north-eastern Brisbane. Five network augmentations were evaluated in detail.
- Economic analysis carried out in accordance with the Regulatory Test has identified that proposed augmentation Option 1 is the least-cost solution over the fifteen-year period of the analysis in the majority of credible scenarios considered, including the most likely medium growth scenario. Sensitivity testing showed the analysis is robust to variation in capital cost and other assumptions. Option 1 is therefore considered to satisfy the AER Regulatory Test.
- Should the draft recommendation in this Application Notice be adopted, construction of the network augmentations as per Option 1 will commence in early 2008 for completion by summer 2009/10 to ensure continued reliability of electricity supply to customers in north-eastern Brisbane.

10. DRAFT RECOMMENDATION

Based on the conclusions drawn from the analysis and the Rules requirements relating to 'New Large Network Assets', it is recommended that the following action be taken to address the future supply requirements in the north-eastern Brisbane area:

- ENERGEX to construct a new 110/33kV substation at Myrletown;
- ENERGEX to construct a double circuit 110kV line between Myrletown and Nudgee Substations;
- ENERGEX to upgrade Sandgate 110/33kV Substation;
- ENERGEX to upgrade 33kV network between Sandgate and Zillmere 33/11kV Substations;
- Powerlink to construct a double circuit 275kV connection between South Pine and Sandgate Substations (initial operation at 110kV); and
- Powerlink to increase transformer capacity at South Pine Substation and split the 110kV bus to provide two 275/110kV substations,

by summer 2009/10, at an estimated total cost of \$140.2 million in 2007/08 prices.

11. CONSULTATION

In accordance with Rules requirements, ENERGEX and Powerlink invite submissions from Registered Participants and interested parties on this Application Notice.

Submissions are due by Tuesday 13 November 2007.

Please address submissions to:

Bevan Holcombe
Network Performance Reporting Manager
ENERGEX Limited
GPO Box 1461
Brisbane QLD 4001

Tel: (07) 3407 4061
bevanholcombe@energex.com.au

OR

Angela Robinson
Network Assessments Consultant
Powerlink Queensland
PO Box 1193
Virginia QLD 4014

Tel: (07) 3866 1126
NetworkAssessments@powerlink.com.au

Following consideration of submissions, ENERGEX and Powerlink expect to publish a final recommendation in November 2007.

APPENDIX 1: TECHNICAL DETAILS OF OPTION 1

As set out in this Application Notice, ENERGEX and Powerlink examined five options to address their reliability of supply obligations for the 2009/10 summer peak loads in the north-eastern Brisbane area. Technical details relevant to the preferred option follow -

Energex works:

- Establishment of new 110/33kV substation at Myrtletown including two 110/33kV 120MVA transformers;
- Construction of new 5.7km double circuit 110kV line between Nudgee and Myrtletown 110/33kV Substations;
- Upgrade of 33kV network between Sandgate and Zillmere 33/11kV Substations;
- Installation of second 110/33kV 80MVA transformer at Sandgate 110/33kV Substation, establishment of 33kV bus and 110kV GIS bus; and
- Associated substation works including new bays, modifications to secondary systems and telecommunications

Powerlink works:

- Construction of new 7.5km double circuit 275kV connection between South Pine and Sandgate Substations, including underground cable component of approximately 2km and associated overhead/underground transition structures;
- Splitting of the South Pine 110kV bus to provide two new 275/110kV substations (South Pine East and South Pine West) under the committed South Pine 110kV replacement project;
- Replacement of existing South Pine 200MVA 275/110kV transformer with 375MVA unit under the committed South Pine 110kV replacement project;
- Installation of a new 375MVA 275/110kV transformer at South Pine Substation; and
- Associated substation works including new bays, modifications to secondary systems and telecommunications

APPENDIX 2: ECONOMIC ANALYSIS

Development Options	FY	Capex \$M	FY	Capex \$M	FY	Capex \$M
	Scenario A		Scenario B		Scenario C	
Option 1						
Myrtletown 110/33kV, 33kV GIS	09/10	10.00	09/10	10.00	09/10	10.00
Nudgee - Myrtletown 110kV	09/10	39.40	09/10	39.40	09/10	39.40
Sandgate 2nd 110/33kV transformer	09/10	1.80	09/10	1.80	09/10	1.80
Sandgate 33kV GIS bus establishment	09/10	5.70	09/10	5.70	09/10	5.70
Sandgate 110kV GIS bus establishment	09/10	6.20	09/10	6.20	09/10	6.20
South Pine - Sandgate 275kV, initial operation 110kV	09/10	51.78	09/10	51.78	09/10	51.78
South Pine bus split and transformer augmentation	09/10	24.27	09/10	24.27	09/10	24.27
Uprate 33kV network between Sandgate and Zillmere	09/10	1.00	09/10	1.00	09/10	1.00
Proposed and modelled projects						
Nudgee 110/33kV transformer uprates	12/13	6.60	11/12	6.60	15/16	6.60
Geebung 33kV fault level uprate	12/13	1.90	11/12	1.90	15/16	1.90
Bundamba - Goodna 275kV augmentation	12/13	50.02	11/12	50.02	15/16	50.02
Goodna - Larapinta 275kV augmentation	13/14	94.42	11/12	94.42	17/18	94.42
Murarrie 3rd 275kV transformer and 275kV bus extension	13/14	16.95	11/12	16.95	17/18	16.95
Nudgee 275/110kV Substation	14/15	24.06	12/13	24.06	19/20	24.06
Sandgate - Nudgee 275kV (double circuit bypass)	14/15	39.93	12/13	39.93	19/20	39.93
Nudgee - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment	19/20	59.10	15/16	59.10	29/30	59.10
Hendra 110/33kV Substation & Hendra - Meeandah 110kV	22/23	48.90	17/18	48.90	35/36	48.90
Meeandah 33kV GIS bus establishment	22/23	2.70	17/18	2.70	35/36	2.70
Option 2						
Myrtletown 110/33kV, 33kV GIS	09/10	10.00	09/10	10.00	09/10	10.00
Nudgee - Myrtletown 110kV	09/10	39.40	09/10	39.40	09/10	39.40
Sandgate 2nd 110/33kV transformer	09/10	1.80	09/10	1.80	09/10	1.80
Sandgate 33kV GIS bus establishment	09/10	5.70	09/10	5.70	09/10	5.70
South Pine - Sandgate 110kV	09/10	35.53	09/10	35.53	09/10	35.53
South Pine bus split and transformer augmentation	09/10	24.27	09/10	24.27	09/10	24.27
Uprate 33kV network between Sandgate and Zillmere	09/10	1.00	09/10	1.00	09/10	1.00
Proposed and modelled projects						
Nudgee 110/33kV transformer uprates	12/13	6.60	11/12	6.60	15/16	6.60
Geebung 33kV fault level uprate	12/13	1.90	11/12	1.90	15/16	1.90
Bundamba - Goodna 275kV augmentation	12/13	50.02	11/12	50.02	15/16	50.02
Goodna - Larapinta 275kV augmentation	13/14	94.42	11/12	94.42	17/18	94.42
Murarrie 3rd 275kV transformer and 275kV bus extension	13/14	16.95	11/12	16.95	17/18	16.95
Myrtletown 110kV GIS bus establishment	13/14	5.00	11/12	5.00	17/18	5.00
Murarrie - Meeandah 110kV	13/14	51.40	11/12	51.40	17/18	51.40
Meeandah - Myrtletown 110kV	13/14	21.60	11/12	21.60	17/18	21.60
Upper Kedron 275/110kV Substation	19/20	42.34	15/16	42.34	29/30	42.34
Upper Kedron - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment	19/20	74.50	15/16	74.50	29/30	74.50
Hendra 110/33kV Substation & Vic Park - Hendra 110kV	19/20	44.70	15/16	44.70	29/30	44.70
Meeandah 33kV GIS bus establishment	22/23	2.70	17/18	2.70	35/36	2.70
Meeandah 110kV GIS bus establishment	22/23	11.30	17/18	11.30	35/36	11.30
Option 3						
Meeandah 3rd 110/33kV transformer	09/10	2.20	09/10	2.20	09/10	2.20
Meeandah 33kV GIS bus establishment	09/10	2.70	09/10	2.70	09/10	2.70
Meeandah 110kV GIS bus establishment	09/10	11.30	09/10	11.30	09/10	11.30
Murarrie - Meeandah 110kV	09/10	51.40	09/10	51.40	09/10	51.40
Meeandah - Myrtletown 110kV	09/10	21.60	09/10	21.60	09/10	21.60
Sandgate 2nd 110/33kV transformer	09/10	1.80	09/10	1.80	09/10	1.80
Sandgate 33kV GIS bus establishment	09/10	5.70	09/10	5.70	09/10	5.70
Uprate 33kV network between Sandgate and Zillmere	09/10	1.00	09/10	1.00	09/10	1.00

Development Options	FY	Capex \$M	FY	Capex \$M	FY	Capex \$M
	Scenario A		Scenario B		Scenario C	
Option 3 cont - Proposed and modelled projects						
Bundamba - Goodna 275kV augmentation	10/11	50.02	09/10	50.02	11/12	50.02
Goodna - Larapinta 275kV augmentation	11/12	94.42	10/11	94.42	13/14	94.42
Myrtle town 110/33kV, 33kV GIS	11/12	10.00	10/11	10.00	13/14	10.00
South Pine - Sandgate 275kV, initial operation 110kV	12/13	51.78	11/12	51.78	15/16	51.78
South Pine bus split and transformer augmentation	12/13	24.27	11/12	24.27	15/16	24.27
Sandgate 110kV GIS bus establishment	12/13	6.20	11/12	6.20	15/16	6.20
Nudgee 110/33kV transformer uprates	12/13	6.60	11/12	6.60	15/16	6.60
Geebung 33kV fault level uprate	12/13	1.90	11/12	1.90	15/16	1.90
Murarrie 3rd 275kV transformer and 275kV bus extension	12/13	16.95	11/12	16.95	15/16	16.95
Nudgee 275/110kV Substation	19/20	24.06	15/16	24.06	29/30	24.06
Sandgate - Nudgee 275kV (single circuit bypass)	19/20	34.91	15/16	34.91	29/30	34.91
Nudgee - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment	19/20	59.10	15/16	59.10	29/30	59.10
Hendra 110/33kV Substation & Hendra - Meeandah 110kV	22/23	48.90	17/18	48.90	35/36	48.90
Option 4						
Myrtle town 110/33kV, 33kV GIS	09/10	10.00	09/10	10.00	09/10	10.00
Murarrie - Meeandah 110kV	09/10	51.40	09/10	51.40	09/10	51.40
Meeandah - Myrtle town 110kV	09/10	21.60	09/10	21.60	09/10	21.60
Sandgate 2nd 110/33kV transformer	09/10	1.80	09/10	1.80	09/10	1.80
Sandgate 33kV GIS bus establishment	09/10	5.70	09/10	5.70	09/10	5.70
Uprate 33kV network between Sandgate and Zillmere	09/10	1.00	09/10	1.00	09/10	1.00
Proposed and modelled projects						
Bundamba - Goodna 275kV augmentation	10/11	50.02	09/10	50.02	11/12	50.02
Goodna - Larapinta 275kV augmentation	11/12	94.42	10/11	94.42	13/14	94.42
South Pine - Sandgate 275kV, initial operation 110kV	12/13	51.78	11/12	51.78	15/16	51.78
South Pine bus split and transformer augmentation	12/13	24.27	11/12	24.27	15/16	24.27
Sandgate 110kV GIS bus establishment	12/13	6.20	11/12	6.20	15/16	6.20
Nudgee 110/33kV transformer uprates	12/13	6.60	11/12	6.60	15/16	6.60
Geebung 33kV fault level uprate	12/13	1.90	11/12	1.90	15/16	1.90
Murarrie 3rd 275kV transformer and 275kV bus extension	12/13	16.95	11/12	16.95	15/16	16.95
Nudgee 275/110kV Substation	19/20	24.06	15/16	24.06	29/30	24.06
Sandgate - Nudgee 275kV (double circuit bypass)	19/20	39.93	15/16	39.93	29/30	39.93
Nudgee - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment	19/20	59.10	15/16	59.10	29/30	59.10
Hendra 110/33kV Substation & Hendra - Meeandah 110kV	22/23	48.90	17/18	48.90	35/36	48.90
Meeandah 33kV GIS bus establishment	22/23	2.70	17/18	2.70	35/36	2.70
Meeandah 110kV GIS bus establishment	22/23	11.30	17/18	11.30	35/36	11.30
Option 5						
Myrtle town 110/33kV, 33kV GIS	09/10	10.00	09/10	10.00	09/10	10.00
Nudgee 110/33kV transformer uprates	09/10	6.60	09/10	6.60	09/10	6.60
Nudgee - Myrtle town 110kV	09/10	39.40	09/10	39.40	09/10	39.40
Geebung 33kV fault level uprate	09/10	1.90	09/10	1.90	09/10	1.90
Nudgee - Geebung 33kV augmentation	09/10	5.40	09/10	5.40	09/10	5.40
Sandgate 33kV GIS bus establishment	09/10	5.70	09/10	5.70	09/10	5.70
Sandgate 110kV GIS bus establishment	09/10	6.20	09/10	6.20	09/10	6.20
South Pine - Sandgate 275kV, initial operation 110kV	09/10	51.78	09/10	51.78	09/10	51.78
South Pine bus split and transformer augmentation	09/10	24.27	09/10	24.27	09/10	24.27
Uprate 33kV network connecting Zillmere and Sandgate to Geebung	09/10	3.60	09/10	3.60	09/10	3.60
Proposed and modelled projects						
Bundamba - Goodna 275kV augmentation	12/13	50.02	11/12	50.02	15/16	50.02
Goodna - Larapinta 275kV augmentation	13/14	94.42	11/12	94.42	17/18	94.42
Murarrie 3rd 275kV transformer and 275kV bus extension	13/14	16.95	11/12	16.95	17/18	16.95
Nudgee 275/110kV Substation	14/15	24.06	12/13	24.06	19/20	24.06
Sandgate - Nudgee 275kV (double circuit bypass)	14/15	39.93	12/13	39.93	19/20	39.93
Sandgate 2nd 110/33kV transformer	16/17	1.80	13/14	1.80	23/24	1.80
Nudgee - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment	19/20	59.10	15/16	59.10	29/30	59.10
Hendra 110/33kV Substation & Hendra - Meeandah 110kV	22/23	48.90	17/18	48.90	35/36	48.90
Meeandah 33kV GIS bus establishment	22/23	2.70	17/18	2.70	35/36	2.70

Scenario A	Medium Economic Growth															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	
Option 1	South Pine-Sandgate 275kV, Nudgee-Myrletown 110kV															
Myrletown 110/33kV, 33kV GIS => TUOS =>> PV of TUOS	\$6.50	0.000	0.000	1.103	1.088	1.073	1.058	1.044	1.029	1.014	1.000	0.985	0.970	0.955	0.941	0.926
Nudgee - Myrletown 110kV => TUOS =>> PV of TUOS	\$25.61	0.000	0.000	4.344	4.286	4.228	4.170	4.112	4.054	3.996	3.938	3.881	3.823	3.765	3.707	3.649
Sandgate 2nd 110/33kV transformer => TUOS =>> PV of TUOS	\$1.17	0.000	0.000	0.198	0.196	0.193	0.191	0.188	0.185	0.183	0.180	0.177	0.175	0.172	0.169	0.167
Sandgate 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$3.71	0.000	0.000	0.628	0.620	0.612	0.603	0.595	0.587	0.578	0.570	0.561	0.553	0.545	0.536	0.528
Sandgate 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$4.03	0.000	0.000	0.684	0.674	0.665	0.656	0.647	0.638	0.629	0.620	0.611	0.602	0.592	0.583	0.574
South Pine - Sandgate 275kV, initial operation 110kV => TUOS =>> PV of TUOS	\$33.66	0.000	0.000	5.709	5.633	5.557	5.480	5.404	5.328	5.252	5.176	5.100	5.024	4.948	4.871	4.795
South Pine bus split and transformer augmentation => TUOS =>> PV of TUOS	\$15.78	0.000	0.000	2.676	2.640	2.604	2.569	2.533	2.497	2.462	2.426	2.390	2.355	2.319	2.283	2.248
Uprate 33kV network between Sandgate and Zillmere => TUOS =>> PV of TUOS	\$0.65	0.000	0.000	0.110	0.109	0.107	0.106	0.104	0.103	0.101	0.100	0.098	0.097	0.096	0.094	0.093
Proposed and modelled projects																
Nudgee 110/33kV transformer uprates => TUOS =>> PV of TUOS	\$2.88	0.000	0.000	0.000	0.000	0.000	0.728	0.718	0.708	0.699	0.689	0.679	0.669	0.660	0.650	0.640
Geebung 33kV fault level uprate => TUOS =>> PV of TUOS	\$0.83	0.000	0.000	0.000	0.000	0.000	0.209	0.207	0.204	0.201	0.198	0.196	0.193	0.190	0.187	0.184
Bundamba - Goodna 275kV augmentation => TUOS =>> PV of TUOS	21.84	0.000	0.000	0.000	0.000	0.000	5.515	5.441	5.368	5.294	5.221	5.147	5.074	5.000	4.926	4.853
Goodna - Larapinta 275kV augmentation => TUOS =>> PV of TUOS	35.51	0.000	0.000	0.000	0.000	0.000	10.410	10.271	10.132	9.993	9.855	9.716	9.577	9.438	9.299	
Murrarrie 3rd 275kV transformer and 275kV bus extension => TUOS =>> PV of TUOS	\$6.37	0.000	0.000	0.000	0.000	0.000	1.869	1.844	1.819	1.794	1.769	1.744	1.719	1.694	1.669	
Nudgee 275/110kV Substation => TUOS =>> PV of TUOS	\$7.70	0.000	0.000	0.000	0.000	0.000	0.000	2.653	2.617	2.582	2.547	2.511	2.476	2.440	2.405	
Sandgate - Nudgee 275kV (double circuit bypass) => TUOS =>> PV of TUOS	\$12.79	0.000	0.000	0.000	0.000	0.000	0.000	4.402	4.344	4.285	4.226	4.167	4.109	4.050	3.991	
Nudgee - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$5.79	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.516	6.429	6.342
Hendra 110/33kV Substation & Hendra - Meeandah 110kV => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Meeandah 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Relative Losses																
* Losses \$ => PV of Loss difference	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total for Option 1	\$184.83															

Scenario A	Medium Economic Growth															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	
Option 2	South Pine-Sandgate 110kV, Nudgee-Myrtletown 110kV															
Myrtletown 110/33kV, 33kV GIS => TUOS =>> PV of TUOS	\$6.50	0.000	0.000	1.103	1.088	1.073	1.058	1.044	1.029	1.014	1.000	0.985	0.970	0.955	0.941	0.926
Nudgee - Myrtletown 110kV => TUOS =>> PV of TUOS	\$25.61	0.000	0.000	4.344	4.286	4.228	4.170	4.112	4.054	3.996	3.938	3.881	3.823	3.765	3.707	3.649
Sandgate 2nd 110/33kV transformer => TUOS =>> PV of TUOS	\$1.17	0.000	0.000	0.198	0.196	0.193	0.191	0.188	0.185	0.183	0.180	0.177	0.175	0.172	0.169	0.167
Sandgate 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$3.71	0.000	0.000	0.628	0.620	0.612	0.603	0.595	0.587	0.578	0.570	0.561	0.553	0.545	0.536	0.528
South Pine - Sandgate 110kV => TUOS =>> PV of TUOS	\$23.10	0.000	0.000	3.917	3.865	3.813	3.760	3.708	3.656	3.604	3.552	3.499	3.447	3.395	3.343	3.290
South Pine bus split and transformer augmentation => TUOS =>> PV of TUOS	\$15.78	0.000	0.000	2.676	2.640	2.604	2.569	2.533	2.497	2.462	2.426	2.390	2.355	2.319	2.283	2.248
Uprate 33kV network between Sandgate and Zillmere => TUOS =>> PV of TUOS	\$0.65	0.000	0.000	0.110	0.109	0.107	0.106	0.104	0.103	0.101	0.100	0.098	0.097	0.096	0.094	0.093
Proposed and modelled projects																
Nudgee 110/33kV transformer uprates => TUOS =>> PV of TUOS	\$2.88	0.000	0.000	0.000	0.000	0.000	0.728	0.718	0.708	0.699	0.689	0.679	0.669	0.660	0.650	0.640
Geebung 33kV fault level uprate => TUOS =>> PV of TUOS	\$0.83	0.000	0.000	0.000	0.000	0.000	0.209	0.207	0.204	0.201	0.198	0.196	0.193	0.190	0.187	0.184
Bundamba - Goodna 275kV augmentation => TUOS =>> PV of TUOS	\$21.84	0.000	0.000	0.000	0.000	0.000	5.515	5.441	5.368	5.294	5.221	5.147	5.074	5.000	4.926	4.853
Goodna - Larapinta 275kV augmentation => TUOS =>> PV of TUOS	\$35.51	0.000	0.000	0.000	0.000	0.000	10.410	10.271	10.132	9.993	9.855	9.716	9.577	9.438	9.299	
Murrarrie 3rd 275kV transformer and 275kV bus extension => TUOS =>> PV of TUOS	\$6.37	0.000	0.000	0.000	0.000	0.000	1.869	1.844	1.819	1.794	1.769	1.744	1.719	1.694	1.669	
Myrtletown 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$1.88	0.000	0.000	0.000	0.000	0.000	0.551	0.544	0.537	0.529	0.522	0.515	0.507	0.500	0.492	
Murrarrie - Meeandah 110kV => TUOS =>> PV of TUOS	\$19.33	0.000	0.000	0.000	0.000	0.000	5.667	5.591	5.516	5.440	5.365	5.289	5.214	5.138	5.062	
Meeandah - Myrtletown 110kV => TUOS =>> PV of TUOS	\$8.12	0.000	0.000	0.000	0.000	0.000	2.381	2.350	2.318	2.286	2.254	2.223	2.191	2.159	2.127	
Upper Kedron 275/110kV Substation => TUOS =>> PV of TUOS	\$4.15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.668	4.606	4.544
Upper Kedron - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$7.30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.214	8.104	7.995
Hendra 110/33kV Substation & Vic Park - Hendra 110kV => TUOS =>> PV of TUOS	\$4.38	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.928	4.862	4.797
Meeandah 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Meeandah 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Relative Losses * Losses \$ => PV of Loss difference	\$2.29	0.000	0.030	0.044	0.044	0.044	0.308	0.434	0.451	0.482	0.516	0.552	0.591	0.632	0.677	0.922
Total for Option 2	\$191.41															

Scenario A	Medium Economic Growth															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	
Option 3	Murrarie-Meeandah 110kV, Meeandah-Myrtletown 33kV															
Meeandah 3rd 110/33kV transformer => TUOS =>> PV of TUOS	\$1.43	0.000	0.000	0.243	0.239	0.236	0.233	0.230	0.226	0.223	0.220	0.217	0.213	0.210	0.207	0.204
Meeandah 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$1.76	0.000	0.000	0.298	0.294	0.290	0.286	0.282	0.278	0.274	0.270	0.266	0.262	0.258	0.254	0.250
Meeandah 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$7.35	0.000	0.000	1.246	1.229	1.213	1.196	1.179	1.163	1.146	1.130	1.113	1.096	1.080	1.063	1.046
Murrarie - Meeandah 110kV => TUOS =>> PV of TUOS	\$33.42	0.000	0.000	5.667	5.591	5.516	5.440	5.365	5.289	5.214	5.138	5.062	4.987	4.911	4.836	4.760
Meeandah - Myrtletown 110kV => TUOS =>> PV of TUOS	\$14.04	0.000	0.000	2.381	2.350	2.318	2.286	2.254	2.223	2.191	2.159	2.127	2.096	2.064	2.032	2.000
Sandgate 2nd 110/33kV transformer => TUOS =>> PV of TUOS	\$1.17	0.000	0.000	0.198	0.196	0.193	0.191	0.188	0.185	0.183	0.180	0.177	0.175	0.172	0.169	0.167
Sandgate 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$3.71	0.000	0.000	0.628	0.620	0.612	0.603	0.595	0.587	0.578	0.570	0.561	0.553	0.545	0.536	0.528
Uprate 33kV network between Sandgate and Zillmere => TUOS =>> PV of TUOS	\$0.65	0.000	0.000	0.110	0.109	0.107	0.106	0.104	0.103	0.101	0.100	0.098	0.097	0.096	0.094	0.093
Proposed and modelled projects																
Bundamba - Goodna 275kV augmentation => TUOS =>> PV of TUOS	\$28.67	0.000	0.000	0.000	5.515	5.441	5.368	5.294	5.221	5.147	5.074	5.000	4.926	4.853	4.779	4.706
Goodna - Larapinta 275kV augmentation => TUOS =>> PV of TUOS	\$47.41	0.000	0.000	0.000	0.000	10.410	10.271	10.132	9.993	9.855	9.716	9.577	9.438	9.299	9.161	9.022
Myrtletown 110/33kV, 33kV GIS => TUOS =>> PV of TUOS	\$5.02	0.000	0.000	0.000	0.000	1.103	1.088	1.073	1.058	1.044	1.029	1.014	1.000	0.985	0.970	0.955
South Pine - Sandgate 275kV, initial operation 110kV => TUOS =>> PV of TUOS	22.61	0.000	0.000	0.000	0.000	0.000	5.709	5.633	5.557	5.480	5.404	5.328	5.252	5.176	5.100	5.024
South Pine bus split and transformer augmentation => TUOS =>> PV of TUOS	10.60	0.000	0.000	0.000	0.000	0.000	2.676	2.640	2.604	2.569	2.533	2.497	2.462	2.426	2.390	2.355
Sandgate 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$2.71	0.000	0.000	0.000	0.000	0.000	0.684	0.674	0.665	0.656	0.647	0.638	0.629	0.620	0.611	0.602
Nudgee 110/33kV transformer uprates => TUOS =>> PV of TUOS	\$2.88	0.000	0.000	0.000	0.000	0.000	0.728	0.718	0.708	0.699	0.689	0.679	0.669	0.660	0.650	0.640
Geebung 33kV fault level uprate => TUOS =>> PV of TUOS	\$0.83	0.000	0.000	0.000	0.000	0.000	0.209	0.207	0.204	0.201	0.198	0.196	0.193	0.190	0.187	0.184
Murrarie 3rd 275kV transformer and 275kV bus extension => TUOS =>> PV of TUOS	\$7.40	0.000	0.000	0.000	0.000	0.000	1.869	1.844	1.819	1.794	1.769	1.744	1.719	1.694	1.669	1.644
Nudgee 275/110kV Substation => TUOS =>> PV of TUOS	\$2.36	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.653	2.617	2.582
Sandgate - Nudgee 275kV (single circuit bypass) => TUOS =>> PV of TUOS	\$3.42	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.849	3.798	3.746
Nudgee - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$5.79	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.516	6.429	6.342
Hendra 110/33kV Substation & Hendra - Meeandah 110kV => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Relative Losses * Losses \$ => PV of Loss difference	\$2.82	0.000	0.214	0.254	0.280	0.014	0.263	0.454	0.471	0.504	0.540	0.578	0.618	0.661	0.708	0.964
Total for Option 3	\$206.02															

Scenario A	Medium Economic Growth															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	
Option 4	Murrarie-Meeandah-Myrtletown 110kV															
Myrtletown 110/33kV, 33kV GIS => TUOS =>> PV of TUOS	\$6.50	0.000	0.000	1.103	1.088	1.073	1.058	1.044	1.029	1.014	1.000	0.985	0.970	0.955	0.941	0.926
Murrarie - Meeandah 110kV => TUOS =>> PV of TUOS	\$33.42	0.000	0.000	5.667	5.591	5.516	5.440	5.365	5.289	5.214	5.138	5.062	4.987	4.911	4.836	4.760
Meeandah - Myrtletown 110kV => TUOS =>> PV of TUOS	\$14.04	0.000	0.000	2.381	2.350	2.318	2.286	2.254	2.223	2.191	2.159	2.127	2.096	2.064	2.032	2.000
Sandgate 2nd 110/33kV transformer => TUOS =>> PV of TUOS	\$1.17	0.000	0.000	0.198	0.196	0.193	0.191	0.188	0.185	0.183	0.180	0.177	0.175	0.172	0.169	0.167
Sandgate 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$3.71	0.000	0.000	0.628	0.620	0.612	0.603	0.595	0.587	0.578	0.570	0.561	0.553	0.545	0.536	0.528
Uprate 33kV network between Sandgate and Zillmere => TUOS =>> PV of TUOS	\$0.65	0.000	0.000	0.110	0.109	0.107	0.106	0.104	0.103	0.101	0.100	0.098	0.097	0.096	0.094	0.093
Proposed and modelled projects																
Bundamba - Goodna 275kV augmentation => TUOS =>> PV of TUOS	\$28.67	0.000	0.000	0.000	5.515	5.441	5.368	5.294	5.221	5.147	5.074	5.000	4.926	4.853	4.779	4.706
Goodna - Larapinta 275kV augmentation => TUOS =>> PV of TUOS	\$47.41	0.000	0.000	0.000	0.000	10.410	10.271	10.132	9.993	9.855	9.716	9.577	9.438	9.299	9.161	9.022
South Pine - Sandgate 275kV, initial operation 110kV => TUOS =>> PV of TUOS	\$22.61	0.000	0.000	0.000	0.000	0.000	5.709	5.633	5.557	5.480	5.404	5.328	5.252	5.176	5.100	5.024
South Pine bus split and transformer augmentation => TUOS =>> PV of TUOS	\$10.60	0.000	0.000	0.000	0.000	0.000	2.676	2.640	2.604	2.569	2.533	2.497	2.462	2.426	2.390	2.355
Sandgate 110kV GIS bus establishment => TUOS =>> PV of TUOS	2.71	0.000	0.000	0.000	0.000	0.000	0.684	0.674	0.665	0.656	0.647	0.638	0.629	0.620	0.611	0.602
Nudgee 110/33kV transformer uprates => TUOS =>> PV of TUOS	2.88	0.000	0.000	0.000	0.000	0.000	0.728	0.718	0.708	0.699	0.689	0.679	0.669	0.660	0.650	0.640
Geebung 33kV fault level uprate => TUOS =>> PV of TUOS	\$0.83	0.000	0.000	0.000	0.000	0.000	0.209	0.207	0.204	0.201	0.198	0.196	0.193	0.190	0.187	0.184
Murrarie 3rd 275kV transformer and 275kV bus extension => TUOS =>> PV of TUOS	\$7.40	0.000	0.000	0.000	0.000	0.000	1.869	1.844	1.819	1.794	1.769	1.744	1.719	1.694	1.669	1.644
Nudgee 275/110kV Substation => TUOS =>> PV of TUOS	\$2.36	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.653	2.617	2.582
Sandgate - Nudgee 275kV (double circuit bypass) => TUOS =>> PV of TUOS	\$3.91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.402	4.344	4.285
Nudgee - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$5.79	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.516	6.429	6.342
Hendra 110/33kV Substation & Hendra - Meeandah 110kV => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Meeandah 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Meeandah 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Relative Losses * Losses \$ => PV of Loss difference	\$2.82	0.000	0.214	0.254	0.280	0.014	0.263	0.454	0.471	0.504	0.540	0.578	0.618	0.661	0.708	0.964
Total for Option 4	\$197.46															

Scenario A	Medium Economic Growth															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	
Option 5	South Pine-Sandgate 275kV, Nudgee-Meeandah-Myrtletown 110kV															
Myrtletown 110/33kV, 33kV GIS => TUOS => PV of TUOS	\$6.50	0.000	0.000	1.103	1.088	1.073	1.058	1.044	1.029	1.014	1.000	0.985	0.970	0.955	0.941	0.926
Nudgee 110/33kV transformer uprates => TUOS => PV of TUOS	\$4.29	0.000	0.000	0.728	0.718	0.708	0.699	0.689	0.679	0.669	0.660	0.650	0.640	0.631	0.621	0.611
Nudgee - Myrtletown 110kV => TUOS => PV of TUOS	\$25.61	0.000	0.000	4.344	4.286	4.228	4.170	4.112	4.054	3.996	3.938	3.881	3.823	3.765	3.707	3.649
Geebung 33kV fault level uprate => TUOS => PV of TUOS	\$1.24	0.000	0.000	0.209	0.207	0.204	0.201	0.198	0.196	0.193	0.190	0.187	0.184	0.182	0.179	0.176
Nudgee - Geebung 33kV augmentation => TUOS => PV of TUOS	\$3.51	0.000	0.000	0.595	0.587	0.579	0.572	0.564	0.556	0.548	0.540	0.532	0.524	0.516	0.508	0.500
Sandgate 33kV GIS bus establishment => TUOS => PV of TUOS	\$3.71	0.000	0.000	0.628	0.620	0.612	0.603	0.595	0.587	0.578	0.570	0.561	0.553	0.545	0.536	0.528
Sandgate 110kV GIS bus establishment => TUOS => PV of TUOS	\$4.03	0.000	0.000	0.684	0.674	0.665	0.656	0.647	0.638	0.629	0.620	0.611	0.602	0.592	0.583	0.574
South Pine - Sandgate 275kV, initial operation 110kV => TUOS => PV of TUOS	\$33.66	0.000	0.000	5.709	5.633	5.557	5.480	5.404	5.328	5.252	5.176	5.100	5.024	4.948	4.871	4.795
South Pine bus split and transformer augmentation => TUOS => PV of TUOS	\$15.78	0.000	0.000	2.676	2.640	2.604	2.569	2.533	2.497	2.462	2.426	2.390	2.355	2.319	2.283	2.248
Uprate 33kV network connecting Zillmere and Sandgate to Geebung => TUOS => PV of TUOS	\$2.34	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333
Proposed and modelled projects																
Bundamba - Goodna 275kV augmentation => TUOS => PV of TUOS	\$21.84	0.000	0.000	0.000	0.000	0.000	5.515	5.441	5.368	5.294	5.221	5.147	5.074	5.000	4.926	4.853
Goodna - Larapinta 275kV augmentation => TUOS => PV of TUOS	\$35.51	0.000	0.000	0.000	0.000	0.000	10.410	10.271	10.132	9.993	9.855	9.716	9.577	9.438	9.299	
Murarrie 3rd 275kV transformer and 275kV bus extension => TUOS => PV of TUOS	6.37	0.000	0.000	0.000	0.000	0.000	1.869	1.844	1.819	1.794	1.769	1.744	1.719	1.694	1.669	
Nudgee 275/110kV Substation => TUOS => PV of TUOS	7.70	0.000	0.000	0.000	0.000	0.000	0.000	2.653	2.617	2.582	2.547	2.511	2.476	2.440	2.405	
Sandgate - Nudgee 275kV (double circuit bypass) => TUOS => PV of TUOS	\$12.79	0.000	0.000	0.000	0.000	0.000	0.000	4.402	4.344	4.285	4.226	4.167	4.109	4.050	3.991	
Sandgate 2nd 110/33kV transformer => TUOS => PV of TUOS	\$0.40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.198	0.196	0.193	0.191	0.188	0.185	
Nudgee - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment => TUOS => PV of TUOS	\$5.79	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.516	6.429	6.342
Hendra 110/33kV Substation & Hendra - Meeandah 110kV => TUOS => PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Meeandah 33kV GIS bus establishment => TUOS => PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Relative Losses * Losses \$ => PV of Loss difference	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total for Option 5	\$191.07															

Scenario B	High Economic Growth															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	
Option 1	South Pine-Sandgate 275kV, Nudgee-Myrletown 110kV															
Myrletown 110/33kV, 33kV GIS => TUOS => PV of TUOS	\$6.50	0.000	0.000	1.103	1.088	1.073	1.058	1.044	1.029	1.014	1.000	0.985	0.970	0.955	0.941	0.926
Nudgee - Myrletown 110kV => TUOS => PV of TUOS	\$25.61	0.000	0.000	4.344	4.286	4.228	4.170	4.112	4.054	3.996	3.938	3.881	3.823	3.765	3.707	3.649
Sandgate 2nd 110/33kV transformer => TUOS => PV of TUOS	\$1.17	0.000	0.000	0.198	0.196	0.193	0.191	0.188	0.185	0.183	0.180	0.177	0.175	0.172	0.169	0.167
Sandgate 33kV GIS bus establishment => TUOS => PV of TUOS	\$3.71	0.000	0.000	0.628	0.620	0.612	0.603	0.595	0.587	0.578	0.570	0.561	0.553	0.545	0.536	0.528
Sandgate 110kV GIS bus establishment => TUOS => PV of TUOS	\$4.03	0.000	0.000	0.684	0.674	0.665	0.656	0.647	0.638	0.629	0.620	0.611	0.602	0.592	0.583	0.574
South Pine - Sandgate 275kV, initial operation 110kV => TUOS => PV of TUOS	\$33.66	0.000	0.000	5.709	5.633	5.557	5.480	5.404	5.328	5.252	5.176	5.100	5.024	4.948	4.871	4.795
South Pine bus split and transformer augmentation => TUOS => PV of TUOS	\$15.78	0.000	0.000	2.676	2.640	2.604	2.569	2.533	2.497	2.462	2.426	2.390	2.355	2.319	2.283	2.248
Uprate 33kV network between Sandgate and Zillmere => TUOS => PV of TUOS	\$0.65	0.000	0.000	0.110	0.109	0.107	0.106	0.104	0.103	0.101	0.100	0.098	0.097	0.096	0.094	0.093
Proposed and modelled projects																
Nudgee 110/33kV transformer uprates => TUOS => PV of TUOS	\$3.31	0.000	0.000	0.000	0.000	0.728	0.718	0.708	0.699	0.689	0.679	0.669	0.660	0.650	0.640	0.631
Geebung 33kV fault level uprate => TUOS => PV of TUOS	\$0.95	0.000	0.000	0.000	0.000	0.209	0.207	0.204	0.201	0.198	0.196	0.193	0.190	0.187	0.184	0.182
Bundamba - Goodna 275kV augmentation => TUOS => PV of TUOS	25.11	0.000	0.000	0.000	0.000	5.515	5.441	5.368	5.294	5.221	5.147	5.074	5.000	4.926	4.853	4.779
Goodna - Larapinta 275kV augmentation => TUOS => PV of TUOS	47.41	0.000	0.000	0.000	0.000	10.410	10.271	10.132	9.993	9.855	9.716	9.577	9.438	9.299	9.161	9.022
Murarie 3rd 275kV transformer and 275kV bus extension => TUOS => PV of TUOS	\$8.51	0.000	0.000	0.000	0.000	1.869	1.844	1.819	1.794	1.769	1.744	1.719	1.694	1.669	1.644	1.620
Nudgee 275/110kV Substation => TUOS => PV of TUOS	\$10.50	0.000	0.000	0.000	0.000	2.653	2.617	2.582	2.547	2.511	2.476	2.440	2.405	2.370	2.334	
Sandgate - Nudgee 275kV (double circuit bypass) => TUOS => PV of TUOS	\$17.43	0.000	0.000	0.000	0.000	4.402	4.344	4.285	4.226	4.167	4.109	4.050	3.991	3.933	3.874	
Nudgee - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment => TUOS => PV of TUOS	\$15.87	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.516	6.429	6.342	6.255	6.168	6.081	5.995
Hendra 110/33kV Substation & Hendra - Meeandah 110kV => TUOS => PV of TUOS	\$8.64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.391	5.319	5.247	5.176	5.104
Meeandah 33kV GIS bus establishment => TUOS => PV of TUOS	\$0.48	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.298	0.294	0.290	0.286	0.282
Relative Losses * Losses \$ => PV of Loss difference	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total for Option 1	\$229.34															

Scenario B	High Economic Growth															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	
Option 2	South Pine-Sandgate 110kV, Nudgee-Myrtletown 110kV															
Myrtletown 110/33kV, 33kV GIS => TUOS =>> PV of TUOS	\$6.50	0.000	0.000	1.103	1.088	1.073	1.058	1.044	1.029	1.014	1.000	0.985	0.970	0.955	0.941	0.926
Nudgee - Myrtletown 110kV => TUOS =>> PV of TUOS	\$25.61	0.000	0.000	4.344	4.286	4.228	4.170	4.112	4.054	3.996	3.938	3.881	3.823	3.765	3.707	3.649
Sandgate 2nd 110/33kV transformer => TUOS =>> PV of TUOS	\$1.17	0.000	0.000	0.198	0.196	0.193	0.191	0.188	0.185	0.183	0.180	0.177	0.175	0.172	0.169	0.167
Sandgate 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$3.71	0.000	0.000	0.628	0.620	0.612	0.603	0.595	0.587	0.578	0.570	0.561	0.553	0.545	0.536	0.528
South Pine - Sandgate 110kV => TUOS =>> PV of TUOS	\$23.10	0.000	0.000	3.917	3.865	3.813	3.760	3.708	3.656	3.604	3.552	3.499	3.447	3.395	3.343	3.290
South Pine bus split and transformer augmentation => TUOS =>> PV of TUOS	\$15.78	0.000	0.000	2.676	2.640	2.604	2.569	2.533	2.497	2.462	2.426	2.390	2.355	2.319	2.283	2.248
Uprate 33kV network between Sandgate and Zillmere => TUOS =>> PV of TUOS	\$0.65	0.000	0.000	0.110	0.109	0.107	0.106	0.104	0.103	0.101	0.100	0.098	0.097	0.096	0.094	0.093
Proposed and modelled projects																
Nudgee 110/33kV transformer uprates => TUOS =>> PV of TUOS	\$3.31	0.000	0.000	0.000	0.000	0.728	0.718	0.708	0.699	0.689	0.679	0.669	0.660	0.650	0.640	0.631
Geebung 33kV fault level uprate => TUOS =>> PV of TUOS	\$0.95	0.000	0.000	0.000	0.000	0.209	0.207	0.204	0.201	0.198	0.196	0.193	0.190	0.187	0.184	0.182
Bundamba - Goodna 275kV augmentation => TUOS =>> PV of TUOS	\$25.11	0.000	0.000	0.000	0.000	5.515	5.441	5.368	5.294	5.221	5.147	5.074	5.000	4.926	4.853	4.779
Goodna - Larapinta 275kV augmentation => TUOS =>> PV of TUOS	\$47.41	0.000	0.000	0.000	0.000	10.410	10.271	10.132	9.993	9.855	9.716	9.577	9.438	9.299	9.161	9.022
Murrarrie 3rd 275kV transformer and 275kV bus extension => TUOS =>> PV of TUOS	\$8.51	0.000	0.000	0.000	0.000	1.869	1.844	1.819	1.794	1.769	1.744	1.719	1.694	1.669	1.644	1.620
Myrtletown 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$2.51	0.000	0.000	0.000	0.000	0.551	0.544	0.537	0.529	0.522	0.515	0.507	0.500	0.492	0.485	0.478
Murrarrie - Meeandah 110kV => TUOS =>> PV of TUOS	\$25.81	0.000	0.000	0.000	0.000	5.667	5.591	5.516	5.440	5.365	5.289	5.214	5.138	5.062	4.987	4.911
Meeandah - Myrtletown 110kV => TUOS =>> PV of TUOS	\$10.85	0.000	0.000	0.000	0.000	2.381	2.350	2.318	2.286	2.254	2.223	2.191	2.159	2.127	2.096	2.064
Upper Kedron 275/110kV Substation => TUOS =>> PV of TUOS	\$11.37	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.668	4.606	4.544	4.481	4.419	4.357	4.295
Upper Kedron - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$20.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.214	8.104	7.995	7.885	7.776	7.666	7.557
Hendra 110/33kV Substation & Vic Park - Hendra 110kV => TUOS =>> PV of TUOS	\$12.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.928	4.862	4.797	4.731	4.665	4.600	4.534
Meeandah 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$0.48	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.298	0.294	0.290	0.286	0.282
Meeandah 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$2.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.246	1.229	1.213	1.196	1.179
Relative Losses * Losses \$ => PV of Loss difference	\$3.00	0.000	0.030	0.015	0.294	0.434	0.451	0.482	0.516	0.552	0.591	0.632	0.677	0.724	0.774	0.829
Total for Option 2	\$249.85															

Scenario B	High Economic Growth															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	
Option 3	Murrarie-Meeandah 110kV, Meeandah-Myrtletown 33kV															
Meeandah 3rd 110/33kV transformer => TUOS =>> PV of TUOS	\$1.43	0.000	0.000	0.243	0.239	0.236	0.233	0.230	0.226	0.223	0.220	0.217	0.213	0.210	0.207	0.204
Meeandah 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$1.76	0.000	0.000	0.298	0.294	0.290	0.286	0.282	0.278	0.274	0.270	0.266	0.262	0.258	0.254	0.250
Meeandah 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$7.35	0.000	0.000	1.246	1.229	1.213	1.196	1.179	1.163	1.146	1.130	1.113	1.096	1.080	1.063	1.046
Murrarie - Meeandah 110kV => TUOS =>> PV of TUOS	\$33.42	0.000	0.000	5.667	5.591	5.516	5.440	5.365	5.289	5.214	5.138	5.062	4.987	4.911	4.836	4.760
Meeandah - Myrtletown 110kV => TUOS =>> PV of TUOS	\$14.04	0.000	0.000	2.381	2.350	2.318	2.286	2.254	2.223	2.191	2.159	2.127	2.096	2.064	2.032	2.000
Sandgate 2nd 110/33kV transformer => TUOS =>> PV of TUOS	\$1.17	0.000	0.000	0.198	0.196	0.193	0.191	0.188	0.185	0.183	0.180	0.177	0.175	0.172	0.169	0.167
Sandgate 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$3.71	0.000	0.000	0.628	0.620	0.612	0.603	0.595	0.587	0.578	0.570	0.561	0.553	0.545	0.536	0.528
Uprate 33kV network between Sandgate and Zillmere => TUOS =>> PV of TUOS	\$0.65	0.000	0.000	0.110	0.109	0.107	0.106	0.104	0.103	0.101	0.100	0.098	0.097	0.096	0.094	0.093
Proposed and modelled projects																
Bundamba - Goodna 275kV augmentation => TUOS =>> PV of TUOS	\$32.52	0.000	0.000	5.515	5.441	5.368	5.294	5.221	5.147	5.074	5.000	4.926	4.853	4.779	4.706	4.632
Goodna - Larapinta 275kV augmentation => TUOS =>> PV of TUOS	\$54.11	0.000	0.000	0.000	10.410	10.271	10.132	9.993	9.855	9.716	9.577	9.438	9.299	9.161	9.022	8.883
Myrtletown 110/33kV, 33kV GIS => TUOS =>> PV of TUOS	\$5.73	0.000	0.000	0.000	1.103	1.088	1.073	1.058	1.044	1.029	1.014	1.000	0.985	0.970	0.955	0.941
South Pine - Sandgate 275kV, initial operation 110kV => TUOS =>> PV of TUOS	26.00	0.000	0.000	0.000	0.000	5.709	5.633	5.557	5.480	5.404	5.328	5.252	5.176	5.100	5.024	4.948
South Pine bus split and transformer augmentation => TUOS =>> PV of TUOS	12.19	0.000	0.000	0.000	0.000	2.676	2.640	2.604	2.569	2.533	2.497	2.462	2.426	2.390	2.355	2.319
Sandgate 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$3.11	0.000	0.000	0.000	0.000	0.684	0.674	0.665	0.656	0.647	0.638	0.629	0.620	0.611	0.602	0.592
Nudgee 110/33kV transformer uprates => TUOS =>> PV of TUOS	\$3.31	0.000	0.000	0.000	0.000	0.728	0.718	0.708	0.699	0.689	0.679	0.669	0.660	0.650	0.640	0.631
Geebung 33kV fault level uprate => TUOS =>> PV of TUOS	\$0.95	0.000	0.000	0.000	0.000	0.209	0.207	0.204	0.201	0.198	0.196	0.193	0.190	0.187	0.184	0.182
Murrarie 3rd 275kV transformer and 275kV bus extension => TUOS =>> PV of TUOS	\$8.51	0.000	0.000	0.000	0.000	1.869	1.844	1.819	1.794	1.769	1.744	1.719	1.694	1.669	1.644	1.620
Nudgee 275/110kV Substation => TUOS =>> PV of TUOS	\$6.46	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.653	2.617	2.582	2.547	2.511	2.476	2.440
Sandgate - Nudgee 275kV (single circuit bypass) => TUOS =>> PV of TUOS	\$9.38	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.849	3.798	3.746	3.695	3.644	3.592	3.541
Nudgee - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$15.87	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.516	6.429	6.342	6.255	6.168	6.081	5.995
Hendra 110/33kV Substation & Hendra - Meeandah 110kV => TUOS =>> PV of TUOS	\$8.64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.391	5.319	5.247	5.176	5.104
Relative Losses * Losses \$ => PV of Loss difference	\$2.95	0.000	0.147	0.280	0.014	0.263	0.454	0.471	0.504	0.540	0.578	0.618	0.661	0.708	0.757	0.810
Total for Option 3	\$253.26															

Scenario B	High Economic Growth															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	
Option 4	Murrarie-Meeandah-Myrtletown 110kV															
Myrtletown 110/33kV, 33kV GIS => TUOS =>> PV of TUOS	\$6.50	0.000	0.000	1.103	1.088	1.073	1.058	1.044	1.029	1.014	1.000	0.985	0.970	0.955	0.941	0.926
Murrarie - Meeandah 110kV => TUOS =>> PV of TUOS	\$33.42	0.000	0.000	5.667	5.591	5.516	5.440	5.365	5.289	5.214	5.138	5.062	4.987	4.911	4.836	4.760
Meeandah - Myrtletown 110kV => TUOS =>> PV of TUOS	\$14.04	0.000	0.000	2.381	2.350	2.318	2.286	2.254	2.223	2.191	2.159	2.127	2.096	2.064	2.032	2.000
Sandgate 2nd 110/33kV transformer => TUOS =>> PV of TUOS	\$1.17	0.000	0.000	0.198	0.196	0.193	0.191	0.188	0.185	0.183	0.180	0.177	0.175	0.172	0.169	0.167
Sandgate 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$3.71	0.000	0.000	0.628	0.620	0.612	0.603	0.595	0.587	0.578	0.570	0.561	0.553	0.545	0.536	0.528
Uprate 33kV network between Sandgate and Zillmere => TUOS =>> PV of TUOS	\$0.65	0.000	0.000	0.110	0.109	0.107	0.106	0.104	0.103	0.101	0.100	0.098	0.097	0.096	0.094	0.093
Proposed and modelled projects																
Bundamba - Goodna 275kV augmentation => TUOS =>> PV of TUOS	\$32.52	0.000	0.000	5.515	5.441	5.368	5.294	5.221	5.147	5.074	5.000	4.926	4.853	4.779	4.706	4.632
Goodna - Larapinta 275kV augmentation => TUOS =>> PV of TUOS	\$54.11	0.000	0.000	0.000	10.410	10.271	10.132	9.993	9.855	9.716	9.577	9.438	9.299	9.161	9.022	8.883
South Pine - Sandgate 275kV, initial operation 110kV => TUOS =>> PV of TUOS	\$26.00	0.000	0.000	0.000	0.000	5.709	5.633	5.557	5.480	5.404	5.328	5.252	5.176	5.100	5.024	4.948
South Pine bus split and transformer augmentation => TUOS =>> PV of TUOS	\$12.19	0.000	0.000	0.000	0.000	2.676	2.640	2.604	2.569	2.533	2.497	2.462	2.426	2.390	2.355	2.319
Sandgate 110kV GIS bus establishment => TUOS =>> PV of TUOS	3.11	0.000	0.000	0.000	0.000	0.684	0.674	0.665	0.656	0.647	0.638	0.629	0.620	0.611	0.602	0.592
Nudgee 110/33kV transformer uprates => TUOS =>> PV of TUOS	3.31	0.000	0.000	0.000	0.000	0.728	0.718	0.708	0.699	0.689	0.679	0.669	0.660	0.650	0.640	0.631
Geebung 33kV fault level uprate => TUOS =>> PV of TUOS	\$0.95	0.000	0.000	0.000	0.000	0.209	0.207	0.204	0.201	0.198	0.196	0.193	0.190	0.187	0.184	0.182
Murrarie 3rd 275kV transformer and 275kV bus extension => TUOS =>> PV of TUOS	\$8.51	0.000	0.000	0.000	0.000	1.869	1.844	1.819	1.794	1.769	1.744	1.719	1.694	1.669	1.644	1.620
Nudgee 275/110kV Substation => TUOS =>> PV of TUOS	\$6.46	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.653	2.617	2.582	2.547	2.511	2.476	2.440
Sandgate - Nudgee 275kV (double circuit bypass) => TUOS =>> PV of TUOS	\$10.73	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.402	4.344	4.285	4.226	4.167	4.109	4.050
Nudgee - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$15.87	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.516	6.429	6.342	6.255	6.168	6.081	5.995
Hendra 110/33kV Substation & Hendra - Meeandah 110kV => TUOS =>> PV of TUOS	\$8.64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.391	5.319	5.247	5.176	5.104	
Meeandah 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$0.48	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.298	0.294	0.290	0.286	0.282	
Meeandah 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$2.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.246	1.229	1.213	1.196	1.179	
Relative Losses * Losses \$ => PV of Loss difference	\$2.95	0.000	0.147	0.280	0.014	0.263	0.454	0.471	0.504	0.540	0.578	0.618	0.661	0.708	0.757	0.810
Total for Option 4	\$247.32															

Scenario B	High Economic Growth															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	
Option 5	South Pine-Sandgate 275kV, Nudgee-Meeandah-Myrtletown 110kV															
Myrtletown 110/33kV, 33kV GIS => TUOS => PV of TUOS	\$6.50	0.000	0.000	1.103	1.088	1.073	1.058	1.044	1.029	1.014	1.000	0.985	0.970	0.955	0.941	0.926
Nudgee 110/33kV transformer uprates => TUOS => PV of TUOS	\$4.29	0.000	0.000	0.728	0.718	0.708	0.699	0.689	0.679	0.669	0.660	0.650	0.640	0.631	0.621	0.611
Nudgee - Myrtletown 110kV => TUOS => PV of TUOS	\$25.61	0.000	0.000	4.344	4.286	4.228	4.170	4.112	4.054	3.996	3.938	3.881	3.823	3.765	3.707	3.649
Geebung 33kV fault level uprate => TUOS => PV of TUOS	\$1.24	0.000	0.000	0.209	0.207	0.204	0.201	0.198	0.196	0.193	0.190	0.187	0.184	0.182	0.179	0.176
Nudgee - Geebung 33kV augmentation => TUOS => PV of TUOS	\$3.51	0.000	0.000	0.595	0.587	0.579	0.572	0.564	0.556	0.548	0.540	0.532	0.524	0.516	0.508	0.500
Sandgate 33kV GIS bus establishment => TUOS => PV of TUOS	\$3.71	0.000	0.000	0.628	0.620	0.612	0.603	0.595	0.587	0.578	0.570	0.561	0.553	0.545	0.536	0.528
Sandgate 110kV GIS bus establishment => TUOS => PV of TUOS	\$4.03	0.000	0.000	0.684	0.674	0.665	0.656	0.647	0.638	0.629	0.620	0.611	0.602	0.592	0.583	0.574
South Pine - Sandgate 275kV, initial operation 110kV => TUOS => PV of TUOS	\$33.66	0.000	0.000	5.709	5.633	5.557	5.480	5.404	5.328	5.252	5.176	5.100	5.024	4.948	4.871	4.795
South Pine bus split and transformer augmentation => TUOS => PV of TUOS	\$15.78	0.000	0.000	2.676	2.640	2.604	2.569	2.533	2.497	2.462	2.426	2.390	2.355	2.319	2.283	2.248
Uprate 33kV network connecting Zillmere and Sandgate to Geebung => TUOS => PV of TUOS	\$2.34	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333
Proposed and modelled projects																
Bundamba - Goodna 275kV augmentation => TUOS => PV of TUOS	\$25.11	0.000	0.000	0.000	0.000	5.515	5.441	5.368	5.294	5.221	5.147	5.074	5.000	4.926	4.853	4.779
Goodna - Larapinta 275kV augmentation => TUOS => PV of TUOS	\$47.41	0.000	0.000	0.000	0.000	10.410	10.271	10.132	9.993	9.855	9.716	9.577	9.438	9.299	9.161	9.022
Murrarie 3rd 275kV transformer and 275kV bus extension => TUOS => PV of TUOS	8.51	0.000	0.000	0.000	0.000	1.869	1.844	1.819	1.794	1.769	1.744	1.719	1.694	1.669	1.644	1.620
Nudgee 275/110kV Substation => TUOS => PV of TUOS	10.50	0.000	0.000	0.000	0.000	2.653	2.617	2.582	2.547	2.511	2.476	2.440	2.405	2.370	2.334	
Sandgate - Nudgee 275kV (double circuit bypass) => TUOS => PV of TUOS	\$17.43	0.000	0.000	0.000	0.000	4.402	4.344	4.285	4.226	4.167	4.109	4.050	3.991	3.933	3.874	
Sandgate 2nd 110/33kV transformer => TUOS => PV of TUOS	\$0.68	0.000	0.000	0.000	0.000	0.000	0.198	0.196	0.193	0.191	0.188	0.185	0.183	0.180	0.177	
Nudgee - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment => TUOS => PV of TUOS	\$15.87	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.516	6.429	6.342	6.255	6.168	6.081	5.995
Hendra 110/33kV Substation & Hendra - Meeandah 110kV => TUOS => PV of TUOS	\$8.64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.391	5.319	5.247	5.176	5.104
Meeandah 33kV GIS bus establishment => TUOS => PV of TUOS	\$0.48	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.298	0.294	0.290	0.286	0.282
Relative Losses																
* Losses \$ => PV of Loss difference	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total for Option 5	\$235.31															

Scenario C	Low Economic Growth															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	
Option 1	South Pine-Sandgate 275kV, Nudgee-Myrtletown 110kV															
Myrtletown 110/33kV, 33kV GIS => TUOS =>> PV of TUOS	\$6.50	0.000	0.000	1.103	1.088	1.073	1.058	1.044	1.029	1.014	1.000	0.985	0.970	0.955	0.941	0.926
Nudgee - Myrtletown 110kV => TUOS =>> PV of TUOS	\$25.61	0.000	0.000	4.344	4.286	4.228	4.170	4.112	4.054	3.996	3.938	3.881	3.823	3.765	3.707	3.649
Sandgate 2nd 110/33kV transformer => TUOS =>> PV of TUOS	\$1.17	0.000	0.000	0.198	0.196	0.193	0.191	0.188	0.185	0.183	0.180	0.177	0.175	0.172	0.169	0.167
Sandgate 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$3.71	0.000	0.000	0.628	0.620	0.612	0.603	0.595	0.587	0.578	0.570	0.561	0.553	0.545	0.536	0.528
Sandgate 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$4.03	0.000	0.000	0.684	0.674	0.665	0.656	0.647	0.638	0.629	0.620	0.611	0.602	0.592	0.583	0.574
South Pine - Sandgate 275kV, initial operation 110kV => TUOS =>> PV of TUOS	\$33.66	0.000	0.000	5.709	5.633	5.557	5.480	5.404	5.328	5.252	5.176	5.100	5.024	4.948	4.871	4.795
South Pine bus split and transformer augmentation => TUOS =>> PV of TUOS	\$15.78	0.000	0.000	2.676	2.640	2.604	2.569	2.533	2.497	2.462	2.426	2.390	2.355	2.319	2.283	2.248
Uprate 33kV network between Sandgate and Zillmere => TUOS =>> PV of TUOS	\$0.65	0.000	0.000	0.110	0.109	0.107	0.106	0.104	0.103	0.101	0.100	0.098	0.097	0.096	0.094	0.093
Proposed and modelled projects																
Nudgee 110/33kV transformer uprates => TUOS =>> PV of TUOS	\$1.77	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.728	0.718	0.708	0.699	0.689	0.679	0.669
Geebung 33kV fault level uprate => TUOS =>> PV of TUOS	\$0.51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.209	0.207	0.204	0.201	0.198	0.196	0.193
Bundamba - Goodna 275kV augmentation => TUOS =>> PV of TUOS	13.44	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.515	5.441	5.368	5.294	5.221	5.147	5.074
Goodna - Larapinta 275kV augmentation => TUOS =>> PV of TUOS	16.69	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.410	10.271	10.132	9.993	9.855	
Murarie 3rd 275kV transformer and 275kV bus extension => TUOS =>> PV of TUOS	\$3.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.869	1.844	1.819	1.794	1.769	
Nudgee 275/110kV Substation => TUOS =>> PV of TUOS	\$2.36	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.653	2.617	2.582
Sandgate - Nudgee 275kV (double circuit bypass) => TUOS =>> PV of TUOS	\$3.91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.402	4.344	4.285
Nudgee - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hendra 110/33kV Substation & Hendra - Meeandah 110kV => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Meeandah 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Relative Losses * Losses \$ => PV of Loss difference	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total for Option 1	\$132.78															

Scenario C	Low Economic Growth															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	
Option 2	South Pine-Sandgate 110kV, Nudgee-Myrtletown 110kV															
Myrtletown 110/33kV, 33kV GIS => TUOS => PV of TUOS	\$6.50	0.000	0.000	1.103	1.088	1.073	1.058	1.044	1.029	1.014	1.000	0.985	0.970	0.955	0.941	0.926
Nudgee - Myrtletown 110kV => TUOS => PV of TUOS	\$25.61	0.000	0.000	4.344	4.286	4.228	4.170	4.112	4.054	3.996	3.938	3.881	3.823	3.765	3.707	3.649
Sandgate 2nd 110/33kV transformer => TUOS => PV of TUOS	\$1.17	0.000	0.000	0.198	0.196	0.193	0.191	0.188	0.185	0.183	0.180	0.177	0.175	0.172	0.169	0.167
Sandgate 33kV GIS bus establishment => TUOS => PV of TUOS	\$3.71	0.000	0.000	0.628	0.620	0.612	0.603	0.595	0.587	0.578	0.570	0.561	0.553	0.545	0.536	0.528
South Pine - Sandgate 110kV => TUOS => PV of TUOS	\$23.10	0.000	0.000	3.917	3.865	3.813	3.760	3.708	3.656	3.604	3.552	3.499	3.447	3.395	3.343	3.290
South Pine bus split and transformer augmentation => TUOS => PV of TUOS	\$15.78	0.000	0.000	2.676	2.640	2.604	2.569	2.533	2.497	2.462	2.426	2.390	2.355	2.319	2.283	2.248
Uprate 33kV network between Sandgate and Zillmere => TUOS => PV of TUOS	\$0.65	0.000	0.000	0.110	0.109	0.107	0.106	0.104	0.103	0.101	0.100	0.098	0.097	0.096	0.094	0.093
Proposed and modelled projects																
Nudgee 110/33kV transformer uprates => TUOS => PV of TUOS	\$1.77	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.728	0.718	0.708	0.699	0.689	0.679	0.669
Geebung 33kV fault level uprate => TUOS => PV of TUOS	\$0.51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.209	0.207	0.204	0.201	0.198	0.196	0.193
Bundamba - Goodna 275kV augmentation => TUOS => PV of TUOS	\$13.44	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.515	5.441	5.368	5.294	5.221	5.147	5.074
Goodna - Larapinta 275kV augmentation => TUOS => PV of TUOS	\$16.69	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.410	10.271	10.132	9.993	9.855	
Murrarrie 3rd 275kV transformer and 275kV bus extension => TUOS => PV of TUOS	\$3.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.869	1.844	1.819	1.794	1.769	
Myrtletown 110kV GIS bus establishment => TUOS => PV of TUOS	\$0.88	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.551	0.544	0.537	0.529	0.522	
Murrarrie - Meeandah 110kV => TUOS => PV of TUOS	\$9.08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.667	5.591	5.516	5.440	5.365	
Meeandah - Myrtletown 110kV => TUOS => PV of TUOS	\$3.82	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.381	2.350	2.318	2.286	2.254	
Upper Kedron 275/110kV Substation => TUOS => PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Upper Kedron - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment => TUOS => PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hendra 110/33kV Substation & Vic Park - Hendra 110kV => TUOS => PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Meeandah 33kV GIS bus establishment => TUOS => PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Meeandah 110kV GIS bus establishment => TUOS => PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Relative Losses * Losses \$ => PV of Loss difference	\$1.14	0.000	0.030	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.308	0.441	0.434	0.451	0.482	0.658
Total for Option 2	\$126.84															

Scenario C	Low Economic Growth															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	
Option 3	Murrarie-Meeandah 110kV, Meeandah-Myrtletown 33kV															
Meeandah 3rd 110/33kV transformer => TUOS =>> PV of TUOS	\$1.43	0.000	0.000	0.243	0.239	0.236	0.233	0.230	0.226	0.223	0.220	0.217	0.213	0.210	0.207	0.204
Meeandah 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$1.76	0.000	0.000	0.298	0.294	0.290	0.286	0.282	0.278	0.274	0.270	0.266	0.262	0.258	0.254	0.250
Meeandah 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$7.35	0.000	0.000	1.246	1.229	1.213	1.196	1.179	1.163	1.146	1.130	1.113	1.096	1.080	1.063	1.046
Murrarie - Meeandah 110kV => TUOS =>> PV of TUOS	\$33.42	0.000	0.000	5.667	5.591	5.516	5.440	5.365	5.289	5.214	5.138	5.062	4.987	4.911	4.836	4.760
Meeandah - Myrtletown 110kV => TUOS =>> PV of TUOS	\$14.04	0.000	0.000	2.381	2.350	2.318	2.286	2.254	2.223	2.191	2.159	2.127	2.096	2.064	2.032	2.000
Sandgate 2nd 110/33kV transformer => TUOS =>> PV of TUOS	\$1.17	0.000	0.000	0.198	0.196	0.193	0.191	0.188	0.185	0.183	0.180	0.177	0.175	0.172	0.169	0.167
Sandgate 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$3.71	0.000	0.000	0.628	0.620	0.612	0.603	0.595	0.587	0.578	0.570	0.561	0.553	0.545	0.536	0.528
Uprate 33kV network between Sandgate and Zillmere => TUOS =>> PV of TUOS	\$0.65	0.000	0.000	0.110	0.109	0.107	0.106	0.104	0.103	0.101	0.100	0.098	0.097	0.096	0.094	0.093
Proposed and modelled projects																
Bundamba - Goodna 275kV augmentation => TUOS =>> PV of TUOS	\$25.11	0.000	0.000	0.000	0.000	5.515	5.441	5.368	5.294	5.221	5.147	5.074	5.000	4.926	4.853	4.779
Goodna - Larapinta 275kV augmentation => TUOS =>> PV of TUOS	\$35.51	0.000	0.000	0.000	0.000	0.000	0.000	10.410	10.271	10.132	9.993	9.855	9.716	9.577	9.438	9.299
Myrtletown 110/33kV, 33kV GIS => TUOS =>> PV of TUOS	\$3.76	0.000	0.000	0.000	0.000	0.000	0.000	1.103	1.088	1.073	1.058	1.044	1.029	1.014	1.000	0.985
South Pine - Sandgate 275kV, initial operation 110kV => TUOS =>> PV of TUOS	13.91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.709	5.633	5.557	5.480	5.404	5.328	5.252
South Pine bus split and transformer augmentation => TUOS =>> PV of TUOS	6.52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.676	2.640	2.604	2.569	2.533	2.497	2.462
Sandgate 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$1.67	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.684	0.674	0.665	0.656	0.647	0.638	0.629
Nudgee 110/33kV transformer uprates => TUOS =>> PV of TUOS	\$1.77	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.728	0.718	0.708	0.699	0.689	0.679	0.669
Geebung 33kV fault level uprate => TUOS =>> PV of TUOS	\$0.51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.209	0.207	0.204	0.201	0.198	0.196	0.193
Murrarie 3rd 275kV transformer and 275kV bus extension => TUOS =>> PV of TUOS	\$4.55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.869	1.844	1.819	1.794	1.769	1.744	1.719
Nudgee 275/110kV Substation => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sandgate - Nudgee 275kV (single circuit bypass) => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nudgee - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hendra 110/33kV Substation & Hendra - Meeandah 110kV => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Relative Losses * Losses \$ => PV of Loss difference	\$1.98	0.000	0.214	0.321	0.254	0.220	0.280	0.309	0.014	-0.133	0.263	0.461	0.454	0.471	0.504	0.688
Total for Option 3	\$158.81															

Scenario C	Low Economic Growth															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	
Option 4	Murrarie-Meeandah-Myrtletown 110kV															
Myrtletown 110/33kV, 33kV GIS => TUOS =>> PV of TUOS	\$6.50	0.000	0.000	1.103	1.088	1.073	1.058	1.044	1.029	1.014	1.000	0.985	0.970	0.955	0.941	0.926
Murrarie - Meeandah 110kV => TUOS =>> PV of TUOS	\$33.42	0.000	0.000	5.667	5.591	5.516	5.440	5.365	5.289	5.214	5.138	5.062	4.987	4.911	4.836	4.760
Meeandah - Myrtletown 110kV => TUOS =>> PV of TUOS	\$14.04	0.000	0.000	2.381	2.350	2.318	2.286	2.254	2.223	2.191	2.159	2.127	2.096	2.064	2.032	2.000
Sandgate 2nd 110/33kV transformer => TUOS =>> PV of TUOS	\$1.17	0.000	0.000	0.198	0.196	0.193	0.191	0.188	0.185	0.183	0.180	0.177	0.175	0.172	0.169	0.167
Sandgate 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$3.71	0.000	0.000	0.628	0.620	0.612	0.603	0.595	0.587	0.578	0.570	0.561	0.553	0.545	0.536	0.528
Uprate 33kV network between Sandgate and Zillmere => TUOS =>> PV of TUOS	\$0.65	0.000	0.000	0.110	0.109	0.107	0.106	0.104	0.103	0.101	0.100	0.098	0.097	0.096	0.094	0.093
Proposed and modelled projects																
Bundamba - Goodna 275kV augmentation => TUOS =>> PV of TUOS	\$25.11	0.000	0.000	0.000	0.000	5.515	5.441	5.368	5.294	5.221	5.147	5.074	5.000	4.926	4.853	4.779
Goodna - Larapinta 275kV augmentation => TUOS =>> PV of TUOS	\$35.51	0.000	0.000	0.000	0.000	0.000	0.000	10.410	10.271	10.132	9.993	9.855	9.716	9.577	9.438	9.299
South Pine - Sandgate 275kV, initial operation 110kV => TUOS =>> PV of TUOS	\$13.91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.709	5.633	5.557	5.480	5.404	5.328	5.252
South Pine bus split and transformer augmentation => TUOS =>> PV of TUOS	\$6.52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.676	2.640	2.604	2.569	2.533	2.497	2.462
Sandgate 110kV GIS bus establishment => TUOS =>> PV of TUOS	1.67	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.684	0.674	0.665	0.656	0.647	0.638	0.629
Nudgee 110/33kV transformer uprates => TUOS =>> PV of TUOS	1.77	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.728	0.718	0.708	0.699	0.689	0.679	0.669
Geebung 33kV fault level uprate => TUOS =>> PV of TUOS	\$0.51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.209	0.207	0.204	0.201	0.198	0.196	0.193
Murrarie 3rd 275kV transformer and 275kV bus extension => TUOS =>> PV of TUOS	\$4.55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.869	1.844	1.819	1.794	1.769	1.744	1.719
Nudgee 275/110kV Substation => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sandgate - Nudgee 275kV (double circuit bypass) => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nudgee - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hendra 110/33kV Substation & Hendra - Meeandah 110kV => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Meeandah 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Meeandah 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Relative Losses * Losses \$ => PV of Loss difference	\$1.98	0.000	0.214	0.321	0.254	0.220	0.280	0.309	0.014	-0.133	0.263	0.461	0.454	0.471	0.504	0.688
Total for Option 4	\$151.02															

Scenario C	Low Economic Growth															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	
Option 5	South Pine-Sandgate 275kV, Nudgee-Meeandah-Myrtletown 110kV															
Myrtletown 110/33kV, 33kV GIS => TUOS =>> PV of TUOS	\$6.50	0.000	0.000	1.103	1.088	1.073	1.058	1.044	1.029	1.014	1.000	0.985	0.970	0.955	0.941	0.926
Nudgee 110/33kV transformer uprates => TUOS =>> PV of TUOS	\$4.29	0.000	0.000	0.728	0.718	0.708	0.699	0.689	0.679	0.669	0.660	0.650	0.640	0.631	0.621	0.611
Nudgee - Myrtletown 110kV => TUOS =>> PV of TUOS	\$25.61	0.000	0.000	4.344	4.286	4.228	4.170	4.112	4.054	3.996	3.938	3.881	3.823	3.765	3.707	3.649
Geebung 33kV fault level uprate => TUOS =>> PV of TUOS	\$1.24	0.000	0.000	0.209	0.207	0.204	0.201	0.198	0.196	0.193	0.190	0.187	0.184	0.182	0.179	0.176
Nudgee - Geebung 33kV augmentation => TUOS =>> PV of TUOS	\$3.51	0.000	0.000	0.595	0.587	0.579	0.572	0.564	0.556	0.548	0.540	0.532	0.524	0.516	0.508	0.500
Sandgate 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$3.71	0.000	0.000	0.628	0.620	0.612	0.603	0.595	0.587	0.578	0.570	0.561	0.553	0.545	0.536	0.528
Sandgate 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$4.03	0.000	0.000	0.684	0.674	0.665	0.656	0.647	0.638	0.629	0.620	0.611	0.602	0.592	0.583	0.574
South Pine - Sandgate 275kV, initial operation 110kV => TUOS =>> PV of TUOS	\$33.66	0.000	0.000	5.709	5.633	5.557	5.480	5.404	5.328	5.252	5.176	5.100	5.024	4.948	4.871	4.795
South Pine bus split and transformer augmentation => TUOS =>> PV of TUOS	\$15.78	0.000	0.000	2.676	2.640	2.604	2.569	2.533	2.497	2.462	2.426	2.390	2.355	2.319	2.283	2.248
Uprate 33kV network connecting Zillmere and Sandgate to Geebung => TUOS =>> PV of TUOS	\$2.34	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333
Proposed and modelled projects																
Bundamba - Goodna 275kV augmentation => TUOS =>> PV of TUOS	\$13.44	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.515	5.441	5.368	5.294	5.221	5.147	5.074
Goodna - Larapinta 275kV augmentation => TUOS =>> PV of TUOS	\$16.69	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.410	10.271	10.132	9.993	9.855	
Murarie 3rd 275kV transformer and 275kV bus extension => TUOS =>> PV of TUOS	3.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.869	1.844	1.819	1.794	1.769
Nudgee 275/110kV Substation => TUOS =>> PV of TUOS	2.36	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.653	2.617	2.582
Sandgate - Nudgee 275kV (double circuit bypass) => TUOS =>> PV of TUOS	\$3.91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.402	4.344	4.285
Sandgate 2nd 110/33kV transformer => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nudgee - Victoria Park 110kV & Victoria Park 110kV GIS bus establishment => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hendra 110/33kV Substation & Hendra - Meeandah 110kV => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Meeandah 33kV GIS bus establishment => TUOS =>> PV of TUOS	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Relative Losses																
* Losses \$ => PV of Loss difference	\$0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total for Option 5	\$140.06															