

Executive Summary

Introduction

- The goal of this study is to develop a unified set of Key Performance Indicators (KPIs) that can be used for performance monitoring of New Engineering Contract projects in the Drainage Services Department (DSD) of the Hong Kong SAR Government. This report presents the approach to the mid-project review; findings from the review of previously completed KPIs and performance review documents from the selected on-going NEC projects at DSD; the comments and adjustments made to the unified KPIs and associated parameters after engaging the project stakeholders; and the validated unified KPIs and associated parameters.

Approach to Mid-project Review

- The mid-project review investigated whether the unified KPIs and associated parameters can accomplish the task of monitoring general project performance of NEC projects at DSD. The research tasks included: i) reviewing previous performance reviews of the selected on-going NEC projects at DSD; ii) input of past project performance review data into the proposed unified KPIs; iii) further engagement with project stakeholders from the selected on-going NEC projects; and iv) a final validation through completion of the unified KPIs template by representatives from the selected NEC projects using the most recent project data.

Findings from Review of Existing Project Data

- While the format and coverage of performance reviews can be different between projects, there are common aspects such as time, cost, quality and safety, as well as NEC-specific elements like mutual trust and cooperation, compensation events and early warnings.
- Performance reviews for the Lam Tsuen Valley and Pak Hok Lam and Sha Tau Kok Village projects are similar, each with over 100 KPIs/parameters. This can make analysis and interpretation of the results confusing.
- Performance reviews for the Happy Valley and Yuen Long sewerage projects are mainly a series of ratings based on mutual objectives and values and behaviours recorded on a quarterly basis. Many of the mutual objectives are project-specific, making it difficult to compare general project performance with other projects.
- The project Building and Civil Maintenance to DSD Plant and Facilities is a term service contract (TSC), rather than engineering and construction contracts (ECC) like other projects selected for this study. Existing performance reviews include

ratings for project targets and project data such as the number of task orders completed on-time and those that are overdue. Like the other projects, traditional general aspects of performance (i.e. time, cost, quality and safety) would still be relevant. TSC-specific KPIs and parameters were included in the unified system to reflect that TSC projects are based on the works orders received.

- Based on this review, it is anticipated that the changes proposed for the unified KPIs would not result in significant difficulties for the project stakeholders.

Input of Past Project Performance Review Data into Proposed Unified KPIs

- KPIs and parameters from the Lam Tsuen Valley and Pak Hok Lam and Sha Tau Kok Village projects were similar (developed by the same NEC consultant) and the most comprehensive. The most relevant project data and ratings from the Lam Tsuen Valley Sewerage project were inserted into the proposed unified KPIs.
- It is possible to enter existing project data into many of the proposed KPIs and parameters but not all were directly transferrable. Project Progress and Schedule Predictability were recorded as “timely completion of the works” (subjective ratings) but could be converted to a quantitative figure based on the works schedule (subsequently proved feasible in the validation process).
- Cost predictability is not measured during the project in the existing system since the Final Contract Sum is not known while the project is still on-going. In the new unified system, cost predictability during the project is determined by comparing the updated project estimate at the time of review against the approved project estimate (again, proved to be feasible in the subsequent validation).
- While qualitative ratings for mutual trust and cooperation (a key feature of NEC contracts) are tied to the mutual objectives and contract administration in the existing system (which makes it difficult to compare results for different projects), they are linked to the five main constructs in the new unified system.
- Performance review templates for the Happy Valley and Yuen Long projects are similar (developed by the same NEC consultant). They are primarily based on qualitative ratings on mutual objectives of the projects. This makes comparison between projects difficult since the mutual objectives for one project would be different than those of another. Recommendations were made on which KPIs and parameters from the unified system can reflect the same areas of performance.
- In general, the proposed unified KPIs and associated parameters can cover the same aspects as the existing system, and offer additional information base on quantitative project data.

Validation of Unified KPIs and Associated Parameters

- The validation process included a discussion at the NEC Working Group Meeting; a group discussion with the Happy Valley project team; and a trial completion of the unified KPIs template and solicitation of comments from project stakeholders.
- The comments raised during the NEC Working Group Meeting include: the value of Compensation Events should be reflected based on contract sizes; concerns on the measurement of defects; and recording the number of accidents in relation to the contract size or total man-hours worked. These comments were subsequently addressed and reflected in the validated unified KPIs and associated parameters.
- It was suggested that an electrical and mechanical works project be included in the study. The project “Provision of Electrical and Mechanical Facilities for Tin Liu Ha Sewage Pumping Station and Tong Min Tsuen Sewage Pumping Station” was selected. The existing performance review is similar to the Happy Valley and Yuen Long sewerage projects (i.e. based on qualitative ratings on mutual trust and cooperation, and how well mutual objectives have been met). The unified KPIs template was sent to the representatives of this project for completion and feedback. The template was successfully completed with no further comments.
- The Happy Valley project team was engaged for further discussion. The comments raised include: entrusted works (that are beyond the original scope) should be reflected in the unified KPIs; the relative risk of the project should also be reflected (by looking into the project contingency amount); and the classification of major and minor defects should be changed because it would be very difficult to judge (whether or not a non-conformance would affect the functional or designed performance was discussed as a potential replacement KPI).
- A template was developed (with adjustments made based on the comments received) and distributed to the selected NEC project teams for completion. In general, the unified KPI templates were successfully completed without much difficulty. The comments received were relatively minor and mainly relate to the finer details such as suggestions on the wording of certain KPIs or parameters for better clarity, and adjustments on the range of certain parameters.

Validated Unified KPIs and Associated Parameters

- A final round of adjustments was made to the unified KPIs and parameters after the validation process. The adjustments were related to the classification of early warnings into those that a) entered into risk register and b) handled in risk reduction meeting; the ranges for classifying compensation events; and wordings for the descriptions of certain KPIs and parameters to improve clarity.

- KPIs specifically for TSC projects have been included and highlighted in the validated unified KPIs and associated parameters.

Conclusion of Study and Way Forward for DSD

- Through a comprehensive research plan and a thorough validation process, a set of unified KPIs and associated parameters for NEC projects at DSD was developed. Due to the uniqueness of TSC projects, additional TSC-specific KPIs were included. The new unified system should make comparison and assessment of project performance of NEC projects easier and more effective for management personnel. This new system categorizes the KPIs and associated parameters into five main constructs (time, cost, quality, safety, and social and environmental impact), and shows a combination of the most relevant quantitative project data and qualitative subjective ratings.
- Should DSD consider adopting the unified KPIs, it is recommended that prior to full implementation, parallel running of the new system alongside the existing system for one or more projects should be planned to ensure a smooth transition for adopting the new system. Once the project team members feel comfortable with the new system after this transition period, full implementation of the unified KPIs and associated parameters can take place.