



**Murraylink Transmission
Company Pty Ltd**

Capital Expenditure
Business Cases

Effective
July 2013 to June 2023



Business Case

Service provider	Murraylink Transmission Company Pty Limited
Asset	Murraylink Victoria – South Australia Transmission Interconnector
Project	<i>Berri water tank, pump and reticulation</i>
Project type	<i>Capex</i>
Prepared by	<i>Stuart Dodds</i>
Endorsed by (State Manager Asset Management)	
Approved by (General Manager Asset Management)	
Date	

PURPOSE

To present a project recommendation and expenditure forecast for inclusion in the Murraylink Regulatory Proposal for years 2013 to 2023.

BACKGROUND

Berri convertor station is not connected to a reticulated water supply. Water for consumption at the site is stored in a 10,000 litre tank.

Periodic maintenance cleaning of the convertor heat exchangers requires a high volume, high pressure water supply (eg. a fire hose or similar). This is required to effectively wash dust and contamination from the heat exchanger surfaces, which are too deep to be cleaned with a conventional high pressure water cleaner.

The existing water supply is inadequate to provide the volume of water or the pressure required for this cleaning operation.

To date, a water tanker with pump (ex-winery service) has been hired to carry out cleaning, but the continued availability of this aged vehicle is in doubt.



IDENTIFICATION OF NEED

This project is to ensure the continued availability of an adequate high volume, high pressure water supply to carry out regular cleaning of the Berri convertor station heat exchangers. This will be achieved by installing a permanent 25,000 litre water tank, pump and reticulation at the site.

EVALUATION OF ALTERNATIVES

The current reliance on hiring an ex-winery water tanker and pump is a limited term, opportunistic solution. The most economical and reliable long-term solution is to establish a permanent facility capable of doing the maintenance cleaning.

ESTIMATED COST

The expected cost of establishing a permanent 25,000 litre water tank and associated high capacity water pump and reticulation is \$7,000. This price is based on a recent inquiry by a specialist equipment installer.

PLAN FOR EFFECTIVE EXECUTION

The requirement for AER acceptance of capital expenditure specified in 6A.6.7(c) of the National Electricity Rules (the Rules) is that the expenditure must be such as would be incurred by a prudent service provider acting efficiently, and represent a realistic expectation of the costs to achieve the requirement.

The installation costs above have been estimated on the basis of a recent quotation for the minimum installation to meet the identified need.

The work will be outsourced to a specialist contractor through a competitive process, to ensure the completion of the project at minimum cost.

JUSTIFICATION

This project to establish a permanent water supply for maintenance cleaning of the Berri convertor station heat exchangers is required to meet the following capital expenditure objectives set out in clause 6A.6.7(a) of the National Electricity Rules (the Rules):

- (1) meet the expected demand for prescribed transmission services over [the regulatory control] period;
- (3) maintain the quality, reliability and security of supply of prescribed transmission services; and
- (4) maintain the reliability, safety and security of the transmission system through the supply of prescribed transmission services.

The lack of a permanent water supply to enable scheduled cleaning of the convertor heat exchangers would potentially affect Murraylink's capacity and availability for service.



RECOMMENDATION

It is recommended that provision be made for an expenditure of \$7,000 to provide a permanent high volume, high pressure water supply at Berri convertor station for cleaning purposes.

The estimated cost has been included in the capital expenditure forecast for the Murraylink proposal in 2015/6.



Business Case

Service provider	Murraylink Transmission Company Pty Limited
Asset	Murraylink Victoria – South Australia Transmission Interconnector
Project	<i>Control system enhancement – Black Start</i>
Project type	<i>Capex</i>
Prepared by	<i>Stuart Dodds</i>
Endorsed by (State Manager Asset Management)	
Approved by (General Manager Asset Management)	
Date	

PURPOSE

To present a project recommendation and expenditure forecast for inclusion in the Murraylink Regulatory Proposal for years 2013 to 2023.

BACKGROUND

The Murraylink control systems are not presently capable of operating to supply an isolated load, since they rely upon the presence of a synchronous signal from the networks to which they are connected. This means that the capability of the link cannot be used to supply an isolated load area or ‘island’, or to enable the startup of generators, at times of system black.

This capability can be provided by means of a modification of Murraylink control systems, without modification of the major equipment that constitutes the link.

Such modification would exploit the full capability of the link to:

- Provide an ancillary service to the market, through the availability of a substantial alternative source of supply for generator restart, during system black and multiple contingency conditions; and



- Support the regional transmission systems in South Australia's Riverland, north-western Victoria and south-western NSW during multiple contingency situations.

IDENTIFICATION OF NEED

This project to enhance the Murraylink control system capability arises from an opportunity to reduce market costs to participants and improve system security, through the economic provision of black start capability between the NEM regions and support to regional transmission systems during multiple contingency conditions.

EVALUATION OF ALTERNATIVES

This project involves enhancement of the control system capability, at relatively minor cost, to enhance the utilisation of the existing Murraylink asset and thereby reduce the overall costs to market participants.

Murraylink has initiated discussions with AEMO and the TNSPs regarding more effective use of the capability of the link, including its availability for black start purposes.

ESTIMATED COST

There are two main components to enabling this control system enhancement:

- The estimated cost of system studies to develop the control system logic and obtain AEMO acceptance of the revised operating conditions is \$250,000; and
- The estimated cost of making the necessary control system modifications at both Berri and Red Cliffs sites is \$250,000.

The basis for these costs is quotations that have been obtained from suppliers during 2011 and early 2012.

PLAN FOR EFFECTIVE EXECUTION

The requirement for AER acceptance of capital and operating expenditure specified in 6A.6.7(c) and 6A.6.6(c) of the National Electricity Rules (the Rules) is that the expenditure must be such as would be incurred by a prudent service provider acting efficiently, and represent a realistic expectation of the costs to achieve the requirement.

The black start facility project will be outsourced to a specialist engineering consultant through a competitive tender process, to ensure the completion of the project at minimum cost.

The proposed date for the completion of both initiatives is during 2016-18.

JUSTIFICATION

The elements of this control system enhancement project are required to meet the following capital and operating expenditure objectives set out in clause 6A.6.7(a) and 6A.6.6(a) of the National Electricity Rules (the Rules):



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

Black Start capability is purchased by AEMO as an ancillary service to the market, from generators capable of providing that service. The availability of Murraylink capability at modest cost would reduce the quantum of black start that must be procured from generators. It would also provide a greater diversity of this important facility and thereby enhance the reliability and security of the transmission system. The expenditure for this element of the project is therefore justified under clause (4).

By providing support for the regional transmission systems under multiple contingency conditions, the proposed expenditure for this project is justified under clauses (3) and (4), being required to maintain security of supply in the provision of prescribed transmission services.

RECOMMENDATION

It is recommended that system studies and the enhancement of the Murraylink control systems be carried out to permit the link to provide black-start supplies between the NEM regions and provide additional security to the regional transmission networks under multiple contingency conditions.

The estimated costs have been included in the operating and capital expenditure forecasts for the Murraylink proposal.



Business Case

Service provider	Murraylink Transmission Company Pty Limited
Asset	Murraylink Victoria – South Australia Transmission Interconnector
Project	<i>Cable relocation</i>
Project type	<i>Capex (Stay in Business)</i>
Prepared by	<i>Stuart Dodds</i>
Endorsed by (State Manager Asset Management)	
Approved by (General Manager Asset Management)	
Date	

PURPOSE

To present a project recommendation and expenditure forecast for inclusion in the Murraylink Regulatory Proposal for years 2013 to 2023.

BACKGROUND

The DC cables that form the connection between the Berri and Red Cliffs AC/DC convertor stations have a route length of approximately 180 km. The cables are mostly buried directly in the ground, within the road reservations linking these towns.

Murraylink does not enjoy the property rights of other TNSPs, who acquire easements to protect the tenure of their lines and cables. Almost the entire Murraylink cable route runs within road reservations and the tenancy of the cable is the subject of agreements with the relevant authorities.

Wherever road works take place that would impact on the cable, Murraylink is required by these tenancy agreements to relocate the cable or arrange for it to be protected, at Murraylink’s cost. This would take place, for example, where a road is to be realigned, widened, or connected to a new side road. There has been one such instance during the current regulatory control period, where a concrete protective cover was provided over the cable.



There is thus a high probability that relocation or protection of the Murraylink cable will be required, during the new regulatory control period. The precise details of the each future deviation are unclear but the associated cost impact has been assessed on a probabilistic basis, based on experience.

IDENTIFICATION OF NEED

This project is to retain the integrity of Murraylink by relocating or protecting the DC cables when road realignment or similar activity would otherwise damage or result in the excavation of sections of the cable.

EVALUATION OF ALTERNATIVES

The circumstances surrounding each requirement to relocate or protect the cable will differ and determine the extent of the remedial works that must be carried out. However, there will be no option but to carry out these works, to ensure the integrity and availability of Murraylink’s prescribed transmission services.

ESTIMATED COST

The expected cost of relocating the Murraylink cables has been estimated on the basis of a requirement to relocate the cable over a distance of 100 metres.

The cost comprises the following components (in \$2012/13):

Survey new cable alignment	\$10,000
Trenching	\$20,000
Jointing	\$16,000
Cable supply	\$32,000
Total cost for one relocation	\$78,000

It is anticipated that there will be two occasions when the cable will need to be relocated during the 2013-23 regulatory control period. This total cost of \$156,000 has been factored into the Murraylink capital expenditure program on the basis of 10 equal annual amounts of \$15,600.

PLAN FOR EFFECTIVE EXECUTION

The requirement for AER acceptance of capital expenditure specified in 6A.6.7(c) of the National Electricity Rules (the Rules) is that the expenditure must be such as would be incurred by a prudent service provider acting efficiently, and represent a realistic expectation of the costs to achieve the requirement.

The expected cable relocation costs above have been estimated using recent costs for the respective components and a realistic expectation of the extent, and number, of cable deviations that will be required during the regulatory control period.

The relocation work will be outsourced to a specialist engineering consultant through a competitive tender process, to ensure the completion of the project at minimum cost and to ensure the requisite standards of reliability.



JUSTIFICATION

This cable relocation project is required to meet the following capital expenditure objectives set out in clause 6A.6.7(a) of the National Electricity Rules (the Rules):

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

Murraylink is required by the terms of its tenancy agreements with road authorities to relocate the cable if so requested. This constitutes a regulatory requirement associated with the provision of Murraylink's prescribed transmission services.

The expenditure will be required to retain the integrity of the Murraylink DC cables and thus the reliability and security of supply of prescribed transmission services and the transmission system.

RECOMMENDATION

It is recommended that provision be made for an expenditure of \$15,600 per annum to cover the cost of relocating the Murraylink cable to enable road realignment and similar works, during the 2013-23 regulatory control period.

The estimated costs have been included in the capital expenditure forecasts for the Murraylink proposal.



Business Case

Service provider	Murraylink Transmission Company Pty Limited
Asset	Murraylink Victoria – South Australia Transmission Interconnector
Project	<i>Air Conditioning Redundancy.</i>
Project type	<i>Capex – SIB (efficiency improvement)</i>
Prepared by	<i>Stuart Dodds</i>
Endorsed by (State Manager Asset Management)	
Approved by (General Manager Asset Management)	
Date	

PURPOSE

To present a project recommendation and expenditure forecast for inclusion in the Murraylink Regulatory Proposal for years 2013 to 2023.

BACKGROUND

At the Murraylink terminal stations, the convertor equipment is controlled by computerised systems. When operating, this equipment generates heat. The stations are thus reliant upon air conditioning, to maintain the temperature of the control equipment and the associated building at acceptable levels.

Each Murraylink converter station currently has a single 40kW water chiller and a single 80kW chiller to supply the air conditioning. While the 80kW chiller has sufficient capacity to supply the air conditioning load all year round, the 40kW chiller does not have the capacity to supply the summer air conditioning load. This asymmetric design avoids having the 80kW unit operate inefficiently at light loads for extended periods. The larger unit is operated only when the ambient temperature is above 30°C. The consequence of this arrangement is that the link is not secure against the failure of the 80kW chiller during the summer.



The lack of security against failure of this single element of plant, during temperatures above 30°C, makes continuous availability of 80kW of chiller capacity critical to the operation of the whole transmission line.

The current 80kW chiller has been generally reliable throughout the past ten years of service, however this reliability is expected to diminish during the next revenue control period.

IDENTIFICATION OF NEED

This project arises from the need to maintain the integrity and reliability of the transmission line for the term of the revenue control period.

RISK ASSESSMENT

The operation of the converter station is dependent on the correct operation of several different computerised control systems. These control systems malfunction when the ambient temperature in the control rooms is not maintained at a stable level below 22°C.

The risk has been assessed according to the requirements of the APA Group Risk Management Policy. Based on historical operation of the chiller, the risk likelihood is assessed as Likely. The consequence level is assessed as Minor, leading to an overall risk level of Moderate.

EVALUATION OF ALTERNATIVES

Alternative number 1 is to keep the existing, single chiller. Under this alternative, the converter station sites continue to operate reliably during summer provided the single 80kW chiller is operational at its rated capacity. Should this chiller fail, Murraylink will be shut down until the chiller is restored.

Alternative number 2 is to install a second 40kW chiller in parallel with the existing 40kW chiller. Under this alternative redundancy is achieved by the operation of two 40kW chillers in parallel to supply the summer air conditioning load. This option reduces the purchase cost of the chiller but increases the cost of the chilled water pipework and the cost and complexity of the control system to ensure that air conditioning load is shared evenly between the two chillers.

ESTIMATED COST

The estimated cost for the Berri site is \$250k

The estimated cost for the Red Cliffs site is \$250k.

The basis for these costs is the quote received from AHI Carrier (Australia) Pty Ltd in 12/2011.

PLAN FOR EFFECTIVE EXECUTION

The requirement for AER acceptance of capital expenditure specified in 6A.6.7(c) of the National Electricity Rules (the Rules) is that the capital expenditure must be such as would be incurred by a prudent service provider acting efficiently, and represent a realistic expectation of the costs to achieve the requirement.



The project will be outsourced to one or more specialist contractors through a competitive tender process, to ensure the completion of the project at minimum cost.

JUSTIFICATION

This project is required to meet the following capital expenditure objectives set out in clause 6A.6.7(a) of the National Electricity Rules (the Rules):

- (1) meet the expected demand for prescribed transmission services over [the regulatory control] period;
- (2) comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services;
- (3) maintain the quality, reliability and security of supply of prescribed transmission services; and
- (4) maintain the reliability, safety and security of the transmission system through the supply of prescribed transmission services.

This capital expenditure project is justified under clause 6A.6.7(a)(3) as being required to maintain the quality, reliability and security of supply of prescribed transmission services. With no redundancy for the current single 80kW chiller, any fault with this chiller during summer will cause Murraylink to be shutdown.

RECOMMENDATION

Install a second 80kW chiller to provide security for failure of the existing chiller during summer.

The second chiller will be installed by specialist contractors using a competitive tender process.



Business Case

Service provider	Murraylink Transmission Company Pty Limited
Asset	Murraylink Victoria – South Australia Transmission Interconnector
Project	<i>Control system enhancements – Runback</i>
Project type	<i>Capex Opex</i>
Prepared by	<i>Stuart Dodds</i>
Endorsed by (State Manager Asset Management)	
Approved by (General Manager Asset Management)	
Date	

PURPOSE

To present a project recommendation and expenditure forecast for inclusion in the Murraylink Regulatory Proposal for years 2013 to 2023.

BACKGROUND

The flow in Murraylink is capable of being altered from its maximum capability in one direction of 200 MW, through to maximum capability in the opposite direction, in a matter of milliseconds. The link control system establishes the flow in the link and this is able to respond to a number of external signals.

Exploiting the full capability of the link to support the market and the regional transmission systems in South Australia’s Riverland and north-western Victoria will require the development of the existing control systems.

The flow in the link may be limited by the capacity of the adjacent transmission networks, particularly at times when these are heavily loaded or under transmission contingency conditions. In the event of unexpected failure of certain transmission elements, a **run-back** scheme may be employed. This scheme monitors the status of the transmission system to which the link is connected and reduces the link flow in the event of a transmission system contingency, if overloading of other elements of



the transmission system would otherwise take place. The link is also presently capable of being programmed for use in a **run-forward** mode, where the flow may be reversed to pro-actively support the transmission system in the region with the contingency.

An existing run-back system has existed for some years in the Victorian regional transmission network. The development of equivalent arrangements for the NSW system is covered by this business case.

In addition to providing regional transmission support, the link is capable of providing black-start supplies between regions of the NEM. This would require modification of the control systems to enable the link to maintain synchronous supplies, when other generation was not available. This modification is covered by a separate business case.

IDENTIFICATION OF NEED

This project to enhance the Murraylink control system capability arises from the need to increase the capacity of the South Australian interconnection under both system normal and transmission contingency conditions. Whilst major system augmentations to increase the capacity of interconnection to South Australia are currently under consideration by AEMO, this incremental upgrade was identified at the time of Murraylink's first regulatory determination.

EVALUATION OF ALTERNATIVES

This project involves relatively minor expenditure, to enhance the utilisation of the existing Murraylink asset and thereby reduce the overall costs to market participants.

TransGrid's Annual Planning Report describes the NSW runback scheme, for completion when the associated communications have been established¹.

Murraylink has initiated discussions with AEMO and the TNSPs regarding more effective use of the capability of the link, including enhanced runback provisions.

ESTIMATED COST

The estimated cost of establishing the NSW run-back scheme is:

- Capital contribution to enable the re-routing of Telstra services: \$250,000;
- Initial connection charges of \$8,000; and
- Annual communications charges of \$62,000.

The basis for these costs is quotations that have been obtained from suppliers during 2011 and early 2012.

PLAN FOR EFFECTIVE EXECUTION

The requirement for AER acceptance of capital and operating expenditure specified in 6A.6.7(c) and 6A.6.6(c) of the National Electricity Rules (the Rules) is that the

¹ TransGrid, New South Wales Annual Planning Report 2011, p. 60.



expenditure must be such as would be incurred by a prudent service provider acting efficiently, and represent a realistic expectation of the costs to achieve the requirement.

The communications costs associated with the NSW run-back scheme are those quoted by the only communications service provider able to provide the required facility.

The proposed date for the completion of this initiative is during 2013/14.

JUSTIFICATION

The elements of this control system enhancement project are required to meet the following capital and operating expenditure objectives set out in clause 6A.6.7(a) and 6A.6.6(a) of the National Electricity Rules (the Rules):

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

The expenditure for the NSW run-back is justified under clauses (1) and (3), being required to maintain the capacity of the link and the security of supply in the provision of prescribed transmission services.

RECOMMENDATION

It is recommended that enhancement of the Murraylink control systems be carried out to complete and commission the NSW run-back scheme.

The estimated costs have been included in the operating and capital expenditure forecasts for the Murraylink proposal.



Business Case

Service provider	Murraylink Transmission Company Pty Limited
Asset	Murraylink Victoria – South Australia Transmission Interconnector
Project	<i>Transformer earth switches at Berri and Red Cliffs</i>
Project type	<i>Capex</i>
Prepared by	<i>Stuart Dodds</i>
Endorsed by (State Manager Asset Management)	
Approved by (General Manager Asset Management)	
Date	

PURPOSE

To present a project recommendation and expenditure forecast for inclusion in the Murraylink Regulatory Proposal for years 2013 to 2023.

BACKGROUND

The Murraylink convertor transformers at Berri and Red Cliffs are located outdoors near the convertor station buildings. They are single-phase units and, as is commonplace for oil filled apparatus, are located within blast walls and with oil containment to limit damage, environmental effects and fire in the event of catastrophic failure of a transformer.

The electrical connection to each transformer HV bushing is physically located around seven metres above ground level. These connections are required to be earthed, to enable maintenance and inspection work to take place on the associated transformer.

At present, earthing of the transformers is carried out using portable earths, which are clamped to a 'D' fitting attached to the transformer HV connection. The use of portable earths in this situation raises OH&S issues.



IDENTIFICATION OF NEED

This project aims to rectify a deficiency in the current design of the switchyard, whereby the earthing of the converter transformer HV connections located seven metres above ground level must be carried out with portable earths. This feature of the design raises OH&S hazards for the staff that must operate and maintain the equipment, as follows:

- The portable earths and their trailing leads are heavy. In raising them to the required height, there is a significant risk that staff will be exposed to physical injury from straining to lift the earthing apparatus;
- There is a risk that staff may overbalance, in the process of lifting the portable earths; and
- On occasion, the earthing clamp can become detached from its insulated operating handle. If a detached earthing clamp and trailing conductor were to fall from the height of the transformer connections, it could cause serious injury to operating staff below.

EVALUATION OF ALTERNATIVES

There is only one satisfactory way to resolve the OH&S issues identified with the use of portable earthing apparatus on the transformer HV connections. The solution is to install permanent earthing switches, which are operated from ground level using a handle and linkage.

Modern transmission switchyard designs invariably include earth switches that are operated from ground level, in situations such as the Berri and Red Cliffs transformer connections.

Equipping the Berri and Red Cliffs switchyards with transformer earthing switches will resolve these OH&S issues and align the design with modern practice.

ESTIMATED COST

The layouts of the switchyards differ. There are three elevated earthing points at Berri and six at Red Cliffs. All require to be fitted with earthing switches.

The estimated cost of installing the earthing switches is \$100,000 each, a total of \$900,000 for the installations at Berri and Red Cliffs. This cost has been estimated on the basis of a quotation to supply and fit the earth switches obtained from a qualified supplier, early in 2012.

PLAN FOR EFFECTIVE EXECUTION

The requirement for AER acceptance of capital expenditure specified in 6A.6.7(c) of the National Electricity Rules (the Rules) is that the expenditure must be such as would be incurred by a prudent service provider acting efficiently, and represent a realistic expectation of the costs to achieve the requirement.

The installation of the earthing switches at Berri and Red Cliffs will be outsourced to a specialist engineering contractor through a competitive tender process, to ensure the completion of the project at minimum cost.



The proposed date for the completion of both switchyards is during 2014/15, to be coordinated with other major maintenance.

JUSTIFICATION

This earthing switch project is required to meet the following capital expenditure objective set out in clause 6A.6.7(a) of the National Electricity Rules (the Rules):

- (2) comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services;

By eliminating an identified OH&S hazard, this expenditure for the transformer earth switches is justified as assists in achieving objective (2),

RECOMMENDATION

It is recommended that transformer earthing switches be installed at the two Murraylink convertor stations to resolve current OH&S issues associated with the use of portable earthing apparatus.

The estimated costs have been included in the operating and capital expenditure forecasts for the Murraylink proposal.



Business Case

Service provider	Murraylink Transmission Company Pty Limited
Asset	Murraylink Victoria – South Australia Transmission Interconnector
Project	<i>Positive pressure ventilation</i>
Project type	<i>Capex</i>
Prepared by	<i>Stuart Dodds</i>
Endorsed by (State Manager Asset Management)	
Approved by (General Manager Asset Management)	
Date	

PURPOSE

To present a project recommendation and expenditure forecast for inclusion in the Murraylink Regulatory Proposal for years 2013 to 2023.

BACKGROUND

The Murraylink AC/DC convertor equipment at Berri and Red Cliffs is designed to be housed in substantial buildings, for weather protection. The heat generated by the electrical equipment is naturally carried by convection to the roof and is presently evacuated from the building by a forced ventilation system comprising five extraction fans mounted on the roof. The air intake ventilation ducts are in the building walls, near ground level.

IDENTIFICATION OF NEED

This project aims to rectify deficiencies in the current design of the forced ventilation system. These deficiencies are:

- There is no specific provision for access to the ventilation fans, such as by a walkway with guardrails, or tether rails, on the roof. This imposes OH&S



issues for staff required to carry out maintenance or replacement of the ventilation fans.

- The design of the existing ventilation system does not include dust filtering on the air intake vents in the walls. In consequence of this, dust from ground level is drawn through the air intake vents and into the building. The dust is electrostatically attracted to the convertor equipment and presents a significant risk of electrical flashover and equipment damage.
- The negative pressure within the building generated by the existing ventilation system draws insects and spiders into the building, through cracks and openings in the walls. Their accumulation also presents a risk of flashover of the convertor equipment.

EVALUATION OF ALTERNATIVES

There are two issues with the design of the existing building ventilation equipment:

- Filtration of the incoming air is required, to reduce the intake of dust distributed within the building and accumulating on the electrical equipment;
- The design of the ventilation system needs to be altered to create positive pressure within the building and thereby discourage the ingress of insects and spiders.

There is only one way to configure a ventilation system that addresses these issues, whilst assisting the natural convection flows of air heated by the electrical equipment within the building. This involves the fitment of air handling equipment (fans equipped with filters) to the ventilation ducts at the base of the building walls and the replacement of the existing vent fans in the roof with capped ventilators. The air handling equipment would create a slight positive pressure within the building and the heated air would escape via the roof vents.

Maintenance impacts

Periodic inspection and checking of the convertor electrical equipment is required. The necessary cleaning of dust and other contamination from insulating surfaces has been carried out during these inspections. This type of preventative maintenance will still be required, although the extent of the decontamination will be reduced.

The filters in the air handling units will be an additional component requiring regular cleaning.

Overall, the effect on the level of routine maintenance will be slightly favourable.

ESTIMATED COST

The estimated cost of establishing the positive pressure building ventilation system at Berri and Red Cliffs is \$212,000?. This cost had been estimated on the basis of a quotation to supply and fit the air handling equipment and roof ventilators obtained from a qualified supplier in early 2012.



PLAN FOR EFFECTIVE EXECUTION

The requirement for AER acceptance of capital expenditure specified in 6A.6.7(c) of the National Electricity Rules (the Rules) is that the expenditure must be such as would be incurred by a prudent service provider acting efficiently, and represent a realistic expectation of the costs to achieve the requirement.

The installation of the positive pressure ventilation systems at Berri and Red Cliffs will be outsourced to a specialist consultant through a competitive tender process, to ensure the completion of the project at minimum cost.

The proposed date for the completion of both initiatives is during 2014/15.

JUSTIFICATION

The elements of this control system enhancement project are required to meet the following capital and operating expenditure objectives set out in clause 6A.6.7(a) and 6A.6.6(a) of the National Electricity Rules (the Rules):

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

The expenditure for the positive pressure ventilation project is justified under the following sub clauses.

- The installation resolves current OH&S issues associated with maintenance of the roof mounted ventilation fans and thus assists achieving objective (2); and
- By reducing the likelihood of flashover and equipment damage to the convertors due to the accumulation of dust on their insulating surfaces, the project achieves objectives (3) and (4).

RECOMMENDATION

It is recommended that positive pressure ventilation systems be installed at the two Murraylink convertor stations be installed to:

- Resolve current issues associated with the maintenance of the roof mounted ventilations fans; and
- Reduce the risk of equipment flashover due to the accumulation of dust on convertor equipment insulating surfaces.

The estimated costs have been included in the operating and capital expenditure forecasts for the Murraylink proposal.



Business Case

Service provider	Murraylink Transmission Company Pty Limited
Asset	Murraylink Victoria – South Australia Transmission Interconnector
Project	<i>Security Fence Replacement</i>
Project type	<i>Capex – SIB (licence compliance)</i> <i>Capex – SIB (risk mitigation)</i>
Prepared by	<i>Stuart Dodds</i>
Endorsed by (State Manager Asset Management)	
Approved by(General Manager Asset Management)	
Date	

PURPOSE

To present a project recommendation and expenditure forecast for inclusion in the Murraylink Regulatory Proposal for years 2013 to 2023.

BACKGROUND

A number of incidents involving the injury or death of trespassers in high voltage substations has resulted in changes to the standards for substation fencing. These changes were incorporated into the substation fencing requirements detailed in the NATIONAL GUIDELINES FOR PREVENTION OF UNAUTHORISED ACCESS TO ELECTRICITY INFRASTRUCTURE published by the Energy Networks Association (ENA Guidelines).

The security fences at the Berri and Red Cliffs converter stations have been in place since their establishment over a decade ago and will need to be upgraded to the current standard during the next regulatory period.



IDENTIFICATION OF NEED

This project arises from the need to:

- Manage the risk of public liability from injury to trespassers.
- Manage the risk of malicious damage to the equipment in the converter station compound.

RISK ASSESSMENT

With the current security fence, entry to the converter station sites can be gained with the use of basic hand tools. Once inside the compound, there is a risk that an individual without proper instruction could be electrocuted by the high voltages on site or cause material damage to major items of plant such as the switchgear and transformers.

The risk has been assessed according to the requirements of the APA Group Risk Management Policy. The risk likelihood is assessed as Rare and the consequence level is assessed as Major, leading to an overall risk level of High.

EVALUATION OF ALTERNATIVES

The alternative to the project is to keep the existing security fence. Under this alternative, the converter station sites would continue to be secured at the existing standard for the duration of the revenue control period. It is anticipated that the other substations in adjacent areas operated by other TNSPs will have their security arrangements upgraded, leaving the Murraylink converter stations with a high level of vulnerability.

ESTIMATED COST

The estimated cost for the Berri site is \$360k.

The estimated cost for the Red Cliffs site is \$490k.

The basis for these costs is the \$813.37 per metre paid for the Bungalora security fence in April, 2011.

PLAN FOR EFFECTIVE EXECUTION

The requirement for AER acceptance of capital expenditure specified in 6A.6.7(c) of the National Electricity Rules (the Rules) is that the capital expenditure must be such as would be incurred by a prudent service provider acting efficiently, and represent a realistic expectation of the costs to achieve the requirement.

The project will be outsourced to one or more specialist fencing contractors through a competitive tender process, to ensure the completion of the project at minimum cost.

The proposed date for the completion of the security fence replacement is the end of 2015.



JUSTIFICATION

This project is required to meet the following capital expenditure objectives set out in clause 6A.6.7(a) of the National Electricity Rules (the Rules):

- (1)
- (2) comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services;
- (3) maintain the quality, reliability and security of supply of prescribed transmission services; and
- (4) maintain the reliability, safety and security of the transmission system through the supply of prescribed transmission services.

This capital expenditure project is justified under clause 6A.6.7(a)(2) as being required to comply with regulatory obligations. South Australian Electricity (General) Regulations 1997, section 15 and Schedule 4 section 6 require the buildings and enclosures must be secured so as to prevent entry by unauthorised persons. The Victorian Electricity Safety Act 1998, section 98 requires APA to minimise the hazards and risks to the safety of any person arising from the supply network.

RECOMMENDATION

Replacement of the security fences at Berri and Red Cliffs to modern specifications is recommended, to mitigate the high risk of injury to a member of the public or major equipment damage.

The upgraded fences will be installed by specialist contractors using a competitive tender process.