

SUMMER RESEARCH 2024/25

PROJECT ABSTRACT



THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

PROJECT # 72

SUPERVISOR/S:	Dr Kim de Graaf & Dr Abhishek Mukherjee
PROJECT TITLE:	Effects Driving the Escalation of 3 Waters Construction Rates in Tauranga
FIELD:	Civil Engineering
DIVISION/SCHOOL:	HECS - Te Kura Mata Ao School of Engineering
PROJECT LOCATION:	Tauranga
EXTERNAL PARTNER:	Tauranga City Council

PROJECT ABSTRACT:

Tauranga City Council (TCC) captures construction unit or contract rates within software to use for the valuation of 3 Waters infrastructure and to forecast expenditure for renewals (replacement) projects. The pipeline network is the largest part of the asset base of the 3 Waters infrastructure (water, wastewater and stormwater). There are numerous aspects that control the unit rates for construction e.g. the size of the pipes, the cover over the pipe (hard surfaces or gravels), depth of embedment of the pipes, level of traffic management required, location of the pipe (CBD/commercial area, residential area, rural area), weather. This project will involve the analysis of past and current construction project costs to determine the key aspects affecting the unit rates and use that data to develop a statistical/economics model to predict future unit rates in response to relevant drivers. This will include understanding how different cost drivers affect the allocation of costs (cost allocation and apportionment), evaluating differences between projected and actual costs (variance analysis), using historical data for future budget projections (incremental budgeting), and identifying activities that drive costs (activity-based costing). Additionally, a cost-benefit analysis will weigh the economic benefits of various construction techniques and materials against their costs, and sensitivity analysis will assess how changes in key assumptions and variables affect the overall cost structure. These techniques will ensure accurate and comprehensive results.

STUDENT SKILLS:

- Civil Engineering with at least 3 years of study completed
- High quality data analysis and data management skills
- Awareness of and interest in economic drivers, project budgeting and project management
- Ability to work independently
- Ability to follow instructions / take direction and suggest improvements / ideas for the development of the research

PROJECT TASKS:

1. Meet with the TCC Asset Management team to develop an understanding of the unit rates and aspects considered within these rates.
2. Review appropriate literature on the development of unit rates for construction including economic effects such as inflation, increases in labour cost (wage increases), and changes in other considerations e.g. compliance costs, weather.
3. Review TCC data for the occurrence of key changes in unit rates from multiple projects and determine how these changes relate to the key aspects determined from the literature review. Perform variance analysis to identify discrepancies between projected and actual costs.
4. Build a statistical/economics model to represent the key aspects most likely to affect changes in unit rates and test the model against existing datasets and against future predictions. Simplify the model to work in an accessible software such as Excel.
5. Prepare a short report, poster and oral presentation to detail the findings of the research for the TCC Asset Management team.

EXPECTED OUTCOMES:

- Student's Research Poster (as per clause 6 of the [Scholarship regulations](#))
- Provide an outline of key drivers that have influenced the change in unit rates in Tauranga for the construction of 3 Waters pipelines.
- Provide a simplified model (e.g. in Excel) for TCC to test as a predictor for potential rate increases for future budgeting/planning of renewals work. The model will utilize incremental budgeting and sensitivity analysis to ensure robust financial planning and risk management.