

# SUMMER RESEARCH 2024/25

## PROJECT ABSTRACT



THE UNIVERSITY OF  
**WAIKATO**  
*Te Whare Wānanga o Waikato*

### PROJECT # 73

<b>SUPERVISOR/S:</b>	Dr Kim de Graaf & Dr Chanelle Gavin
<b>PROJECT TITLE:</b>	Pipeline Adjustment Factors – Effects of Embedment on Material Degradation
<b>FIELD:</b>	Materials / Chemical / Civil Engineering
<b>DIVISION/SCHOOL:</b>	HECS - Te Kura Mata Ao School of Engineering
<b>PROJECT LOCATION:</b>	Tauranga
<b>EXTERNAL PARTNER:</b>	Tauranga City Council

#### PROJECT ABSTRACT:

Tauranga City Council (TCC) manage the renewal of their 3 waters pipelines using adjustment factors within a pipeline modelling software. The adjustment factors are used to reduce the lifespan of a pipe depending on the subsurface conditions where the pipe is embedded, e.g swamp, peat, sand, below/above groundwater, in corrosive soils, on slopes. This adjustment of pipe lifespan feeds directly into the depreciation of the asset (cost) and influences the timing for pipe renewal. TCC seek to develop an accurate set of adjustment factors that are realistic for modern typical pipe materials and varying site conditions throughout the TCC region. This project will consist of a literature review to determine the background of the adjustment factors used, data mining of pipe failure data provided by TCC and laboratory testing to determine the degradation of varying types of pipe material to compare with the failure data and current adjustment factors.

#### STUDENT SKILLS:

- Materials/Chemical/Civil Engineering with at least 3 years of study completed
- High quality data analysis and data management skills, experience with GIS useful
- Awareness of laboratory testing protocols and health and safety requirements
- Ability to work independently in laboratories following training
- 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 adjustment factors, how they are used and where the factors have been taken from.
2. Review appropriate literature on adjustment factors for pipe material lifespan and determine the background for these factors.
3. Review available TCC failure data and consider usability of this to compare failure reasons and adjustment factors
4. Undertake a GIS comparison between areas where adjustment factors are applied and degradation and failures of local pipes
5. Undertake a series of laboratory tests (using techniques such as spectroscopy, dynamic mechanical analysis, hardness, compression, visual inspection) on new and failed pipe materials to assist with understanding the degradation effects based on subsurface conditions.
6. 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](#))
- A detailed outline of how adjustment factors are developed and what are the current NZ and internationally recommended values to be used based on pipe material and subsurface conditions.
- Comparison of laboratory testing results with failure data, GIS model and existing adjustment factors to determine suitable values that should be used in the Tauranga City region.

