Line 94U-Refurbishment

Cost Benchmarking Assessment

Transgrid

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Executive Summary

Transgrid has prepared Option Evaluation Report (OER) N2582 that sets out the evaluation of two options against a base case to remediate asset condition issues on Line 94U. The preferred option "Option B" replaces all 138 wood poles at a cost of $19.97M exhibiting a Net Present Value (NPV) of $102.41M.

The Australian Energy Regulator (AER) Draft Determination reduces the funding request by 12% ($16.2M) on the basis that the implied unit rate for replacing wood poles is too high relative to recent years.

GHD's benchmarking and bottom-up cost estimation indicates that the 132kV single circuit wood pole replacement unit rates are within a reasonable range of the benchmark projects / cost estimation we have considered taking into account levels of accuracy that can be expected for forecasts at this stage of project development. Similarly, the forecasted capex for the project is within a reasonable margin of the benchmark projects / cost estimation build we have considered and is consistent with that which would be incurred by a prudent and efficient business.

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1. Introduction

Line 94U is a 30.4 km 132 kV wood pole line between Parkes and Forbes. Detailed analysis of asset condition information indicates that the line has several condition issues which require refurbishment to address its deteriorating health and maintain appropriate risk levels across the network. The OER N2582 indicates 28% of the structure population in this line requires replacement by 2028. Given the extent of condition issues across the wood pole structures on Line 94U, it is considered that the entire line is approaching the end of its serviceable life. In 2025, the asset will have reached 39 years of age. While this is a relatively low age, the use of early vintage pressure impregnated poles has contributed to an accelerated deterioration in asset condition.

The OER N2582 considers replacing identified structures (i.e., the affected 28% of the population) and replacing all wood poles (i.e., the entire population) against a base case defined as a 'do nothing' scenario, where the assets are left in service until they fail and require replacement. The preferred option "Option B" replaces all wood poles at a cost of $19.97M exhibiting a NPV of $102.41M.

The AER's Draft Determination reduces the funding request by 12% ($16.2M) on the basis that the implied unit rate for replacing wood poles is too high relative to recent years. Other issues related to the overestimation of environmental risk costs and included reputational risk were noted. Once adjusted the Transgrid preferred option still remains as NPV positive. These issues are considered outside the scope of GHD's review.

Transgrid has engaged GHD to perform a benchmark assessment of unit rates.

1.1 Purpose of this report

This report outlines an independent assessment of Transgrid's OER N2582 unit rates submitted to the AER for funding associated Line 94U refurbishment.

This report may be used to support Transgrid's Revised Revenue Proposal to be submitted at the AER.

1.2 Scope and limitations

GHD has been engaged by Transgrid to perform an independent assessment of unit rates included in the Line 94U refurbishment capital forecast.

This report: has been prepared by GHD for Transgrid and may only be used and relied on by Transgrid for the purpose agreed between GHD and Transgrid as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Transgrid arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

2. 132kV benchmarking

GHD has benchmarked Transgrid's capital forecast against two relevant and recent capital projects, and a reference cost estimate data point. Project 1 is in the planning phase and Project 2 has been delivered, where GHD has access to the projects unit rates noting that the accuracy of the forecast during this stage is +/- 25% which aligns with a Class 3 estimate detailed in Appendix A-2.

We have also reviewed the actual costs for a recently delivered a pole replacement project on Line 94K (Wellington to Parkes) which is adjacent to 94U and considered good comparator.

Table 1   132kV benchmarking

Project	Project details	Approx. cost per pole	Comments / conclusion
Transgrid Line 94U (Option B)	– 138 structures (130 suspension structures + 8 tension structures) and dismantling and removal of existing structures – 132kV single circuit – Pastural or grazing land use along the route – Flat terrain – Existing easement – 6 existing poor soil foundations, 14 existing rock foundations – Site Establishment – Very light clearing, Access required – Structure replacements only – No new conductor, OHEW or stringing.	$145K. To be replaced with concrete or steel poles.	Refer conclusion below.
Project 1 – DNSP (NSW), in planning phase.	– Planning to replace 76 structures of 132kV double circuit steel towers leaving the existing conductors and insulators with new two single circuit concrete poles.	$350K per structure location or $175K per concrete pole. This unit rate excludes conductors, insulators and stringing costs.	Project 1 is within an urban area where it would be expected that constructions cost would be higher compared to a rural area due to additional traffic management. Also, Project 1 replaces an existing double circuit steel towers. Given the above context, both Line 94U and Project 1 per structure replacement unit rates are within +/- 25% which is the expected accuracy of forecasting at this project phase.
Project 2 – Desalination Plant (WA), recently delivered.	– Construction of a 10km long 132kV single circuit overhead line. – Plus, additional installation of 21 new steel poles.	$193K per steel pole and foundation for the 10km long line project. $132K per steel pole and foundation for the 21 new steel pole project. These unit rates exclude conductors, insulators and stringing costs. These unit rates does have removal of	Within +/- 25% which is the expected accuracy of forecasting at this project phase.

Project	Project details	Approx. cost per pole	Comments / conclusion
		existing assets as this was a greenfield project.	
	– 132kV single circuit steel poles excluding any removal and decommissioning of existing assets.	$132K per steel pole	Within +/- 25% which is the expected accuracy of forecasting at this project phase.
Transgrid Line 94K (Wellington to Parkes)	– $20M for 141 poles.	$142K per pole	Within +/- 25% which is the expected accuracy of forecasting at this project phase.

2.1   Benchmarking conclusion

Figure 1 in Appendix A-2 indicates the levels of accuracy that can be expected for estimates prepared for capital works at various stages of a project development. Due to the different levels of engineering input, and completeness in the design, there are various levels of accuracy that can be reasonably expected.

OER N2582 indicates that the capital forecast is +/- 25% and at a cost of $145K per pole this is within the range of the external and internal benchmark projects we have considered.

3.   Bottom-up estimate

In addition to benchmarking, GHD has developed its own bottom-up estimate of the capital costs based upon concrete poles excluding conductors, insulators, stringing costs, removal and decommissioning of existing assets. Our estimate is $20.8M noting the level of accuracy is +/- 30% which is within the estimate prepared by Transgrid.

The data sources used for the development of unit rates include:

– Contract and procurement costs available for recent projects completed by electricity utilities

– Material cost data that may be obtained from suppliers

– Market cost data available through recent operational and capital expenditure reviews for electricity transmission utilities

– Recent asset valuations by GHD

– Cost data available in the public domain, including standard labour costs.

Our standard estimating unit rates have been based on the following:

– Our standard transmission line configurations for overhead lines on concrete support structures (towers and poles)

– All concrete support structures considered to have normal or typical foundations.

The following adjustment factor has been applied to the unit rates in our estimates:

– Remote area working allowance of 5% for labour costs.

The following have been excluded from the estimates:

– No Goods and Services Tax (GST) allowance

– No consideration of construction difficulties with transmission line support structure foundations

–   No separate consideration of any transmission line crossings

A-1   Documents considered

- AER - Transgrid 2023-28 - Draft Decision - Attachment 5 - Capital expenditure - September 2022.pdf
- Transgrid - OER-N2582 Rev 3 Line 94U Refurb - 31 Oct 2022 - PUBLIC.pdf
- Transgrid - OER-N2582 Rev 1 Line 94U Refurb - 14 Nov 2021 - PUBLIC.pdf
- OFS-N2582B Rev 0 - Line 94U - Refurb-Line 94U Refurb Option B (002).pdf
- OFS-N2582A Rev 0 - Line 94U - Refurb-Line 94U Refurb Option A.pdf
- General - Wood Pole Analysis POF-CONFIDENTIAL.pdf
- Copy of Line 94U Refurb Option B Cost Breakdown

A-2 Estimate accuracy for assessment

Figure 1 indicates the levels of accuracy that can be expected for estimates prepared for capital works at various stages of a project development. Due to the different levels of engineering input, and completeness in the design, there are various levels of accuracy that can be reasonably expected.

Figure 1   Standard estimate accuracy levels

Type of Estimate	Order of Magnitude	Preliminary	Definitive	Detailed
Provided Documentation	• Product capacity and Location • Cost Data on Similar Projects • Major Equipment List	• Preliminary Equipment List • Engineering Line Diagram • Plant Outline General Arrangement • Maps and Surveys • Bench Test Results • Nature of Facilities	• Equipment Specifications and Vendor Quotations • Construction Schedule • Electrical One Lines • Piping and Instrumentation Flow Diagrams • Soil Data and Architect Features • Site Survey and Labour Complete	• Bulk Material Specifications and Vendor Quotes • Construction Specification and Sub Contractor Quotations • Engineering Advanced Approximately 10%
Definition of Scope of Work	Conceptual	Approximate	Clearly Described Essentially Complete	Complete. Well Detailed
Estimating Procedure	Factoring	Combination of Factoring and Quantity Take-Off	Most Quantity Take-Off. Very little Factoring	Complete Quantity Take-Off
Use of Study	Comparison/ Rejection	Final Feasibility	Budget	Funding

The accuracy chart shows % Probable Accuracy of Estimate (±30, ±25, ±20, ±15, ±10) against the study stages: PRE-FEASIBILITY STUDY, PRE-LIMINARY STUDY, DEFINITIVE STUDY, DETAILED STUDY.
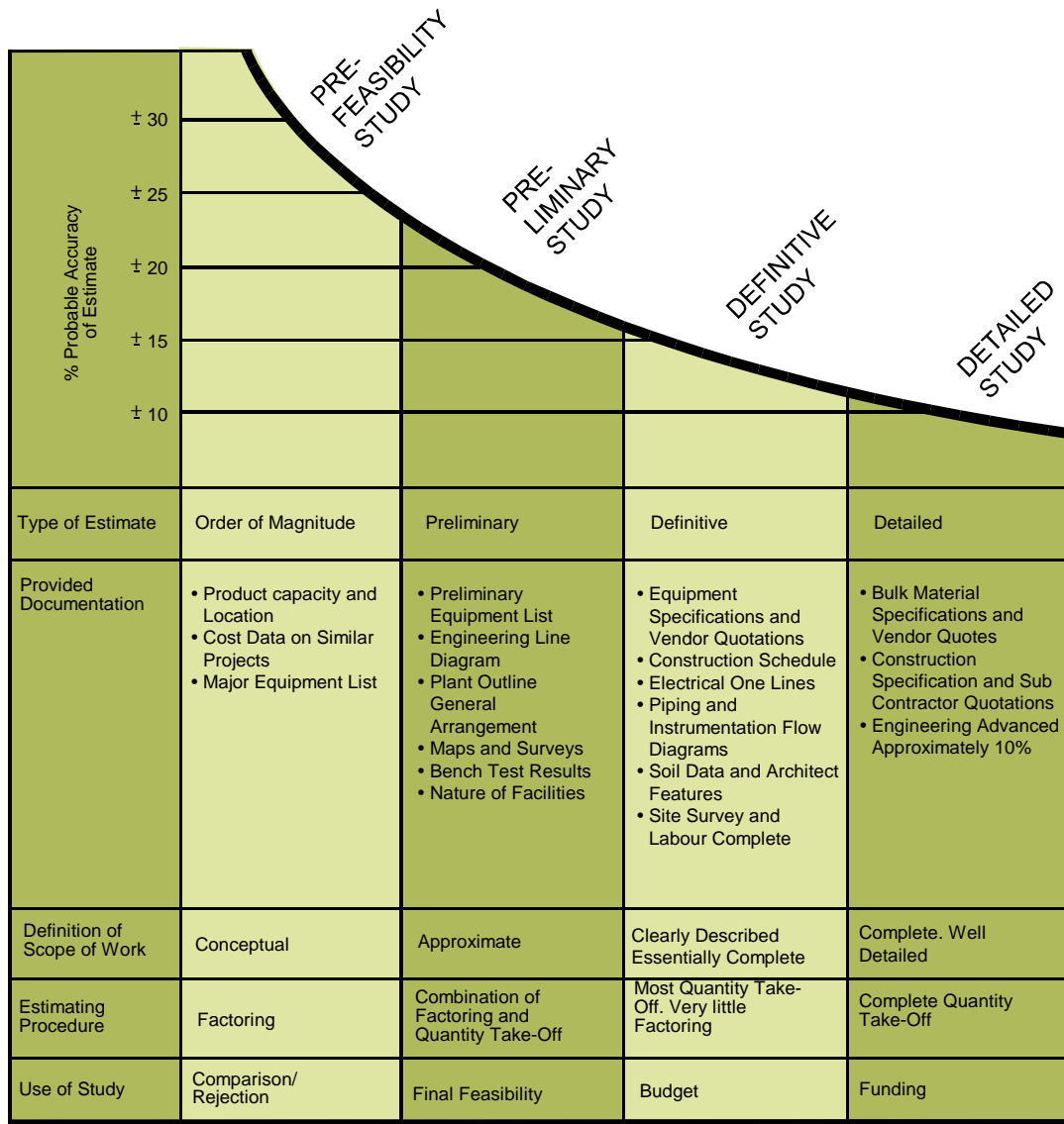
Table 2 shows the classification of estimates as defined in the AACE International *Recommended Practice No. 96R-18 Cost Estimating Classification System EPC Power Transmission Line Infrastructure Industries*.

Table 2　　　　*Cost estimate classification matrix for the power transmission line industries*

Estimate class	Primary characteristic	Secondary Characteristics		
	Maturity Level of project definition deliverables Expressed as % of complete definition	**End usage** Typical purpose of estimate	**Methodology** Typical estimating method	**Expected accuracy range** Typical variation in low and high ranges at an 80% confidence interval
Class 5	0% to 2%	Concept screening	Cost / length, factored or parametric models, judgement, or analogy	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Study or feasibility	Cost / length, factored or parametric models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget, authorisation or control	Semi-detailed unit costs with assembly level line items	L: -10% to -20% H: +10% to +30%
Class 2	30% to 75%	Control or bid/tender	Detailed unit cost with forced detailed take-off	L: -5% to -15% H: +5% to +20%
Class 1	65% to 100%	Check estimate or bid/tender	Detailed unit cost with detailed take-off	L: -3% to -10% H: +3% to +15%

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