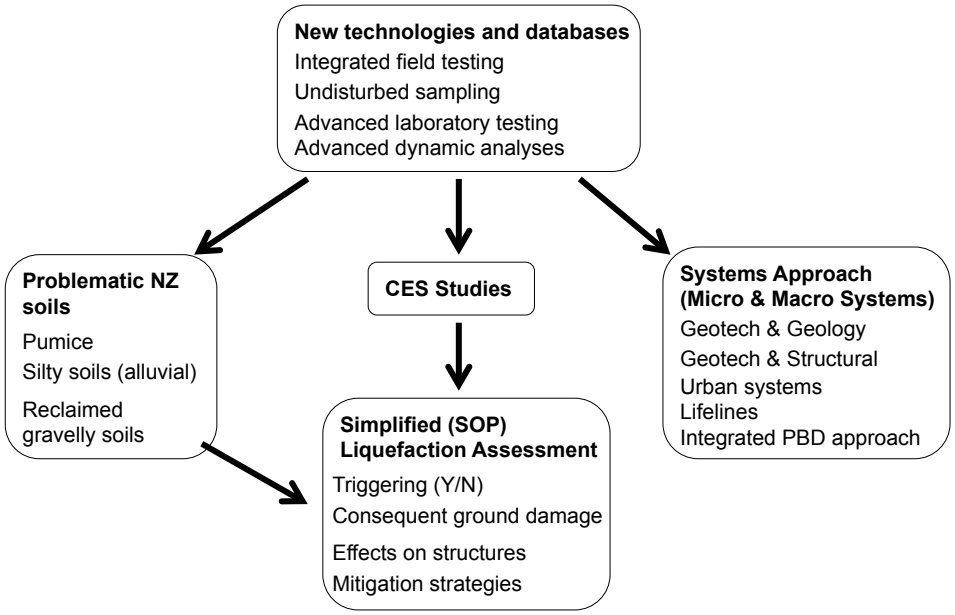
FP2 Research (Liquefaction Impacts on Infrastructure)



7 Projects Funded in 2016

1. Liquefaction Evaluation - Beyond Current State-of-Art-and-Practice: development and improvement of liquefaction assessment methods

#160XX - Effects of Partial Saturation on Liquefaction Triggering - *Cubrinovski, Baki, Stringer, van Ballegooy*

#160XX - Comparison between deterministic and probabilistic triggering assessment approaches over the Christchurch area *Lacrosse, Bradley, van Ballegooy*

#160XX - Lateral Spreading Observations and Interpretation from the Christchurch Earthquakes - *van Ballegooy, Cubrinovski, Russell, Bastin*

#160XX - Whakatane liquefaction case history from the 1987 Edgecumbe Earthquake: examination of an extensive CPT dataset supplemented by paleo-liquefaction investigations - *S. van Ballegooy, S. Bastin, Orense, Pender, Wotherspoon*

2. Liquefaction Vulnerability of NZ Land and Infrastructure: development of assessment procedures and cost-effective mitigation strategies for challenging soils, ground conditions and critical issues related to liquefaction impacts on infrastructure in NZ

#160XX - Evaluation of liquefaction potential of pumiceous deposits through field testing - *Orense, Pender, Wotherspoon, Cubrinovski, van Ballegooy*

#160XX - Evaluation of undisturbed sampling techniques for pumiceous soils - *Stringer, Orense, Cubrinovski, Pender*

#160XX - Characterisation of cyclic behaviour and liquefaction resistance of Wellington Port gravelly soils - *Chiaro, Taylor, Wotherspoon, Palmer*

3. Liquefaction Assessment and Mitigation: Systems Approach: development of performance based criteria for micro and macro systems integrating geotechnical engineering knowhow within cross-disciplinary tools and methodologies

3 Projects Funded in 2017

1. Liquefaction Evaluation - Beyond Current State-of-Art-and-Practice: development and improvement of liquefaction assessment methods

#17141 - Scrutiny of Simplified Liquefaction Triggering Procedures based on Historical NZ Earthquakes - *Ballegooy, Bastin, Wotherspoon, Cox, Cubrinovski, Stringer, Rees, Baki*

#17131 - Characterization and Interpretation of Lateral Spreading Observations from the 2010-2011 Christchurch Earthquakes - *Bastin, Cubrinovski, Ballegooy, Russell*

2. Liquefaction Vulnerability of NZ Land and Infrastructure: development of assessment procedures and cost-effective mitigation strategies for challenging soils, ground conditions and critical issues related to liquefaction impacts on infrastructure in NZ

#17127 - Liquefaction characteristics of pumiceous deposits from high-quality sampling - *Orense, Stringer,* Pender, *Cubrinovski, van Ballegooy*

3. Liquefaction Assessment and Mitigation: Systems Approach: development of performance based criteria for micro and macro systems integrating geotechnical engineering knowhow within cross-disciplinary tools and methodologies

Aligned Major Projects

(multi-year; medium-to-large projects)

1. Liquefaction Evaluation - Beyond Current State-of-Art-and-Practice: development and improvement of liquefaction assessment methods

- 55 Christchurch Sites (VsVp project) - *NZ, US*
- Silty Soils Project - *NZ, US*
- CES Lateral Spreading Studies – *UC*
- Gel-Push and DM sampling – *UC, US, Japan*
- Lateral Spreading (NHRP) – *UC*

2. Liquefaction Vulnerability of NZ Land and Infrastructure: development of assessment procedures and cost-effective mitigation strategies for challenging soils, ground conditions and critical issues related to liquefaction impacts on infrastructure in NZ

- Pumiceous soils (NHRP) – *UA*
- Reclaimed gravelly soils – *NZ, US*
- Laboratory studies on Christchruch sands and silty soils – *UC, US*
- Kaikoura Earthquake Studies – *NZ, US*

3. Liquefaction Assessment and Mitigation: Systems Approach: development of performance based criteria for micro and macro systems integrating geotechnical engineering knowhow within cross-disciplinary tools and methodologies

- CBD Buildings – *UC, US*
- Port of Wellington Studies – *NZ, US*
- SFSI studies - *UC, UA*
- Liquefaction Impacts on Bridges – *UC, UA*
- Impacts on Potable Water and Wastewater Networks – *NZ, US*
- Impacts on Residential Land and buildings – *NZ (T&T)*

2018 ideas for FP2 research

1. Liquefaction Evaluation - Beyond Current State-of-Art-and-Practice: development and improvement of liquefaction assessment methods

Interpretation of case history data from CES: Liquefaction triggering; consequences; *lateral spreading*

- Comparative assessment of different factors; Quantifying factors/effects; Modification of existing and development of new models and procedures

- Integrated characterization of deposits soils in liquefaction assessment using CPT, Vs, Vp, BH and lab testing
- Partial saturation effects in clean sands and silty soils (IN PROGRESS)
- Effects of vertical discontinuity of liquefiable soils on development and manifestation of liquefaction (IN PROGRESS)
- Compute time of occurrence of LIQ for CES records, then shaking-induced spreading displacements
- Further development (and transfer to practice) of advanced field/lab and numerical analysis technologies (IN PROGRESS)

2. Liquefaction Vulnerability of NZ Land and Infrastructure: development of assessment procedures and cost-effective mitigation strategies for challenging soils, ground conditions and critical issues related to liquefaction impacts on infrastructure in NZ

- Field, laboratory and analytical studies on challenging NZ soils in liquefaction evaluation

- Pumiceous soils: alternative liquefaction assessment procedures for crushable soils (IN PROGRESS)
- Silty soils (fabric, micro-structure, micro-layering effects on liquefaction resistance; differences with sand) (IN PROGRESS)
- Reclaimed gravelly soils (Wellington waterfront and port studies; comprehensive field testing; simplified analyses; simulation of Kaikoura EQ induced site responses
- Geological and geotechnical characterization of sites with historical evidence of liquefaction in NZ (IN PROGRESS)

3. Liquefaction Assessment and Mitigation: Systems Approach: development of performance based criteria for micro and macro systems integrating geotechnical engineering knowhow within cross-disciplinary tools and methodologies

- Advanced experimental (centrifuge) and numerical studies

- System response of liquefiable deposits (effective stress analyses of 55 CHC sites) (IN PROGRESS)
- Simulations of LEAP centrifuge experiments
- Preparation of centrifuge tests in ISMGEO (Bergamo) using CHC soils (IN PROGRESS)
- Original constitutive models for advanced numerical analyses (SDM in OpenSees) (IN PROGRESS)
- Effective stress analyses of buildings on shallow foundations in liquefiable soils
- Simulation of Kaikoura EQ liquefaction effects on wharves and buildings at CPL
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