



## Business Case

<b>Service Provider:</b>	APA Group	<b>Date:</b>	December 2019
<b>Asset:</b>	Directlink		
<b>Project:</b>	<b>Cable Modification</b>		
<b>Project Type:</b>	<i>Capex/Opex : Capex \$1.2m</i>		
<b>Prepared:</b>	<i>Mark Allen</i>	<i>Regulatory Manager</i>	
<b>Endorsed:</b>	Noel Powell	<i>Reliability Engineer</i>	
<b>Approved:</b>	Stuart Dodds	<i>Asset and Renewables Manager</i>	

## PURPOSE

To present a project recommendation and expenditure forecast for inclusion in the Directlink Regulatory Proposal for the years 2020 to 2025.

## BACKGROUND

Directlink seeks to invest in regular analysis of cable fault data, to assist with any improvement strategies that could be implemented to maintain reliability. Cable faults cause downtime to the network and are a disruption to productivity in the business. Fault repairs can be a strain on resources and our normal operations. Cable faults cause system outages and impact the availability of Directlink.

The Directlink cable is 59km and approximately 14km is above ground in galvanised steel tray (GST). There are approximately 76 cable transition points between below and above ground.

*The cable runs above and below ground over the course of Directlink. The components of the transition from above to below ground. The cable travels from the galvanised steel tray through to a concrete duct then underground.*

Amplitude Consultants (a Brisbane based consultancy specialising in HVDC assets) undertook a study on the cable faults commencing in April 2018 and continuing through to December 2019.



## IDENTIFICATION OF NEED

In partnership with the Directlink operations team, Amplitude were able to identify that a significant number of cable faults appear to be occurring at, or near, cable transitions.

*The problem as identified by Amplitude Consultants appears to be:*

*However, there are two specific behaviours seen in the typical fault area which are known electrical stress raisers - the temperature difference ( $\Delta T$ ) between the inner and outer edges of insulation peaks in this region and there is a significant spike in volumetric strain. Amplitude are of the opinion that the combination of these two components are most likely to be responsible for the pattern of failures incurred at this location within the transition.*

The Amplitude recommended solution to the problem identified by them is to reduce the intensity of thermal changes at transitions. The final report containing recommendations is expected to be received in late 2019 or early 2020.

## EVALUATION OF ALTERNATIVES

### Do nothing

Directlink would expect to experience ongoing increases in the number of failures at the cable transitions due to aging cable and aging of the materials at the transition exacerbating the problem.

### Completely underground Cable

This would remove the transitions and address the issue of failures. However, a preliminary estimate of the cost of this project is approximately \$40m which is disproportionate the problem being experienced.

## RECOMMENDATION

### Engineer to slower transitions

The proposed solution is to:

- Installation of a plastic sunshade over the galvanised steel trays
- Addition of a thermal insulating foam layer to block out the heat from the inside of the galvanised steel trays, this is attached to the lid of the galvanised steel trays on the inside



- Perforating the galvanised steel trays by drilling on the sides of the tray (this is to allow for the heat to escape from the galvanised steel trays)
- Painting the galvanised steel trays to improve heat reflection

## ESTIMATE OF COST

The total estimate for the Cable Modification project is \$1,200,000. This includes work to test different materials for insulation and sunshade to find the most cost effective solution as well as installing the materials once they are identified.

This project is forecast to be executed in FY21-FY23.

The estimated costs for the recommendation detailed have been included in the capital expenditure forecasts for the Directlink Regulatory submissions.

## 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 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 delivery of the project has been scheduled as detailed in the Estimate sections above, occurring in FY21-F23.

## JUSTIFICATION

The Cable Modification Program for “Directlink” is 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 project is justified under sub rule (3) on the basis that the transition modification project will assist to maintain the quality, reliability and security of supply of prescribed transmission service