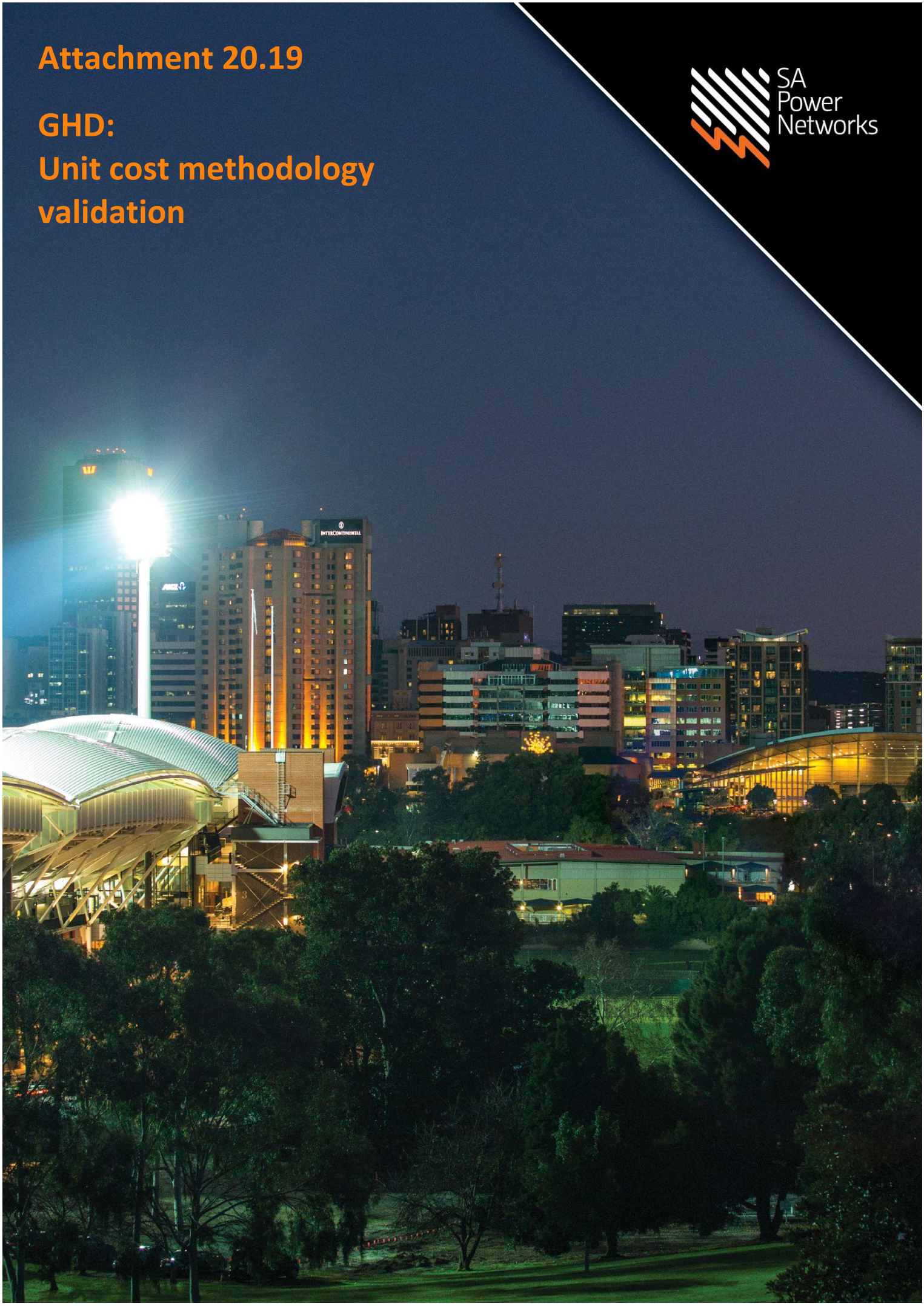
Attachment 20.19

GHD:
Unit cost methodology validation



SA Power Networks

Regulatory Technical SME

Review of Unit Cost Methodology

October 2014

Executive summary

GHD with Aquenta Consulting has been commissioned to assist SA Power Networks to demonstrate that the methodology for developing unit cost information used to develop the expenditure forecasts in the revenue proposal to the Australian Energy Regulator (AER) is appropriate and fit for purpose.

The scope included a review of SA Power Networks' process for determining unit costs \

The key findings identified through our review of the unit cost estimation process include:

- The process currently applied by SA Power Networks to estimate unit costs leverages from cost information gained from completed projects, and escalated on an annual basis. The building blocks are constantly benchmarked to current as built projects to ensure that they are still current and within the right order of magnitude. The building block costs derived from historical projects are averaged to develop a set of building block unit costs that are used by planners to develop capex estimates for planned projects. Those capex estimates feed into the expenditure forecasts in the revenue submission to the AER. These building block unit costs are the total cost to the business, and include design, procurement, construction and overheads.
- As the building blocks are derived from average historical costs they incorporate the average level of additional costs incurred through project preliminaries and variations on projects and risks materialising. It is therefore appropriate that when planners cost planned projects using these building blocks they do not make any additional allowance for site preliminary costs, risk or contingency. It is important to note that this does not provided accurate costs for each individual project but over the vast sum of projects that are included within the forecast they will average out to create a total estimated value within an acceptable order of magnitude.
- The building block unit costs are used to develop estimates for routine projects. A significant number of these routine projects have been delivered by SA Power Networks which means that the building block unit costs derived from historical project costs provide a reasonable basis for estimating the cost of these projects.
- For less routine and more unique projects that are not adequately represented in the historic projects, bespoke project estimates are developed. This approach is appropriate as there is a high risk that estimates developed using the building block unit costs would not be sufficiently accurate for these projects. Where necessary pricing is sourced from contractors to assist in the estimates.
- The process and tools used by planners to apply the building block cost estimates is designed to ensure building blocks are utilised consistently.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.2 and the assumptions and qualifications contained throughout the Report.

Table of contents

1. Introduction

SA Power Networks sought the assistance of a GHD and Aquenta Consulting to provide an independent review of the process used to determine unit cost estimates and apply those unit costs to develop the expenditure forecasts included in their regulatory proposal.

The review considered the unit costs that are relied on in the 2015 – 2020 revenue proposal.

1.1 Purpose of this report

The purpose of this report is to outline any opportunities for improvement or gaps in SA Power Networks' unit cost estimating process identified by GHD and Aquenta Consulting and to recommend actions that can be taken to address those gaps.

The gap review considered:

- Any misalignment with regulatory requirements defined in the AER's RIN, Repex and Augex models;
- Gaps in methodologies, processes and documentation use to develop unit costs;
- Inconsistencies in the application of unit costs across the business.

1.2 Scope and limitations

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

GHD otherwise disclaims responsibility to any person other than SA Power Networks 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.

GHD has prepared this report on the basis of information provided by SA Power Networks, which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Estimating Methodology

2.1 Review Methodology

The gap review involved reviewing SA Power Networks' documents defining how the unit costs are derived and applied. Further information was gathered through on-site interviews with key SA Power Networks' personnel.

The following documents were reviewed:

- Unit Cost Methodology v1.1a
- Sample Project List Structure
- Governance documentation v1
- SA Power Networks Project Management Methodology and Governance Framework

SA Power Networks personnel interviewed were:

- Shane Venning and Helen Edmonds, representing Network Management Asset Replacements
- Steve Fraser, representing Network Management Augmentations.

Our review did not extend to a formal audit of either the process used to generate building block unit cost estimates from historical project costs, or the process used by planner to apply the building block unit costs to develop cost estimates for planned projects. Executing an audit of this nature has the potential to add value by independently verifying that expected practices are being consistently applied.

2.2 Summary

The estimating process seems to be quite transparent, with no apparent critical gaps. This level of estimating is only used for high level forecasting and not for setting budgets for individual projects.

Personnel interviewed indicated that the unit costs are reviewed annually, and updated to reflect changes in procurement (period contracts), or for CPI. Any changes to the unit costs are tracked to enable visibility of changes over time.

Consistency of use of the estimating tool spreadsheet is ensured by the requirement for a login for its use and the requirement to populate the spreadsheet from pull down menus. Only Network Planning Officers have log in access, and only staff with administrator rights can make any amendments to the master costs and document.

SA Power Networks use historical actual project costs or estimates from suppliers to determine their building block unit costs. These unit costs are used by network planners to develop pre-planning cost estimates for all routine projects, including some that are 10+ years out. These tasks follow the Detailed Design Project Model as described in the Project Management Methodology and Governance Framework.

For less routine and more unique projects that are not adequately represented in the historic project set, bespoke project estimates are developed, with advice from contractors.

For defect and condition based maintenance, unit costs are based on the ratio of historic costs and volumes. Estimates for asset replacement works are derived from these unit costs and are managed though SAP. These projects follow the Work Task Project Model as described in the Project Management Methodology and Governance Framework.

3. Review findings

We understand that no contingency is directly applied to the estimates developed by planners applying the building block unit costs. We believe this is appropriate as the unit costs are derived from actual historic project costs and include a distribution of all overheads, contingency used, the same is true for project preliminary costs, such as mobilisation, site clean-up and traffic management. The unit costs therefore represent the total expected cost to the business for an average project.

Our review confirmed the following aspects of the process used to determine the building block costs from historical project costs:

- A sufficient quantum of historical projects have been processed to ensure adequate representation of each building block in the historical project set.
- The range of building block costs derived from historical projects is monitored and used to identify whether any project should be excluded from processing to avoid skewing results.
- The average cost determined for each building block cost from the historical project costs form the building block unit cost estimates used by the planners in estimating costs of future projects
- The building block cost estimates are refreshed annually by building up estimates with building blocks to compare the estimated cost to actual project costs to ensure the building block data is still current and accurate. In this approach all building block costs are escalated to the same reference point.

We have considered the full estimating process during this review. While no critical issues were found, some opportunities for improvement have been identified.

The methodology, process and documentation improvement opportunities that were identified during the document review are shown in the following sections and have been grouped according the document that they relate to.

3.1 Unit Costs Methodology version 1.1a

1. The methodology document requires updating to reflect new company name and current pricing (existing doc refers to 2008 pricing and projects).
2. This document should define all the items in the estimating spreadsheet – for example, for the project classification refers to small/medium/large/complex classification but the threshold for each classification is not defined in the document.
3. Section 1.3 of this document discusses the requirement for a unit cost to fall into an expected range, however the expected range is not defined. The range should be defined as should the method for determining the range.
4. Section 1.3 of this document describes an allowance being made for unforeseen scope changes, however it is unclear how that allowance is defined and applied. Better definition of this it recommended to ensure consistent and correct application.
5. Section 1.3 of this document specifies that to calculate building block unit costs, any corporate overheads and project contingencies are removed from the historic project costs. The present overhead rate is then added back into the building block unit cost so that it represents the total installed cost assuming current overhead rates applied. The section should clarify that building blocks unit costs include average historic project contingencies, with overheads reflecting the current overhead rate.

6. The document would benefit from explicit inclusion of a description of how the building blocks are separated from the as built project costs. This new section should demonstrate the following:
    - This is done using a consistent approach across all projects
    - That the costs caused by variations are evenly distributed over the building blocks and
    - That items like mobilisation costs, site clean-up costs, traffic management, etc are evenly distributed to the various building blocks.
7. The document does not clearly express where there are no recent projects to provide historic estimates, how the unit costs are generated and/or reviewed to ensure that the figures are reasonable.
8. The document does not clearly express that for unique projects, unit costs are not used to develop estimates, rather pricing information is sought from contractors. Including a description of the approach adopted would add value. This additional section might also explain:
    - Whether contingency is applied to the contractors pricing by either SA Power Networks or by the contractor. If so how the appropriate level of contingency is determined
    - The mechanism applied to determine when a bespoke estimate is used rather than the one developed from the building blocks.
9. Section 1.5.2 in this document attempts to illustrate the differences between different levels of estimates. These levels should be clearly defined and highlight the differences between them. Does the unit cost estimate include risk? What level of confidence is the Project Estimate? To be more meaningful, this section should reference management risk and how this is managed at a project or a portfolio level.
10. It is not clear if design is built into the estimate and if so where is this captured and what is it based on.
11. The method for determining unit costs for defect and condition based maintenance has not been covered.

3.2 Project List Structure – Estimating Spreadsheet

12. It is unclear what method of escalation is used. Without this clarity there is the risk that different planners are using different escalation rates. During the interview it was made clear that Field Services' escalating tool allows for escalation, with any estimates provided in the dollars for the year that the project is anticipated to commence. It was also made clear that the building block unit costs were reviewed annually and escalated to current dollar values, and that the tool itself does not allow for any escalation to be applied.
13. Application across the business – there does not appear to be a work procedure to outline who this tool should be used by.

3.3 Project Management Methodology and Governance Framework

Although the content of this document does not directly impact on the cost forecasts that are contained within the submission to the AER, it was considered prudent to review it as part of the greater estimating process. This review has highlighted a number of questions that the document does not clearly answer/explain.

14. This document does not explain the methodology to determine concept estimates. We assume this estimate is made using the building block unit costs, however there does not appear to be an explanatory document to outlines this process. Such a document would better define:

    – How risk (and other contingencies) are built into these estimates. We understand that the derivation of building block unit costs from historical projects costs means that the building blocks already incorporate an average level of risk and contingency and therefore it is appropriate that no addition risk allowance is included in developing project cost estimates,

15. Section 9.7.5 of this document describes contingency. It is not made clear what differentiates significant and complex risks.

    – This document indicates that the Project Manager must use their experience and professional judgement to assess all risks and then categorize them as significant / complex, etc. Is this decision made by Project Manager alone or are others involved? And what differentiates: “significant and complex” At what stage is the Project Manager allocated to a project? Do they have any input into the concept estimate, or is this estimate made purely by the network planning engineer?

    – The document would benefit from providing greater clarity regarding the process for applying any contingency allowance, is contingency spread over the entire estimate or spilt into each item, if not used, is it handed back during construction or held back for unforseen events?

16. Section 9.7.5 of this document describes the Monte Carlo Method, however interviews with staff indicate that this method is not used within the business. If this is the case, the document should be amended to remove all references to the Monte Carlo Method. Its inclusion raises the following questions:

    – Monte Carlo appears to be the preferred evaluation method used for risk analysis. This document recommends that this method be used, but there do not appear to be any guidelines indicating whether this is compulsory for all projects or only particular projects. The detail contained under the heading “What is the Monte Carlo Method” discussed what is and is not contingency rather than describing the Method. Questions unanswered here include:

    – What software is used? And are estimators trained in Monte Carlo simulation systems and are standard ranges and distributable’s used?

    – What confidence level percentile is typically used (eg P50, P90, etc) and how is this established for each project? This is not described in any document, though reference is made to ‘tolerance’ in the Methodology and Governance Framework.

    – Does the Monte Carlo simulations take into account both quantities and rates and are opportunities considered? (Also, known unknowns and unknown unknowns)

    – Are lessons learnt fed back to estimator for future Monte Carlo Simulation?

17. What influence does the project manager have in the estimated costs? Are there team reviews that include PM? How is consistency assured

18. Section 9.7.8 of this document describes Variation Management. It is unclear how the project variation order template captures:

    – how the decision for the variation was made

    – how the impact on the cost was considered

    – is the same pricing methodology for variations maintained?

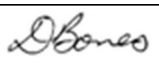
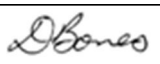
19. Section 9.7.12 of this document describes the process for Post Implementation Reviews. It is not clear if the results from these reviews are taken into consideration in reviews of the accuracy of project estimates and if so what the process is to show how this information is captured. We understand from interviews with staff that the building block unit costs are routinely refreshed taking into account the cost of recently delivered projects. This approach would provide a direct process to improve estimates.

GHD

Level 4 211 Victoria Square Adelaide SA 5000
GPO Box 2052 Adelaide SA 5001 Australia
T: 61 8 8111 6600 F: 61 8 8111 6699 E: adlmail@ghd.com

g:\41\27673\WP\56883.docx

Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	J Gater R Mazzone	D Bones		D Bones		24/10/2014

www.ghd.com