2018-22
POWERLINK QUEENSLAND REVENUE PROPOSAL

Project Pack - PUBLIC

CP.02507
Collinsville Proserpine Inland Section Transmission Line Refit

Delivering better value

CAPITAL PROJECT ENDORSEMENT SHEET

Project: **CP.02507**	Description: **Collinsville – Proserpine Inland Section Transmission Line Refit**

In order to ensure that all the issues associated with network operational works are addressed, it is desirable to have all relevant Managers within Powerlink Queensland endorse project approval submissions prior to financial approval being received.

Endorsement by responsible parties ensures that the proposed project scope achieves Powerlink's requirements. The following parties endorse this project and recommend its approval, specifically:

1. there is an ongoing need for the project and the project scope is consistent with the intended objective of the project;
2. the project scope (including the timing) and associated estimate are consistent, and appropriate budget has been identified for the required works to ensure a deliverable outcome;
3. there is sufficient budget provision to undertake this operational refurbishment project and the project is allowed for within the overall portfolio of works; and
4. the proposed scope is technically acceptable and complies with all current plant strategies.

[redacted]
Project Sponsor

[redacted]
Signature

24/9/2015
Date

[redacted]
Group Manager HV Strategies

[redacted]
Signature

13.10.15
Date

[redacted]
A/Network Integration Manager

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19/10/2015
Date

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Group Manager Strategy & Planning

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26/10/15
Date

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Group Manager Portfolio & Business Management

Signature

Date

INVESTMENT & PLANNING

BUSINESS CASE

CP.02507 Collinsville Proserpine Transmission Line Refit

24 September 2015

Document Control

Issue Date	Responsible Person	Objective Document Name	Background
24/09/2015	[redacted]	Business Case CP.02507 Collinsville Proserpine Transmission Line Refit	Initial Issue

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SUMMARY

This report sets out a business case to justify a capital project for transmission line refit works of the 74km inland section of the Collinsville to Proserpine double circuit transmission line (BS1202 and BS1240). It discusses the need for investment, examines solutions to address the condition issues and makes prudent provision for future load growth.

It is recommended that approval be sought for Option 4 for refit of the 74km inland section of the Collinsville to Proserpine transmission line and undertake surface preparation and painting of 94 of the 194 towers. The estimated cost is $34.3 million escalated to completion ($29.8 million plus a 15% contingency allowance). Works are to be completed by December 2018.

1. INTRODUCTION

As a transmission network service provider, Powerlink undertakes works to meet its obligations contained in the *National Electricity Rules* (the Rules) to plan, design, operate and maintain the transmission network to allow the efficient transfer of electrical energy from producers to users. In addition, under its *Transmission Authority* obligations set out in the *Electricity Act*, Powerlink must make appropriate investments to ensure continuity of supply (refer Attachment 1).

These obligations give rise to a program of capital expenditure to develop the network to ensure efficient transfer of electrical energy and to replace assets to maintain reliability of supply. This business case describes a capital project to refit the 74km inland section of the Collinsville to Proserpine 132kV double circuit line (BS1202 and BS1240) to maintain reliable supply to the Proserpine area.

2. BACKGROUND

The Collinsville to Proserpine 132kV double circuit transmission line supplies the T039 Proserpine Substation and the Whitsunday Region in North Queensland. It is an essential 132kV transmission line for supply to the area, the longer term future for the region has this transmission line as the sole 132kV supply into the region.

The line is 90km in length and was originally constructed in 1967. It consists of three built sections – BS1202 Collinsville to Peter Faust Dam 60km inland section, a 14km deviation, BS1240, around the Peter Faust Dam constructed in 1986 (reusing the 1967 constructed towers) and BS1203 the 16km coastal section.

Built Section 1203, the coastal section from Peter Faust Dam to Proserpine Substation, was replaced in-situ in 2014 under a separate capital project CP.01942 due to significant corrosion

The inland section of the Collinsville to Proserpine line experiences a slower corrosion rate compared to the coastal section due to less onerous environmental conditions.

The Proserpine substation is also supplied by an additional 132kV double circuit line from Mackay substation. However, this line will be removed from service and is to be decommissioned in mid-2016 due to poor condition leaving Proserpine substation supplied from Collinsville Substation only.

The existing conductor has a rating of 95MVA. There is also additional transfer capacity available across the 66kV network from Bowen. The forecast loading reaches 62MVA in the 10 year, 50PoE, forecast.

3. NEED

A condition assessment of the inland section of the Collinsville to Proserpine line undertaken in 2013/14 confirmed that the 74km inland section requires corrective action to address condition issues.

Primary defects identified include grade 2[1] and grade 3[1] corrosion on the overhead earth wire, cross arms, conductor hardware, insulators, minor members, some k-points, step bolts, bolts and nuts.

The condition assessment also identified that the majority of key components of the line including foundations, major members and conductors are in suitable condition for continued use. The slow corrosion rates on the inland section are attributed to environmental factors in the inland area of reduced humidity and increased distance from the coast.

Remedial action is required in the short term to avoid further damage to the underlying steel component.

There is a long term need to retain the transmission line between Collinsville and Proserpine as the transmission line section between Proserpine and Glenella (in the Mackay area) is to be decommissioned and removed by July 2016, leaving the 132kV Collinsville Proserpine transmission line as the sole source of 132kV supply into the Whitsunday Region.

It is not acceptable to do nothing to address the need as the condition of the remaining transmission line asset has identified conditions to be addressed and timely action will deliver extended life from the asset while minimising the cost of the remediation works.

Deferring expenditure now so as to take action a few years into the future is unlikely to deliver significant savings and may prove more expensive with an increased number of bolts and members requiring replacement.

[1] Grade 2 – indicates surface rust with loss of galvanic protective layer in some areas; Grade 3 – indicates significant surface rust, some pitting of steel, loss of galvanic protective layer and small steel loss; and Grade 4 – indicates large steel loss and loss of strength.

4. PROPOSED SOLUTION

4.1. Options Considered

Four options were considered to address the identified issues:

Option 1 – line replacement;

Option 2 – line refit excluding painting followed by adjacent replacement;

Option 3 – line refit including painting of 194 towers; and

Option 4 – line refit painting of 94 towers.

The estimates used for all options are Concept Estimate.

4.2. Recommended Solution

An economic assessment has been completed to assess the options. The results of the financial analysis are summarised in Table 1.

Table 1 – Summary of Financial Analysis

Discount rate 10%		PV ($M)	Rank
Option 1	Line replacement	38.3	3
Option 2	Line refit , followed by later replacement	41.3	4
Option 3	Line refit including painting all towers	34.8	2
Option 4	Line refit including painting of 94 towers	30.8	1

On balance, in light of the financial analysis and having weighed the risks and benefits of each option, it is recommended that Option 4 - Line Refit including painting of 94 towers – represents the most prudent and efficient option. The estimated cost of these works is $29.8 million escalated to completion.

4.2.1. Option 1 – Line Replacement

Option 1 involves acquisition of an adjacent easement by late 2019 and construction of the replacement line adjacent to the existing line by 2023.

The key benefit of this option is that the replaced line will be a modern design with improved reliability, maintainability and capacity.

The key risks associated with this option relate to:

- costs – the large upfront cost.

- strategic – the locked development path for the Proserpine area and reduced future flexibility for this asset.
- easements – easement assessment report has been initiated into the existing transmission line easement for BS1202 and BS1240.
- estimates - easement costs are based on a preliminary estimate. The concept estimate identified $5.3 million of risk around foundation requirements.

The estimated cost of this option in $2015/16 is:

$3.0 million to acquire the easement; and

$63.1 million for the adjacent replacement line and demolition of the existing line by 2024, which does not include the $5.3 million risk for foundations.

This option would address the condition issues.

4.2.2. Option 2 – Line Refit, Excluding Painting, Followed by Adjacent Replacement

Option 2 involves line refit of the existing towers in 2017/18, acquisition of an adjacent easement by 2030 and construction of the replacement line adjacent to the existing line by 2033.

The line refit would include bolt, member, insulator, replacement of overhead earth wire with 11mm 24 fibre OPGW and some k-points, but excludes painting.

The key benefits of this option include:

- costs – lowest cost initial investment.
- strategic – the increased strategic flexibility as the line replacement is deferred. Due to the low corrosion rates in the area, a second refit in the future may provide additional replacement deferral.
- easements – easement assessment report has been initiated into the existing transmission line easement for BS1202 and BS1240 to confirm easement conditions and easement continuity.
- deferred easement acquisition requirement
- flexibility – Powerlink retains options to change strategic direction into the future.

The key risks of this option are in relation to:

- delivery – Refit panel performance has not been proven at this stage.
- construction camp – the project delivery will rely upon development of a local temporary construction camp along or adjacent to the midpoint of the work site. Development and approval of a construction camp will be included in the Refit contract for panel members, a number of third party approvals would be required prior to camp development.
- quality – unproven service providers may delivery poor quality outcomes.
- workload – delivery outcomes are dependent upon Refit Panel production rates and we may find that project delivery does not meet completion date requirements.

The estimated cost for this option in $2015/16 is:

$25.2 million for line refit works;

$3.0 million to acquire the easement; and

$63.2 million for the adjacent replacement line and demolition of the existing line by 2032, which does not include the $5.3 million risk for foundations.

This option would address the condition issues.

4.3. Option 3 – Line Refit Including Painting of All Towers

Option 3 involves line refit of the existing towers including painting of all towers to be completed by 2019/20, which is expected to extend the asset life by at least 25 years.

The line refit would include bolt, member, insulator, replacement of overhead earth wire with 11mm 24 fibre OPGW and some k-points, and painting.

The key benefits of this option include:

- costs – low cost initial investment compared to replacement.
- strategic – the increased strategic flexibility as the line replacement is deferred.
- easements – no additional easement required avoids the endangered flora issue.
- flexibility – Powerlink retains options to change strategic direction into the future.

The key risks of this option are in relation to:

- delivery – Refit panel performance has not been proven at this stage.
- quality – unproven service providers may delivery poor quality outcomes.
- workload – delivery outcomes are dependent upon Refit Panel production rates and we may find that project production does not meet completion date requirements.

The cost estimate for this option is $34.8 million ($2015/16) for the line refit. This option would address the condition issues.

4.4. Option 4 – Line Refit Including Painting of 94 Towers

Option 4 involves line refit of the existing towers including painting of 94 towers between 1202-STR-0103 and 1240-STR-7190 in 2018/19 which is expected to extend the asset life by at least 25 years.

The line refit would include bolt, member, insulator, replacement of overhead earth wire with 11mm 24 fibre OPGW and some k-points, and includes painting of 94 of the 194 towers.

The key benefits of this option include:

- costs – lower cost initial investment compared to replacement.
- strategic – the increased strategic flexibility as the line replacement is deferred.
- easements – no additional easement required avoids the endangered flora issue.
- flexibility – Powerlink retains options to change strategic direction into the future.

The key risks of this option are in relation to:

- delivery – Refit panel performance has not been proven at this stage.
- quality – unproven service providers may delivery poor quality outcomes.
- workload – delivery outcomes are dependent upon Refit Panel production rates and we may find that project production does not meet completion date requirements.

The cost estimate for this option is $26.4 million ($2015/16) for the line refit. This option would address the condition issues.

5. STRATEGIC FIT

The project aligns with, AM-POL-0357 Maintenance of Lattice Steel Towers.

6. PROJECT SCOPE

The project scope is shown in Attachment 2.

7. PROJECT COMPLETION

The planned completion date for the project is December 2019.

8. DEPENDENCIES

There were two projects that this project was dependent upon, both projects have been completed.

- CP.01942 Collinsville Proserpine Coastal Section T/L Replacement October 2014; and
- CP.02039 Collinsville Substation Replacement – September 15.

At this time, there are no directly dependant projects relying on completion of this project.

9. COSTS

The project concept estimate is shown in Attachment 3. The projected cash flows are set out below.

	Year 1	Year 2	Year 3	Year 4	
Basis of Cost	**2015/16 $ '000**	**2016/17 $ '000**	**2017/18$' 000**	**2018/19 $'000**	**Total $ '000**
15/16 Cost Level	**2,059**	**5,986**	**9,612**	**8,756**	26,413
At Completion	**2,144**	**6,485**	**10,894**	**10,273**	**29,796**

A 15% contingency allowance should be included to cater for unforeseen changes in scope and potential site access costs that were partially addressed in the concept estimate. This brings the total amount to be approved to $34.3 million at completion.

The contingency amount has two components 10% for unforeseen changes to the project scope and 5% allowance for the increased of the construction camp approvals and development.

Summary Table from Concept Estimate 2015/16

Escalated	Estimate $k	Estimate Escalated to Completion $k
Preliminary Costs (I&P Concept Estimate, Grid Planning)	[redacted]	[redacted]
Q leave	[redacted]	[redacted]
Project Management	[redacted]	[redacted]
Construction Management	[redacted]	[redacted]
Design Support	[redacted]	[redacted]
Procurement	[redacted]	[redacted]
Structural Refit & Painting (94 twrs) Access Track upgrades	[redacted]	[redacted]
Replace Insulators & Hardware & OHEW	[redacted]	[redacted]
Switching	[redacted]	[redacted]
Total	**26,413**	**29,796**

10. FUNDING

The total investment for this project is $34.3 million ($29.8 million escalated to completion plus a 15% contingency allowance), for prescribed transmission services. The capital expenditure can be accommodated within the current approved capital budget and as such within Powerlink's borrowing requirements.

11. RETURN ON INVESTMENT

To support Powerlink's capital expenditure to meet its regulatory obligations, the following matters have been considered for the proposed investment:

- the expenditure is demonstrated to be cost effective;
- the requirement for the assets does not diminish in future (i.e. asset stranding does not occur);
- the proposed capital expenditure relative to the capex allowance in Powerlink's 2012/13 to 2016/17 Transmission Determination; and
- appropriate consultation and approvals processes are undertaken.

Each of these issues is discussed in turn below.

11.1. Cost Effective Solution

This report discusses the need for refit of BS1202 and BS1240, the 75km inland sections of the 132kV double circuit Collinsville to Proserpine line. The recommended option is the lowest cost solution to address the condition issues and has prudent regard for long term business requirements.

The works to be undertaken are also in accordance with Powerlink's Procurement Policy and existing procurement arrangements to ensure effective pricing competition. The expenditure is therefore considered to be cost effective.

11.2. Stranding Risk

The Collinsville to Proserpine transmission line will continue to provide essential 132kV supply to the Proserpine Area in North Queensland. Ergon Energy will continue to take supply from the Proserpine Substation into the future. The stranding risk associated with this proposed investment is therefore not considered to be significantly different to that of Powerlink's other typical prescribed investments.

11.3. Capital Expenditure Allowance

For the 2012/13 to 2016/17 regulatory period, the regulatory arrangements include an ex-ante capex allowance. Powerlink will receive a full regulated return on, and of, the expenditure, provided the investment required to meet Powerlink's obligations over the five year period is prudent and efficient, and within the capital expenditure allowances in the AER's Transmission Determination for Powerlink.

Further, the AER requires that all new assets to be rolled into the regulated asset base at the end of the 2012/13 to 2016/17 regulatory period be subjected to the appropriate consultation and approvals processes.

11.4. Approval and Consultation

At the time of writing there are no National Energy Regulator requirements for approvals, public or participant consultation on the refit of transmission line assets included in this project. However, this project is subject to Powerlink's capital governance process.

In line with the *Queensland GOC Investment Guideline*, as the works are greater than $20 million, Shareholding Ministers will be notified following the Board approval.

12. RECOMMENDATION

It is recommended that approval be sought for the refit of the 75km inland section including painting of 94 tower structures of the Collinsville to Proserpine transmission line. The estimated cost is $34.3 million escalated to completion ($29.7 million plus a 15% contingency allowance). Works are to be completed by October 2018.

13. REFERENCES

1. Condition Assessment Report – A1527084
2. Project Scope Report – A1745547
3. Project Concept Estimate – A2181923
4. NPV Calculation – A2332921

ATTACHMENT 1 – PLANNING OBLIGATIONS

As a transmission network service provider (TNSP), Powerlink is obliged to meet the requirements of Schedule 5.1 of the *National Electricity Rules* (the Rules) and in particular, clause S 5.1.2.1:

"Network Service Providers must plan, design, maintain and operate their transmission network… to allow the transfer of power from generating units to Customers with all facilities or equipment associated with the power system in service and may be required by a Registered Participant under a connection agreement to continue to allow the transfer of power with certain facilities or plant associated with the power system out of service, whether or not accompanied by the occurrence of certain faults (called "credible contingency events").

The following credible contingency events and practices must be used by Network Service Providers for planning and operation of transmission networks….

The credible contingency events must include the disconnection of any single generating unit or transmission line, with or without the application of a single circuit two-phase-to-ground solid fault on lines operating at or above 220 kV".

The voltage stability criteria outlined in Clause S5.1.8 of the National Electricity Rules requires 'that an adequate reactive power margin must be maintained at every connection point in a network with respect to the voltage stability limit as determined from the voltage/reactive load characteristic at that connection point'. In line with this requirement, a reactive margin of 1% of the maximum fault level (in MVA) at each connection point is required.

Powerlink's transmission authority also includes a responsibility on Powerlink to:

"…..plan and develop its transmission grid in accordance with good electricity industry practice such that:

(b) if the power quality standards do not specify different obligations during normal and other operating conditions – the power quality standards will also be met by the transmission entity even during the most critical single network element outage; and

(c) the power transfer available through the power system will be adequate to supply the forecast peak demand during the most critical single network element outage…" (Electricity Act 1994).

These obligations give rise to an ongoing program of capital expenditure to develop the grid and to replace aged assets.