

SUMMER RESEARCH 2024/25

PROJECT ABSTRACT



THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

PROJECT # 33

SUPERVISOR/S:	Dr Mark Lay & Bodo Hellberg
PROJECT TITLE:	Monitoring the hydrological impact of earthworks and land use change associated with land development
FIELD:	Engineering, Civil Engineering, Environmental Engineering, Earth Sciences
DIVISION/SCHOOL:	HECS - Te Kura Mata Ao School of Engineering
PROJECT LOCATION:	Tauranga
EXTERNAL PARTNER:	Tauranga City Council

PROJECT ABSTRACT:

Under the Resource Management Act (RMA), local and regional authorities must assess the environmental effects of proposed land-use activities within their jurisdiction. Land development activities can significantly impact the hydrological cycle by altering surface topography and permeability. Although guidelines for mitigating these effects are available from various organizations, many in New Zealand are based on documents prepared for Auckland and are often not sufficiently adjusted for different climate and soil conditions found in other parts of the country. In Tauranga and the wider Western Bay, the soils are generally highly permeable, allowing a substantial portion of annual precipitation to infiltrate the ground and recharge groundwater layers. The volcanic soils in this area, however, are highly sensitive to compaction, losing much of their permeability during the earthworks associated with land development.

This research program aims to monitor and document the changes in land use from agricultural to predominantly residential urban areas, focusing on how these changes impact the hydrological cycle, particularly rainfall runoff generation. One of the earmarked urban growth areas is on the southern fringe of Tauranga, along the highway corridor to Rotorua. The current land use in this area is primarily small-scale farming, orchards, and lifestyle properties. Despite previous alterations from its natural state when covered in native bush, the land is still expected to have high infiltration capacity.

Tauranga City Council would like to provide students with the opportunity to monitor soil infiltration capacity in designated areas and document changes throughout the development period. We anticipate needing at least three monitoring campaigns over approximately 5 to 7 years, although the exact duration is difficult to predict at this stage. The findings from this project will be used to update our stormwater management guidelines, ensuring that mitigation strategies are tailored to the specific soil conditions in the wider Tauranga area.

STUDENT SKILLS:

- Learn and apply new methods
- Compile data in spreadsheets, draw meaningful conclusions, prepare tables and graphs
- Drivers licence (i.e. able to drive a Tauranga Council or University fleet vehicle)
- Able to write and present nicely concise and comprehensive reports
- Ability to consistently adhere to rigorous standard testing procedures

PROJECT TASKS:

1. Monitor soil infiltration capacity in designated areas.
2. Contribute to updating stormwater management guidelines tailored to local soil conditions.
3. Prepare a report
4. Prepare a research poster

EXPECTED OUTCOMES:

- Student's Research Poster (as per clause 6 of the [Scholarship regulations](#))
- Soil infiltration data for selected locations in Tauranga
- Recommendations for updating the stormwater management guidelines

