APPENDIX 17

Forecast network capital projects 1 July 2009 – 30 June 2014 (>$10M)

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Introduction

Transend's capital expenditure forecast for the 1 July 2009 to 30 June 2014 regulatory control period is provided in Chapter 5 of Transend's revenue proposal.

This appendix presents project summaries for augmentation, connection and asset renewal projects that have an estimated cost greater than $10 million ($2008–09). The purpose of the project summaries is to provide an overview of the investment need for the identified projects.

The project summaries include for each project:

- the background to the project providing the context in which the proposed work is to be undertaken;
- an overview of the project, briefly describing the work being proposed;
- a summary of the need for the project and how each project relates to the capital expenditure objectives defined in the National Electricity Rules (Rules);
- reasons for the timing of the project; and
- a summary of what alternatives have been considered.

The project summaries regularly refer to Aurora Energy. Aurora Energy is the distribution network service provider in Tasmania.

PROJECT TITLE	**Waddamana–Lindisfarne 220 kV transmission line**
INVESTMENT CATEGORY	**Augmentation**
PLANNED COMMISSIONING DATE	**2011**
ESTIMATED COST	**$153m**

1 BACKGROUND

The southern region of Tasmania is heavily reliant upon the 220 kV transmission lines from Liapootah Switching Station and Gordon Substation that connect to Chapel Street Substation in Hobart. The existing 110 kV transmission line from Waddamana to Lindisfarne contributes to meeting the supply requirements for the southern region. It has limited capacity and is at the end of its useful life due to its poor condition.

The southern region demand has increased to the extent where load cannot be met by the existing transmission network under certain circumstances without load shedding or the risk of voltage collapse. Transend has a network support agreement with Hydro Tasmania to mitigate the impact of the transmission network constraints for the short term.

To increase capacity and security of supply to the southern region, a second 220 kV injection point is currently being implemented. The second injection point comprises a new 220 kV transmission line between Waddamana and Lindisfarne substations, initially strung on one side only. This augmentation project has passed the market benefit limb of the regulatory test.

2 PROJECT OVERVIEW

This project comprises the construction of a double circuit transmission line between Waddamana and Lindisfarne substations, initially strung on one side. The project also includes the establishment of a new 220 kV substation at Waddamana and the extension of Lindisfarne Substation.

3 INVESTMENT NEED

This project is required to achieve the following capital expenditure objectives identified in clause 6A.6.7(a) of the Rules:

- meet the expected demand for prescribed transmission services over that period;
- comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services; and
- maintain the reliability, safety and security of the transmission system through the supply of prescribed transmission services.

The key investment drivers for this project are to:

- provide adequate capacity to meet the southern region demand;
- improve the security of supply to southern region by reducing reliance on the 220 kV transmission lines that connect to Chapel Street Substation; and
- replace assets that are at the end of their useful lives.

4 INVESTMENT TIMING

An independent assessment of market benefits from transmission network reinforcement in southern Tasmania (undertaken by McLennan Megasanik Associates) indicates that the optimal timing for the network augmentation, determined by comparing annual market benefits against the annualised total cost of the investment, provides net market benefits from 2009 onwards under most scenarios. The project is scheduled for completion in the 2010–11 financial year.

5 INVESTMENT OPTIONS

Alternative options considered were:

- Do nothing (110 kV remedial work would be required)—market benefit analysis indicates that this is not the most beneficial option.
- Waddamana–Lindisfarne 220 kV double circuit augmentation—market benefit analysis indicates that the double circuit option is not the most beneficial option at this time.
- Install gas generation attached to the Bridgewater Substation—market benefit analysis indicates that the installed generation option is not the most beneficial option.

PROJECT TITLE	**Creek Road Substation 110 kV redevelopment**
INVESTMENT CATEGORY	**Asset renewal**
PLANNED COMMISSIONING DATE	**2014**
ESTIMATED COST	**$33m**

1 BACKGROUND

Creek Road Substation is an integral part of the transmission system in the southern region of Tasmania with 110 kV transmission lines connecting to Chapel Street, New Norfolk, North Hobart and Risdon substations. The substation also supplies a number of Aurora Energy's zone substations at 33 kV. Aurora Energy's zone substations supply customers in the greater Hobart area, including Hobart's central business district (CBD).

The majority of the 110 kV assets in service at Creek Road Substation were commissioned in 1952, are at the end of their useful lives and need to be replaced due to their poor condition and the consequential impact of failure.

2 PROJECT OVERVIEW

The proposed works at Creek Road Substation include the replacement of all 110 kV switch bays, bus bars and associated protection and control systems.

3 INVESTMENT NEED

This project is required to achieve the following capital expenditure objectives identified in clause 6A.6.7(a) of the Rules:

- maintain the quality, reliability and security of supply of prescribed transmission services; and
- maintain the reliability, safety and security of the transmission system through the supply of prescribed transmission services.

The key investment drivers for this project are:

- asset condition—the majority of the assets are in poor condition and are an obsolete design; and
- asset performance—the majority of the assets are susceptible to failure and any major asset failure is likely to have a significant impact on the availability and reliability of supply to the greater Hobart area (including Hobart's CBD).

4 INVESTMENT TIMING

The timing of this project has been co-ordinated with the prioritised circuit breaker, disconnector and post insulator replacement programs, and the protection and control system replacement program. It has also been timed for site works to commence after the Waddamana–Lindisfarne 220 kV transmission line project is completed.

5 INVESTMENT OPTIONS

Alternative options considered were:

- Do nothing—this option does not address the risks associated with the quality, reliability and security of electricity supply and would not allow Transend to achieve the capital expenditure objectives.
- Replace selected 110 kV assets—it is not the most cost-effective solution to address the identified issues associated with the quality, reliability and security of electricity supply.

The selected option is considered the most cost-effective option to address the risks presented by the 110 kV assets at Creek Road Substation.

PROJECT TITLE	**Norwood–Mowbray 110 kV transmission line**
INVESTMENT CATEGORY	**Augmentation**
PLANNED COMMISSIONING DATE	**2011**
ESTIMATED COST	**$29m**

1 BACKGROUND

Mowbray Substation is connected to the transmission system via the Trevallyn–Mowbray 110 kV transmission line. The substation comprises a 110 kV transmission line bay, a 30/50 MVA transformer, 22 kV switchgear incorporating ten distribution feeders and one incomer circuit breaker. Of the existing 22 kV feeders, two are connected in parallel between Trevallyn and Mowbray substations and provide a back-up electricity supply in the case of an outage of the Trevallyn–Mowbray 110 kV transmission line or the transformer at Mowbray Substation. This arrangement limits the capacity of Mowbray Substation to 45 MVA.

A project is currently in progress to install additional 22 kV connection points, a 110 kV bus coupler circuit breaker, a second 30/50 MVA transformer and associated infrastructure and a 110 kV transmission line bay to connect the proposed 110 kV transmission line from Norwood Substation.

2 PROJECT OVERVIEW

This project comprises the construction of a new 110 kV transmission line between Norwood and Mowbray substations. The major components of this project are:

- connection to the 110 kV transmission line bay (currently under construction) at Mowbray Substation;
- construction of a 110 kV transmission line bay at Norwood Substation;
- construction of a new 110 kV transmission line between Norwood and Mowbray substations; and
- design and installation of protection and control systems for the new transmission line.

3 INVESTMENT NEED

This project is required to achieve the following capital expenditure objectives identified in cause 6A.6.7(a) of the Rules:

- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services; and
- maintain the reliability, safety and security of the transmission system through the supply of prescribed transmission services.

The key investment drivers for this project are:

- Customer requirements—Aurora Energy has submitted a connection application requesting that firm supply be provided at Mowbray Substation.
- Demand growth—the ability to provide a firm supply at Mowbray Substation is a key part of Transend and Aurora Energy's joint strategy to address demand growth in the Launceston area. To achieve this objective, Transend is required to provide a second 110 kV transmission line to Mowbray Substation.
- Network performance requirements—this project is required to satisfy the following jurisdictional network performance requirements:
  - no more than 25 MW of load is to be capable of being interrupted by a credible contingency event; and

- the unserved energy to load that is interrupted by a single asset failure is not to be capable of exceeding 3 000 MWh at any time.

Based on the 2008 demand forecast, the loss of the Trevallyn–Mowbray 110 kV transmission line will interrupt more than 25 MW of load by 2011.

A tower failure on the Hadspen–Norwood or Hadspen–Trevallyn 110 kV transmission lines would result in unserved energy exceeding 3 000 MWh.

4 INVESTMENT TIMING

This project is scheduled to be completed in 2011.

5 INVESTMENT OPTIONS

Alternative options considered were:

- Do nothing—would not comply with all applicable regulatory obligations, would not address the issues of reliability and security of supply, would not meet the requirements of Aurora Energy's connection application and would not allow Transend to achieve the capital expenditure objectives.
- Distribution reinforcement—would require additional transformers and would also involve the expansion of an already congested distribution system.
- Distribution reinforcement plus demand side management with local co-generation schemes—no viable solution identified, would require additional planning approvals and would involve issues associated with tariff changes. It would also not address the issue of a transmission tower failure on the Trevallyn–Mowbray transmission line.

Based on present information, Transend and Aurora Energy have jointly determined that the best solution to ensure reliability and security of supply for the Launceston area and to meet Aurora Energy's requirements is to construct a new 110 kV transmission line between Norwood and Mowbray substations.

This project is classified as a new large transmission network asset and is subject to the consultation process under clause 5.6.6 of the Rules.

PROJECT TITLE	**Hobart Eastern Shore new 110/33 kV connection site**
INVESTMENT CATEGORY	**Connection**
PLANNED COMMISSIONING DATE	**2011**
ESTIMATED COST	**$24m**

1 BACKGROUND

Hobart's eastern shore is supplied from Lindisfarne and Rokeby substations at 33 kV and 11 kV respectively. The 33 kV supply from Lindisfarne Substation is currently non-firm and the 11 kV supply from Rokeby Substation will be non-firm by 2010 based on the 2008 demand forecast.

Aurora Energy has requested that a new 33 kV connection site be established to supply Hobart's eastern shore area to provide additional capacity and to improve the reliability and security of supply to the area.

2 PROJECT OVERVIEW

The project comprises the establishment of a new 110/33 kV substation on Hobart's eastern shore. The substation will be capable of providing firm supply of 60 MVA, as requested by Aurora Energy.

3 INVESTMENT NEED

This project is required to achieve the following capital expenditure objectives identified in clause 6A.6.7(a) of the Rules:

- meet the expected demand for prescribed transmission services; and
- comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services.

The key investment drivers for this project are:

- Customer requirements—Aurora Energy has submitted a connection application for a new 33 kV connection site on Hobart's eastern shore. The connection site is required to have a firm capacity of 60 MVA.
- Demand growth—This project is part of Transend and Aurora Energy's joint strategy to address demand growth in the area.
- Network performance requirements—This project is required to satisfy the following jurisdictional network performance requirements:
  - the unserved energy to load that is interrupted consequent on damage to a network element resulting from a credible contingency event is not to be capable of exceeding 300 MWh at any time.

  Based on the 2008 demand forecast, the loss of a transformer at Lindisfarne Substation would result in a unserved energy exceeding 300 MWh.

4 INVESTMENT TIMING

This project is scheduled to be completed in 2011.

5 INVESTMENT OPTIONS

Alternative options considered were:

- Do nothing—would not comply with all applicable regulatory obligations, would not provide the additional capacity required, would not meet the requirements of Aurora Energy's connection application and would not allow Transend to achieve the capital expenditure objectives.
- Install a third transformer at Lindisfarne Substation—this option does not meet Aurora Energy's requirements. Under this option, there would still be insufficient transformation capacity to supply the distribution system. Rokeby Substation constraints will not be addressed by this option and by 2010 loss of one supply transformer would result in unserved energy exceeding 300 MWh.

This project is classified as a new large transmission network asset and is subject to the consultation process under clause 5.6.6 of the Rules.

PROJECT TITLE	**Wynyard Substation new 110/22 kV connection site**
INVESTMENT CATEGORY	**Connection**
PLANNED COMMISSIONING DATE	**2013**
ESTIMATED COST	**$23m**

1 BACKGROUND

The Wynyard area is currently supplied via long 22 kV distribution feeders from Burnie and Port Latta substations. Aurora Energy has advised that these 22 kV distribution feeders are unreliable. Some feeders exceed their firm capacity during peak load and there is limited transfer capability within the distribution system in this area. The 2008 demand forecast indicates that the 22 kV supply from Burnie Substation will be non-firm by 2013.

Aurora Energy has requested that a new connection site be established in the Wynyard area to provide additional capacity and to improve the reliability and security of supply to the area.

2 PROJECT OVERVIEW

The project comprises the establishment of a new 110/22 kV substation in the Wynyard area. The substation will connect into the Burnie–Smithton and Burnie–Port Latta 110 kV transmission lines and will be capable of providing firm supply of 60 MVA, as requested by Aurora Energy.

3 INVESTMENT NEED

This project is required to achieve the following capital expenditure objectives identified in clause 6A.6.7(a) of the Rules:

- meet the expected demand for prescribed transmission services over that period; and
- comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services.

The key investment drivers for this project are:

- Customer requirements—Aurora Energy has submitted a connection application for the establishment of a new 22 kV connection point in the Wynyard area. The connection point is to have a firm supply of 60 MVA.

  The new connection point will enable Aurora Energy to improve the reliability of its distribution system by reducing the length of long distribution feeders and allow for transferring of load from Burnie Substation to reduce loading below firm capacity.
- Demand growth—Burnie Substation transformer firm capacity is currently exceeded. The firm emergency rating is expected to be exceeded from winter 2013.

4 INVESTMENT TIMING

This project is scheduled to be completed in 2013.

5 INVESTMENT OPTIONS

Alternative options considered were:

- Do nothing—would not address the issues presented by the poor reliability of Aurora Energy's 22 kV distribution feeders in the Wynyard area, would not address the capacity issues at Burnie Substation,

would not meet the requirements of Aurora Energy's connection application and would not allow Transend to achieve the capital expenditure objectives.

- Install a third transformer and additional 22 kV feeder connection points at Burnie Substation—would not address the issues presented by the poor reliability of Aurora Energy's 22 kV distribution system in the Wynyard area nor adequately cater for future demand growth.
- Demand side management and local co-generation schemes—no viable solution identified, would require additional planning approvals and would involve issues associated with tariff changes.

Based on present information, Transend and Aurora Energy have jointly determined that the best solution to ensure reliability of supply for the Wynyard area and to address the capacity issues at Burnie Substation is to establish a connection site in the Wynyard area.

This project is classified as a new large transmission network asset and is subject to the consultation process under clause 5.6.6 of the Rules.

PROJECT TITLE	**Newstead Substation new 110/22 kV connection site**
INVESTMENT CATEGORY	**Connection**
PLANNED COMMISSIONING DATE	**2012**
ESTIMATED COST	**$20m**

1 BACKGROUND

The Newstead area is currently supplied from Mowbray and Norwood substations via heavily loaded 22 kV distribution feeders. The 22 kV supply from Norwood Substation is currently non-firm and the 22 kV supply from Mowbray Substation will be non-firm by 2011 based on the 2008 demand forecast.

Aurora Energy has requested a new 22 kV connection site be established in the Newstead area to provide additional capacity and to improve the reliability and security of supply to that area.

2 PROJECT OVERVIEW

The project comprises the establishment of a new 110/22 kV substation in the Newstead area. The substation will be capable of providing firm supply of 60 MVA, as requested by Aurora Energy.

3 INVESTMENT NEED

This project is required to achieve the following capital expenditure objectives identified in clause 6A.6.7(a) of the Rules:

- meet the expected demand for prescribed transmission services; and
- comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services.

The key investment drivers for this project are:

- Customer requirements—Aurora Energy has submitted a connection application for a new 22 kV connection site in the Newstead area. The connection site is required to have a firm capacity of 60 MVA.
- Demand growth—this project is part of Transend and Aurora Energy's joint strategy to address demand growth in the area.
- Network performance requirements—This project is required to satisfy the following jurisdictional network performance requirements:
    - the unserved energy to load that is interrupted consequent on damage to a network element resulting from a credible contingency event is not capable of exceeding 300 MWh at any time.

  The loss of a transformer at Norwood Substation will exceed 300 MWh now.

4 INVESTMENT TIMING

The new connection site in the Newstead area is required as soon as practicable, and is planned to be completed by 2012. The project has been coordinated with the Norwood–Mowbray 110 kV transmission line project.

5 INVESTMENT OPTIONS

Alternative options considered were:

- Do nothing—would not provide the additional capacity requirements or allow Transend to comply with the network performance requirements, would not meet the requirements of Aurora Energy's connection application and would not allow Transend to achieve the capital expenditure objectives.
- Distribution reinforcement—would require additional transformers and would also involve the expansion of an already congested distribution system.
- Distribution reinforcement plus demand side management with local co-generation schemes—no viable solution identified, would require additional planning approvals and would involve issues associated with tariff changes.
- Install a third transformer at Norwood Substation—would reduce reliability and security of supply at the distribution level and is limited by physical constraints when running distribution feeders out of Norwood Substation.

Based on present information, Transend and Aurora Energy have jointly determined that the best solution to ensure reliability and security of supply to the Newstead area and to meet Aurora Energy's requirements is to establish a new 110/22 kV substation in the Newstead area.

This project is classified as a new large transmission network asset and is subject to the consultation process under clause 5.6.6 of the Rules.

PROJECT TITLE	**Tungatinah Substation 110 kV redevelopment**
INVESTMENT CATEGORY	**Asset renewal**
PLANNED COMMISSIONING DATE	**2015**
ESTIMATED COST	**$20m**

1 BACKGROUND

Tungatinah Substation is an integral part of the shared transmission network in central Tasmania with 110 kV transmission lines connecting to Derwent Bridge and Waddamana substations, and Tarraleah Switching Station. It also supplies Aurora Energy's customers located in central Tasmania at 22 kV and connects generation from Hydro Tasmania's Butlers Gorge and Tungatinah power stations to the transmission system.

Tarraleah Switching Station is also an integral part of the shared transmission network in central Tasmania with 110 kV transmission lines connecting to Meadowbank, New Norfolk and Tungatinah substations. It also connects Tarraleah Power Station to the transmission system. Tarraleah Switching Station is located approximately 400 metres from Tungatinah Substation.

The majority of the 110 kV assets in service at Tungatinah Substation and Tarraleah Switching Station were commissioned in 1953 and 1951 respectively and are at the end of their useful lives and need to be replaced due to safety, condition and performance issues.

This project includes the rationalisation of assets at both Tarraleah and Tungatinah.

2 PROJECT OVERVIEW

The proposed works at Tungatinah Substation include the replacement of all 110 kV switch bays, bus bars and associated protection and control systems at Tungatinah Substation and Tarraleah Switching Station. This project also includes the rationalisation of assets at Tarraleah Switching Station and Tungatinah Substation with some relocation of transmission circuits to Tungatinah Substation.

3 INVESTMENT NEED

This project is required to achieve the following capital expenditure objectives identified in clause 6A.6.7(a) of the Rules:

- meet the expected demand for prescribed transmission services over that period;
- comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services; and
- maintain the reliability, safety and security of the transmission system through the supply of prescribed transmission services.

The key investment drivers for this project are:

- safety—sub-standard clearances and the likelihood of asset failure present a significant safety risk;
- asset condition—the majority of the assets are in poor condition, are an obsolete design and are susceptible to failure; and
- asset performance—the majority of the assets are susceptible to failure and any major asset failure is likely to have a significant impact on the availability and reliability of supply.

4 INVESTMENT TIMING

This project has been timed to commence after the Waddamana–Lindisfarne 220 kV transmission line project is completed.

5 INVESTMENT OPTIONS

Alternative options considered were:

- Do nothing—this option does not address the risks associated with the quality, reliability and security of electricity supply and would not allow Transend to achieve the capital expenditure objectives.
- Replace selected 110 kV assets—it is not the most cost-effective solution to address the identified issues associated with the quality, reliability and security of electricity supply.

The selected option is considered the most cost-effective option to address the risks presented by the 110 kV assets at Tungatinah Substation and Tarraleah Switching Station.

PROJECT TITLE	**Penguin Substation new 110/22 kV connection site**
INVESTMENT CATEGORY	**Connection**
PLANNED COMMISSIONING DATE	**2016**
ESTIMATED COST	**$15m**

1 BACKGROUND

The Penguin area is currently supplied via long 22 kV distribution feeders from Burnie and Ulverstone substations. Aurora Energy has advised that these 22 kV distribution feeders are heavily loaded and unreliable. There is limited transfer capability within the distribution system in this area.

Aurora Energy has requested that a new connection site be established in the Penguin area to provide additional capacity and to improve the reliability and security of supply to the area.

2 PROJECT OVERVIEW

The project comprises the establishment of a new 110/22 kV substation in the Penguin area. The substation will connect into the Burnie–Sheffield and Ulverstone–Emu Bay 110 kV transmission lines and will be capable of providing firm supply of 60 MVA, as requested by Aurora Energy.

3 INVESTMENT NEED

This project is required to achieve the following capital expenditure objectives identified in clause 6A.6.7(a) of the Rules:

- meet the expected demand for prescribed transmission services over that period; and
- comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services.

The key investment drivers for this project are:

- Customer requirements—Aurora Energy has submitted a connection enquiry for a new 22 kV connection point in the Penguin area. The connection point is to have a firm supply of 50 MVA.
- Demand growth—Burnie Substation transformer firm capacity is currently exceeded. The firm emergency rating is expected to be exceeded from winter 2013.
- Reliability of supply—the new connection point will enable Aurora Energy to improve the reliability of its distribution system by reducing the length of long distribution feeders. It will also allow load to be transferred from Burnie Substation to allow it to operate within firm capacity.

4 INVESTMENT TIMING

This project is scheduled to be completed in 2016.

5 INVESTMENT OPTIONS

Alternative options considered were:

- Do nothing—would not address the issues presented by the poor reliability of Aurora Energy's 22 kV distribution feeders in the Penguin area, would not address the capacity issues at Burnie Substation, would not meet the requirements of Aurora Energy's connection application and would not allow Transend to achieve the capital expenditure objectives.

- Install a third transformer and additional 22 kV feeder connection points at Burnie Substation—would not address the issues presented by the poor reliability of Aurora Energy's 22 kV distribution feeders in the Penguin area or adequately cater for future demand growth in the area, would not meet the requirements of Aurora Energy's connection application and would not allow Transend to achieve the capital expenditure objectives.
- Demand side management and local co-generation schemes—no viable solution identified, would require additional planning approvals and would involve issues associated with tariff changes.

Based on present information, Transend and Aurora Energy have jointly determined that the best solution to ensure reliability of supply for the Penguin area and to address the capacity issues at Burnie Substation is to establish a connection site in the Penguin area.

This project is classified as a new large transmission network asset and is subject to the consultation process under clause 5.6.6 of the Rules.

PROJECT TITLE	**George Town Substation 220 kV security upgrade**
INVESTMENT CATEGORY	**Augmentation**
PLANNED COMMISSIONING DATE	**2012**
ESTIMATED COST	**$18m**

1 BACKGROUND

George Town Substation is supplied from Hadspen and Sheffield substations. It provides connection points for Basslink, Bell Bay Power Station, direct connect customers and Aurora Energy's customers in the George Town area. George Town Substation is a critical node on the transmission system and it is vital to sustaining a reliable and secure electricity supply in Tasmania.

George Town Substation 220 kV currently does not meet the network performance requirements and certain assets need to be replaced due to condition and performance issues.

2 PROJECT OVERVIEW

The George Town Substation 220 kV security upgrade project comprises the reconfiguration of 220 kV bus bars to improve the security of supply at George Town Substation. The project also includes the replacement of a number of critical assets that need to be replaced due to condition and performance issues.

3 INVESTMENT NEED

This project is required to achieve the following capital expenditure objectives identified in clause 6A.6.7(a) of the Rules:

- comply with all applicable regulatory obligations associated with the provision of prescribed transmission services; and
- maintain the quality, reliability and security of supply of prescribed transmission service.

The key investment drivers for this project are:

- Network performance requirements—This project is required to satisfy the following jurisdictional network performance requirements:
  - the unserved energy to load that is interrupted consequent on damage to a network element resulting from a credible contingency event is not to be capable of exceeding 300 MWh at any time; and
  - the unserved energy to load that is interrupted by a single asset failure is not to be capable of exceeding 3 000 MWh at any time.
- Asset condition—a number of critical assets are in poor condition and are an obsolete design; and
- Asset performance—the major failure of critical substation assets is likely to have a significant impact on the availability and reliability of supply.

  Power system stability studies have identified that the power system would not remain stable in the event of failure of certain assets or in the event of an unplanned 220 kV bus bar outage at George Town Substation.

4 INVESTMENT TIMING

This project is scheduled for completion in 2012.

5 INVESTMENT OPTIONS

Alternative options considered were:

- Do nothing— would not comply with all applicable regulatory obligations, would not address the issues of reliability and security of supply, and would not allow Transend to achieve the capital expenditure objectives.

This project is classified as a new large transmission network asset and is subject to the consultation process under clause 5.6.6 of the Rules.

PROJECT TITLE	**Kingston Substation new 110/33 kV connection site**
INVESTMENT CATEGORY	**Connection**
PLANNED COMMISSIONING DATE	**2011**
ESTIMATED COST	**$18m**

1 BACKGROUND

Kingston Substation 110/11 kV currently supplies Aurora Energy's distribution system in the Blackmans Bay, Kingston and Margate areas. These areas have experienced substantial growth in recent years, leading to a significant increase in demand from Electrona and Kingston substations.

Kingston Substation is currently operating non-firm. Electrona Substation is currently being developed to provide 25 MVA firm supply to Aurora Energy. This will allow approximately 5 MVA of load to be transferred from Kingston Substation to Electrona Substation. This will address the capacity issues in the short-term, however based on the 2008 demand forecast, the firm capacity of Kingston Substation will again be exceeded in 2011.

Aurora Energy has submitted a connection enquiry for the establishment of a new 110/33 kV connection site at Kingston Substation.

2 PROJECT OVERVIEW

This project comprises the establishment of a new 110/33 kV connection site at Kingston Substation. The major components of this project are the:

- installation of two 110/33 kV transformers and associated infrastructure;
- construction of a 33 kV switchboard and associated protection and control equipment; and
- reconfiguration of the 110 kV bus bars at Kingston Substation to cater for the new connection site.

3 INVESTMENT NEED

This project is required to meet the following capital expenditure objectives, as prescribed in clause 6A.6.7(a) of the Rules:

- meet the expected demand for prescribed transmission services over that period; and
- comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services.

The key investment drivers for this project are:

- Customer requirements—Aurora Energy has submitted a connection enquiry requesting the establishment of a new 110/33 kV connection site at Kingston Substation.
- Demand growth—This project is a key part of Transend and Aurora Energy's joint strategy to address demand growth in the Kingston area. To achieve this objective, Transend is required to establish a 110/33 kV connection site at Kingston Substation.

4 INVESTMENT TIMING

This project is scheduled to be completed in 2011.

5 INVESTMENT OPTIONS

Alternative options considered were:

- Do nothing—would not provide adequate capacity to meet the demand in the Kingston area, would not meet the requirements of Aurora Energy's connection application and would not allow Transend to achieve the capital expenditure objectives.
- Increase the capacity of the existing 110/11 kV connection site and reinforce the distribution system—would require additional or larger transformers and would also involve the expansion of an already congested distribution system.
- Distribution reinforcement plus demand side management with local co-generation schemes—no viable solution identified, would require additional planning approvals and would involve issues associated with tariff changes.

Based on present information, Transend and Aurora Energy have jointly determined that the best solution to ensure adequate capacity of electricity supply to the Kingston area and to meet Aurora Energy's requirements is to establish a new 110/33 kV connection site at Kingston Substation.

This project is classified as a new large transmission network asset and is subject to the consultation process under clause 5.6.6 of the Rules.

PROJECT TITLE	**Bridgewater Substation 110/33 kV connection site**
INVESTMENT CATEGORY	**Connection**
PLANNED COMMISSIONING DATE	**2016**
ESTIMATED COST	**$17m**

1 BACKGROUND

Bridgewater Substation 110/11 kV currently supplies Aurora Energy's distribution system in the northern suburbs of Hobart, including the Bridgewater, Brighton, Claremont and Granton areas. These areas have experienced substantial growth in recent years, leading to a significant increase in demand at Bridgewater Substation. Based on the most recent demand forecast, the connection site capacity at Bridgewater Substation will be exceeded in 2018.

Aurora Energy has submitted a connection enquiry for the establishment of a new 110/33 kV connection site in the Bridgewater area.

2 PROJECT OVERVIEW

This project comprises the establishment of a new 110/33 kV connection site at Bridgewater Substation. The major components of this project are the:

- installation of two 110/33 kV transformers and associated infrastructure;
- construction of a 33 kV switchboard and associated protection and control equipment; and
- reconfiguration of the 110 kV bus bars at Bridgewater Substation to cater for the new connection site.

3 INVESTMENT NEED

This project is required to meet the following capital expenditure objectives, as prescribed in clause 6A.6.7(a) of the Rules:

- meet the expected demand for prescribed transmission services over that period; and
- comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services.

The key investment drivers for this project are:

- Customer requirements—Aurora Energy has submitted a connection enquiry requesting the establishment of a new 110/33 kV connection site in the Bridgewater area.
- Demand growth—this project is a key part of Transend and Aurora Energy's joint strategy to address demand growth in Hobart's northern suburbs. To achieve this objective, Transend is required to establish a 110/33 kV connection site at Bridgewater Substation.

4 INVESTMENT TIMING

The timing for this project has been discussed with Aurora Energy and the new connection site is scheduled to be completed in 2016.

5 INVESTMENT OPTIONS

Alternative options considered were:

- Do nothing—would not provide adequate capacity to meet the demand at Hobart's northern suburbs, would not meet the requirements of Aurora Energy's connection application and would not allow Transend to achieve the capital expenditure objectives.

- Increase the capacity of the existing 110/11 kV connection site and reinforce the distribution system—would require additional or larger transformers and would also involve the expansion of an already congested distribution system.
- Distribution reinforcement plus demand side management with local co-generation schemes—no viable solution identified, would require additional planning approvals and would involve issues associated with tariff changes.

Based on present information, Transend and Aurora Energy have jointly determined that the best solution to ensure adequate capacity of electricity supply to Hobart's northern suburbs and to meet Aurora Energy's requirements is to establish a new 110/33 kV connection site at Bridgewater Substation.

This project is classified as a new large transmission network asset and is subject to the consultation process under clause 5.6.6 of the Rules.

PROJECT TITLE	**Wesley Vale Substation new 110/22 kV connection site**
INVESTMENT CATEGORY	**Connection**
PLANNED COMMISSIONING DATE	**2013**
ESTIMATED COST	**$17m**

1 BACKGROUND

Wesley Vale Substation was originally constructed in 1966 to provide electricity supply at 11 kV to the pulp mill, presently owned by Paper Australia. There are no feeders connected to Aurora Energy's distribution system from this substation. The Wesley Vale area is currently supplied from Devonport and Railton substations. The 22 kV supply from Devonport Substation will be non-firm by 2013 based on the 2008 demand forecast, and the 22 kV supply from Railton Substation is currently non-firm.

Aurora Energy has requested that a new connection site be established at Wesley Vale Substation to provide additional capacity, to improve the reliability and security of supply to the area and relieve load from Devonport and Railton substations.

A number of 110 kV circuit breakers also need to be replaced due to condition and performance issues.

2 PROJECT OVERVIEW

The project comprises the establishment of a new 110/22 kV connection site at Wesley Vale Substation. The substation will be capable of providing firm supply of 60 MVA, as requested by Aurora Energy. The project also includes the replacement of three 110 kV circuit breakers that are susceptible to failure and associated works.

3 INVESTMENT NEED

This project is required to achieve the following capital expenditure objectives identified in clause 6A.6.7(a) of the Rules:

- meet the expected demand for prescribed transmission services over that period;
- comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services; and
- maintain the reliability, safety and security of the transmission system through the supply of prescribed transmission services.

The key investment drivers for this project are:

- Customer requirements—Aurora Energy has submitted a connection application for the establishment of a new 22 kV connection site at Wesley Vale Substation. The connection point is to have a firm supply of 50 MVA.
- Demand growth—this project is part of Transend and Aurora Energy's joint strategy to address demand growth in the area.

  The establishment of a 22 kV connection site at Wesley Vale Substation will allow load to be transferred from Devonport and Railton substations, allowing these substations to operate within their firm capacity.
- Asset condition—a number of assets are in poor condition; and
- Asset performance—the major failure of critical substation assets asset failure is likely to have a significant impact on the availability and reliability of supply.

4 INVESTMENT TIMING

This project is scheduled to be completed in 2013.

5 INVESTMENT OPTIONS

Alternative options considered were:

- Do nothing—would not provide the required capacity to allow Devonport and Railton substations to operate within their firm capacity, would not meet the requirements of Aurora Energy's connection application and would not allow Transend to achieve the capital expenditure objectives.
- Install an additional transformer and additional 22 kV feeder connection points at Devonport or Railton substations—would not address the issues presented by the poor reliability of Aurora Energy's 22 kV distribution feeders in the Wesley Vale area or adequately cater for future demand growth in the area.
- Demand side management and local co-generation schemes—no viable solution identified, would require additional planning approvals and would involve issues associated with tariff changes.

Based on present information, Transend and Aurora Energy have jointly determined that the best solution to ensure reliability of supply for the Devonport area and to address the capacity issues at Devonport and Railton substations is to establish a connection site at Wesley Vale Substation.

This project is classified as a new large transmission network asset and is subject to the consultation process under clause 5.6.6 of the Rules.

PROJECT TITLE	**Palmerston Substation 110 kV redevelopment**
INVESTMENT CATEGORY	**Asset renewal**
PLANNED COMMISSIONING DATE	**2013**
ESTIMATED COST	**$14m**

1 BACKGROUND

Palmerston Substation 110 kV is an integral part of the transmission system because it provides an interconnection between the northern and southern transmission systems. The substation also supplies Avoca and Derby substations at 110 kV, customers in the Cressy and Longford areas at 22 kV and it connects generation from Hydro Tasmania's Poatina Power Station. The majority of the 110 kV assets in service at Palmerston Substation were installed when the substation was commissioned in 1963 and are at the end of their useful lives and need to be replaced due to condition and performance issues.

2 PROJECT OVERVIEW

The proposed works at Palmerston Substation include the replacement of all 110 kV switch bays and associated protection and control systems.

3 INVESTMENT NEED

This project is required to achieve the following capital expenditure objectives identified in clause 6A.6.7(a) of the Rules:

- maintain the quality, reliability and security of supply of prescribed transmission services; and
- maintain the reliability, safety and security of the transmission system through the supply of prescribed transmission services.

The key investment drivers for this project are:

- asset condition—the majority of the assets are in poor condition and are an obsolete design; and
- asset performance—the majority of the assets are susceptible to failure and any major asset failure is likely to have a significant impact on the availability and reliability of supply.

4 INVESTMENT TIMING

The timing of this project has been co-ordinated with the prioritised 110 kV circuit breaker replacement program and the protection and control system upgrade program and is scheduled to be completed in 2013.

5 INVESTMENT OPTIONS

Alternative options considered were:

- Do nothing—would not address the risks associated with the quality, reliability and security of electricity supply and would not allow Transend to achieve the capital expenditure objectives.
- Replace selected 110 kV assets—it is not the most cost-effective solution to address the identified issues associated with the quality, reliability and security of electricity supply.

The selected option is considered the most cost-effective option to address the risks presented by the 110 kV assets at Palmerston Substation.

PROJECT TITLE	**Sheffield–Burnie 110 kV transmission line augmentation**
INVESTMENT CATEGORY	**Augmentation**
PLANNED COMMISSIONING DATE	**2013**
ESTIMATED COST	**$14m**

1 BACKGROUND

Burnie Substation is supplied via the Sheffield–Burnie No 1 220 kV transmission line and two Sheffield–Burnie 110 kV transmission lines, one of which also supplies Emu Bay and Ulverstone substations and also connects generation from Hydro Tasmania's Paloona Power Station. Burnie Substation supplies Tasmania's north-west region.

Under certain circumstances, the capacity of the 110 kV transmission lines that supply Burnie Substation is exceeded in the event of the loss of the Sheffield–Burnie No 1 220 kV transmission line. It is proposed to augment the Sheffield–Burnie 110 kV transmission lines to remove the constraint.

2 PROJECT OVERVIEW

This project comprises the augmentation of the Sheffield–Burnie 110 kV transmission lines from a design operating temperature of 49°C to 75°C.

3 INVESTMENT NEED

This project is required to fulfil the following capital expenditure objectives as specified in clause 6A.6.7(a) of the Rules:

- comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services; and
- maintain the reliability, safety and security of the transmission system through the supply of prescribed transmission services.

The key investment drivers for this project are:

- Demand growth—demand forecasts indicate that the existing transmission circuits supplying Ulverstone, Emu Bay, Burnie, Port Latta and Smithton substations are likely to be unable to supply the load from 2011 (this is currently managed by using transmission dynamic ratings). The loss of the Sheffield—Burnie No. 1 220 kV circuit would cause an overload on the remaining 110 kV circuits.
- Network performance requirements—this project is required to satisfy the following jurisdictional network performance requirements:
    - the unserved energy to load that is interrupted consequent on damage to a network element resulting from a credible contingency event is not to be capable of exceeding 300 MWh at any time.

  Based on the 2008 demand forecast, the loss of the Sheffield–Burnie No. 1 220 kV transmission line would result in a unserved energy exceeding 300 MWh.

4 INVESTMENT TIMING

This project is scheduled to be completed in 2013.

5 INVESTMENT OPTIONS

Alternative options considered were:

- Do nothing—would not provide adequate supply capacity to Burnie Substation and would not allow Transend to comply with all applicable regulatory obligations, would not provide the additional capacity required and would not allow Transend to achieve the capital expenditure objectives.
- Demand side management and local co-generation schemes—no viable solution identified, would require additional planning approvals and would involve issues associated with tariff changes.

Based on present information, Transend has determined that the best solution to ensure a reliable and security supply to the Burnie area is to augment the Sheffield–Burnie 110 kV transmission lines.

This project is classified as a new large transmission network asset and is subject to the consultation process under clause 5.6.6 of the Rules.

PROJECT TITLE	**Knights Road–Electrona transmission line replacement**
INVESTMENT CATEGORY	**Asset renewal**
PLANNED COMMISSIONING DATE	**2011**
ESTIMATED COST	**$13m**

1 BACKGROUND

The Knights Road–Electrona 110 kV transmission line provides an alternative supply to Knights Road and Electrona substations. The transmission line was constructed in 1941, has been subjected to many bushfires throughout its service life. The transmission line is at the end of its service life and needs to be replaced due to safety, condition and performance issues. The transmission line also has substandard conductor-to-ground clearances and the copper conductor is annealed in some sections and is susceptible to failure.

2 PROJECT OVERVIEW

The project comprises the replacement of the transmission line with a new transmission line and associated substation works.

3 INVESTMENT NEED

This project is required to fulfil the following capital expenditure objectives as specified in clause 6A.6.7(a) of the Rules:

- comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services; and
- maintain the reliability, safety and security of the transmission system through the supply of prescribed transmission services.

The investment drivers for this project are:

- Public safety—conductor-to-ground clearances do not comply with contemporary safety and design standards. The likelihood of conductor failure also presents a significant public safety risk.
- Asset condition—the transmission line is in poor condition and audits have identified broken conductor strands underneath the suspension clamps at a number of locations. Numerous bushfires under this transmission line has annealed the copper conductors, reducing its mechanical strength.
- Asset performance—the transmission line is susceptible to failure and any major asset failure is likely to have a significant impact on the security of supply to the Kingston–Huon area.

4 INVESTMENT TIMING

This project is scheduled to be completed in 2011.

5 INVESTMENT OPTIONS

Alternative options considered were:

- Do nothing—would not address the risks associated with public safety and the quality, reliability and security of electricity supply and would not allow Transend to achieve the capital expenditure objectives.

PROJECT TITLE	**Kingston–Huon area transmission line capacity upgrade**
INVESTMENT CATEGORY	**Augmentation**
COMMISSIONING DATE	**2015**
ESTIMATED COST	**$12m**

1 BACKGROUND

The Kingston–Huon area (supplied from Electrona, Huon River, Kermandie, Kingston, and Knights Road substations) is supplied via the Chapel Street–Kingston–Knights Road and the Chapel Street–Kingston–Electrona 110 kV transmission lines. The 2008 demand forecast indicates that the Kingston–Huon area load will exceed the capacity of the transmission lines by 2016. Further, the load on these transmission lines will be such that a tower failure will result in the loss of over 3 000 MWh of unserved energy by 2015.

2 PROJECT OVERVIEW

This project comprises the construction of a new 110 kV transmission line from Chapel Street Substation to Kingston Substation and associated substation works.

3 INVESTMENT NEED

This project is required to fulfil the following capital expenditure objectives as specified in clause 6A.6.7(a) of the Rules:

- comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services; and
- maintain the reliability, safety and security of the transmission system through the supply of prescribed transmission services.

The key investment drivers for this project are:

- Demand growth—based on the 2008 demand forecast, the Kingston–Huon area load will exceed the capacity of the Chapel Street–Kingston–Knights Road and the Chapel Street–Kingston–Electrona 110 kV transmission lines by 2016.
- Network performance requirements—this project is required to satisfy the following jurisdictional network performance requirements:
    - the unserved energy to load that is interrupted by a single asset failure is not to be capable of exceeding 3 000 MWh at any time.

  A tower failure on the Chapel Street–Kingston–Knights Road and the Chapel Street–Kingston–Electrona 110 kV transmission lines would result in unserved energy exceeding 3 000 MWh by 2015.

4 INVESTMENT TIMING

The project is scheduled to be completed in 2015.

5 INVESTMENT OPTIONS

Alternative options considered were:

- Do nothing—would not provide adequate supply capacity to the Kingston–Huon area and would not allow Transend to comply with all applicable regulatory obligations, would not provide the additional capacity required and would not allow Transend to achieve the capital expenditure objectives.

- Demand side management and local co-generation schemes—no viable solution identified, would require additional planning approvals and would involve issues associated with tariff changes. Would not address the issue of a transmission tower failure on the Chapel Street–Kingston–Knights Road and the Chapel Street–Kingston–Electrona 110 kV transmission lines.
- Transmission line from another substation—the modelling undertaken to date has indicated that a new Chapel Street–Kingston 110 kV transmission line is the least cost option that addresses the identified issues.

Based on present information, Transend has determined that the best solution to ensure a reliable and secure supply to the Kingston–Huon area is to construct a new 110 kV transmission line between Chapel Street and Kingston substations.

This project is classified as a new large transmission network asset and is subject to the consultation process under clause 5.6.6 of the Rules.