

Nelson-Tasman Geotechnical Site Classification Study

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Planning and Funding:

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Bruce Mutton – NCC

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Aim of the Nelson-Tasman Site Classification Study

- Define the geotechnical dynamic site characteristics across the Nelson-Tasman region
- Collect and interpret geotechnical and geophysical data
- Develop maps of subsoil characterisation metrics
 - Site subsoil classification (NZS1170.5)



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Nelson-Tasman Basement Geology

Pale Yellow = Recent deposits of clays, gravels, silts and sands. Includes reclaimed land.

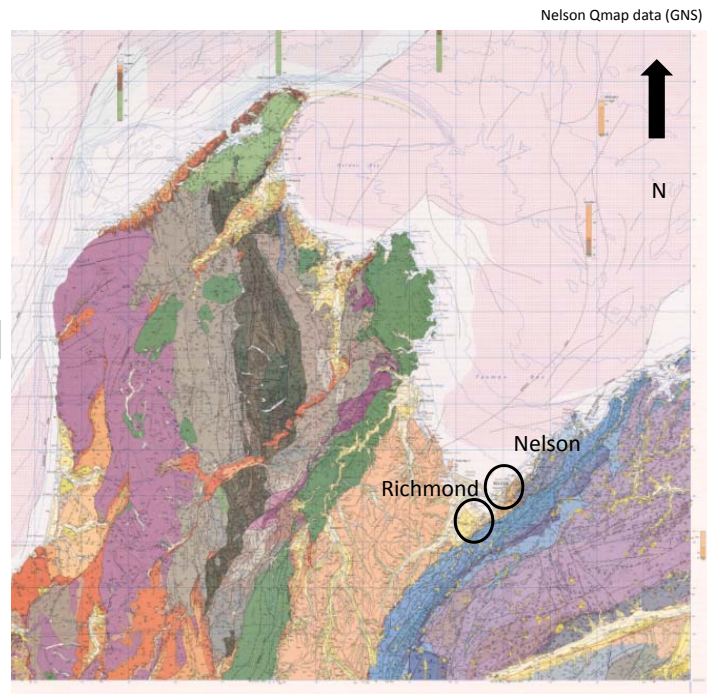
Purple = Karamaea Suite (Granite)

Grey = Buller Terrane (Schist/Siltstone/Sandstone)

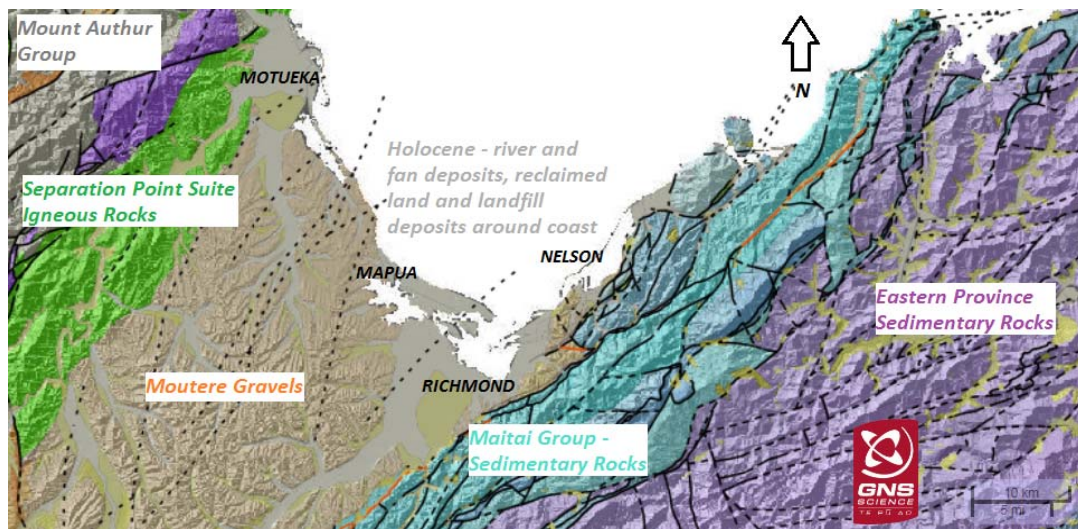
Orange = Moutere Gravel

Blue = Dun Mountain / Maitai Terrane, Siltstone/Sandstone/Conglomerate

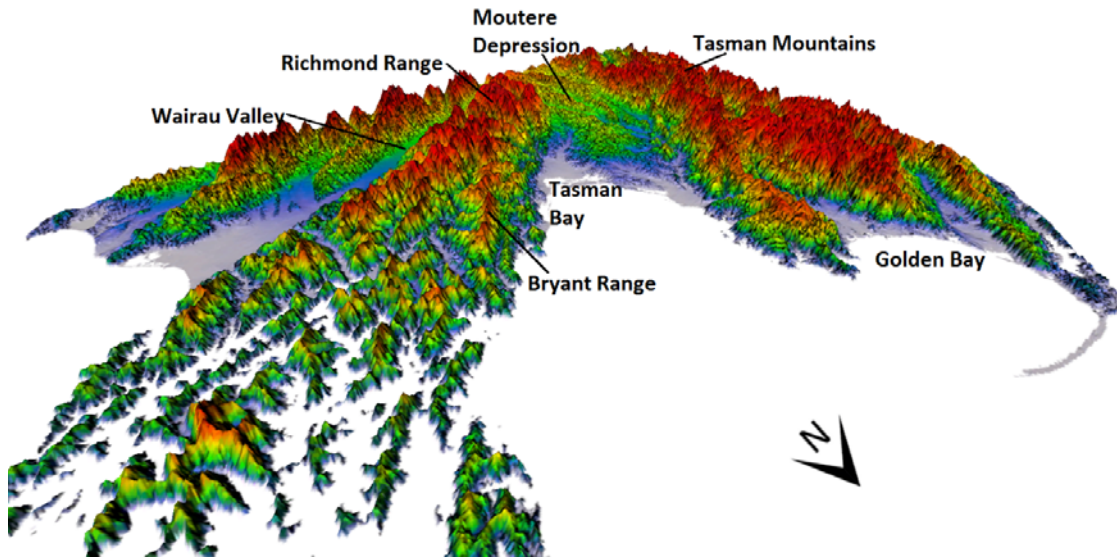
Lighter Purple = Marlborough Schist



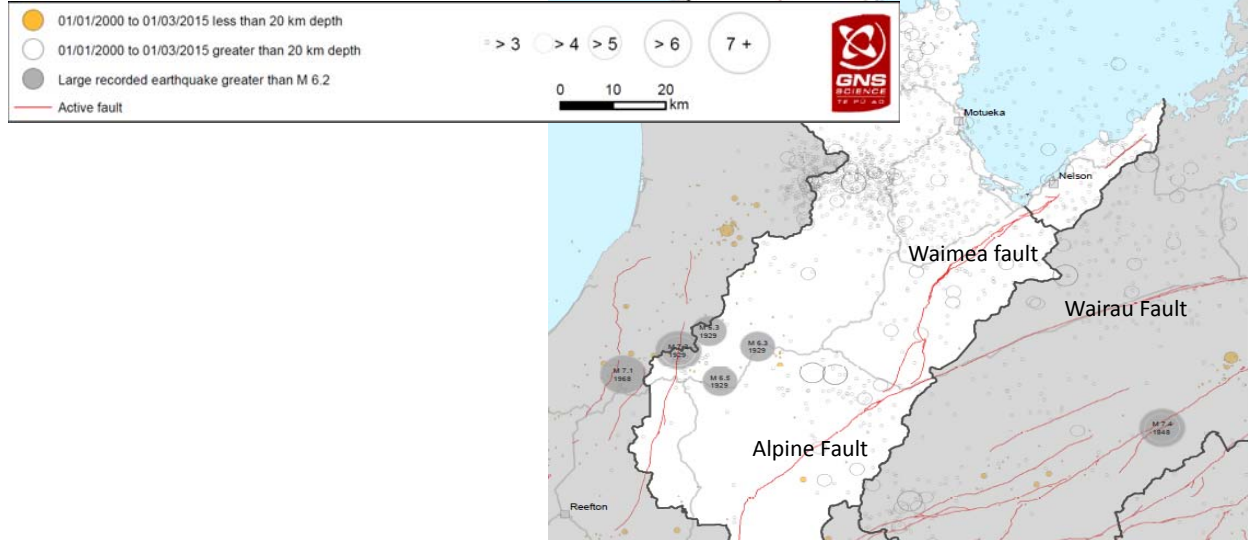
Nelson-Tasman Geology



Nelson-Tasman Geomorphology



Nelson-Tasman Seismicity



Other relevant information for the region

Deformed Neogene basins, active faulting and topography in Westland:
Distributed crustal mobility west of the Alpine Fault transpressive plate
boundary (South Island, New Zealand)

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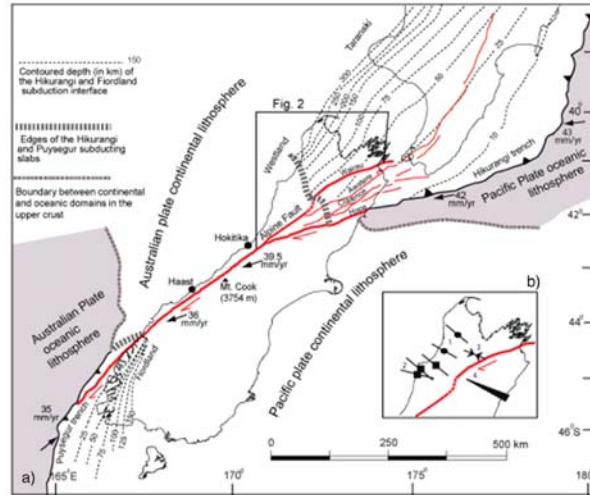
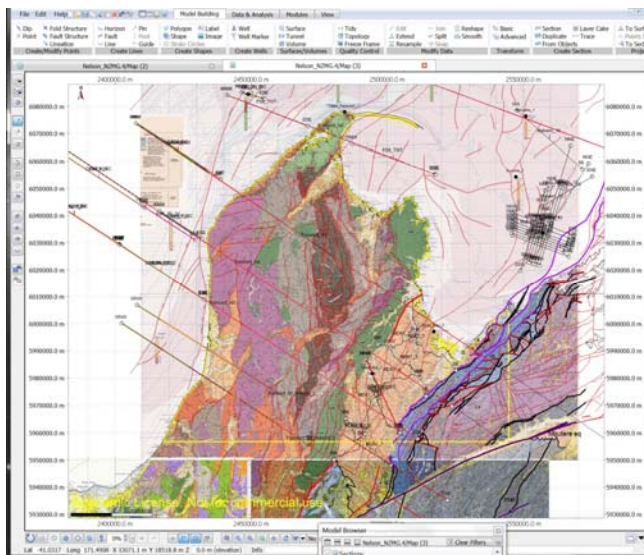


Fig. 1. (a) Regional tectonic setting of the South Island (New Zealand), in relation to oblique convergence between the Pacific and Australian Plates. The right lateral Alpine Fault transforms the opposite subduction polarity of the Pacific and Australian Plates at the Hikurangi and Puysegur trenches. (b) Regional strain and stress indicators in the study region (cf. Sibson et al., 2012). 1: σ_1 orientation from stress inversion of M2-M6 earthquakes (Bullough et al., 2005); 2: P axes from focal mechanisms of M5.8-7.1 pure reverse slip earthquakes; 3: σ_1 orientation from small-scale faults (Pettigrew and Wise, 1994); 4: axes of maximum contractional strain rate from a pure reverse slip earthquake (Pearson, 1993). (a) Plate slip vectors from de Méro et al. (2010); Contoured depth of the Hikurangi and Puysegur subduction interface beneath the northern South Island redrawn from Williams et al. (2013) and Sutherland et al. (2009), respectively.

Other relevant information for the region



Other relevant information for the region



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Reinterpretation of seismic reflection data from the
 Moutere Depression, Nelson region, South Island, New
 Zealand

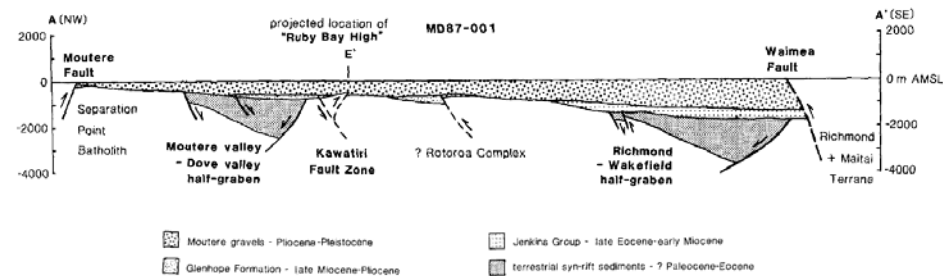
Joanne C. Lillie^{a,b}

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 Wellington, P.O. Box 600, Wellington, New Zealand

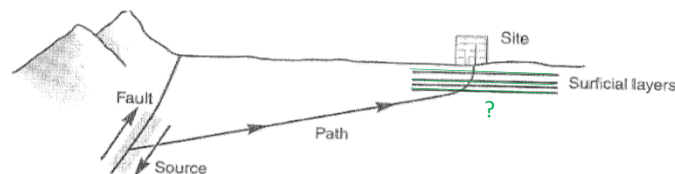
^b Department of Earth Sciences, University of Oxford, Oxford, OX1 3PR, United Kingdom
 Published online: 23 Mar 2010.

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Methodology and Outputs



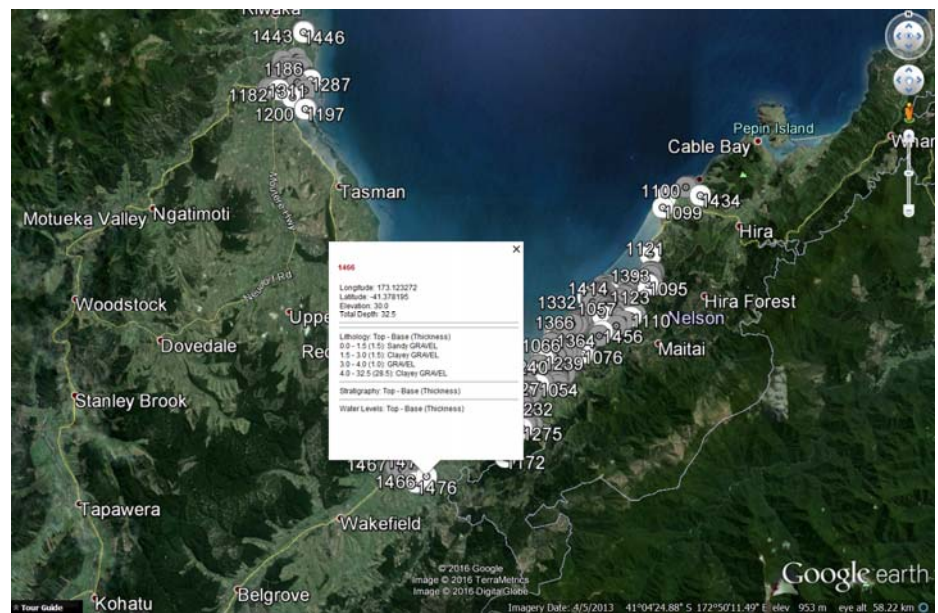
1. Review and create database of historic sub-surface information
2. Carry out additional site investigations and testing
 - a. Subsurface –Stratigraphy and water table info
 - b. Geophysical testing – Shear wave velocity, site period
3. Maps (first generation) produced for a range of dynamic site characterisation metrics

Benefits of this project:

- Consistent Seismic Design - Assessment/Retrofit/New Build.
- Lifeline structures
- Regional response
- Hazard and risk studies
- Regional ground-motion modelling (related study)

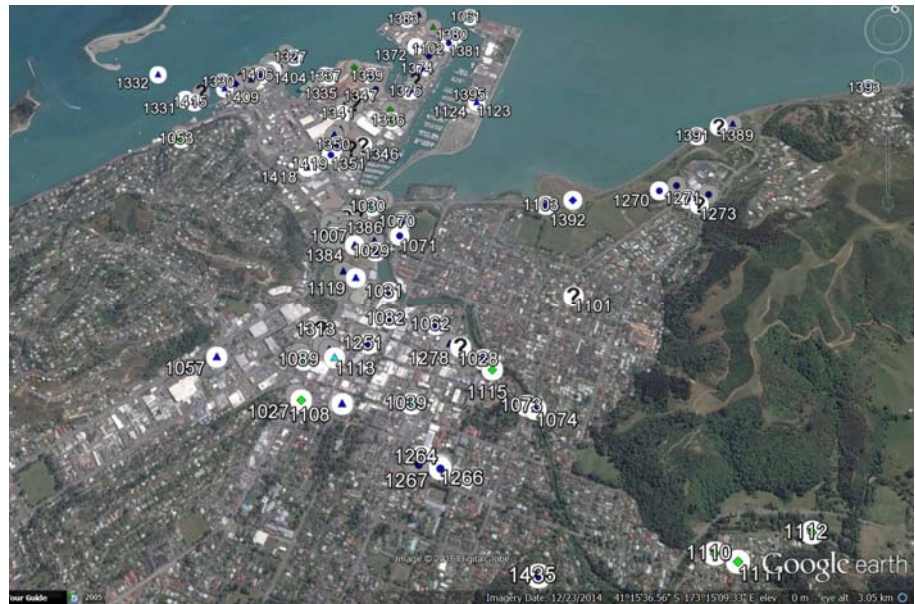


Historic Data Collection



Historic Data Collection

Colour and point symbols used to visually identify trends in data

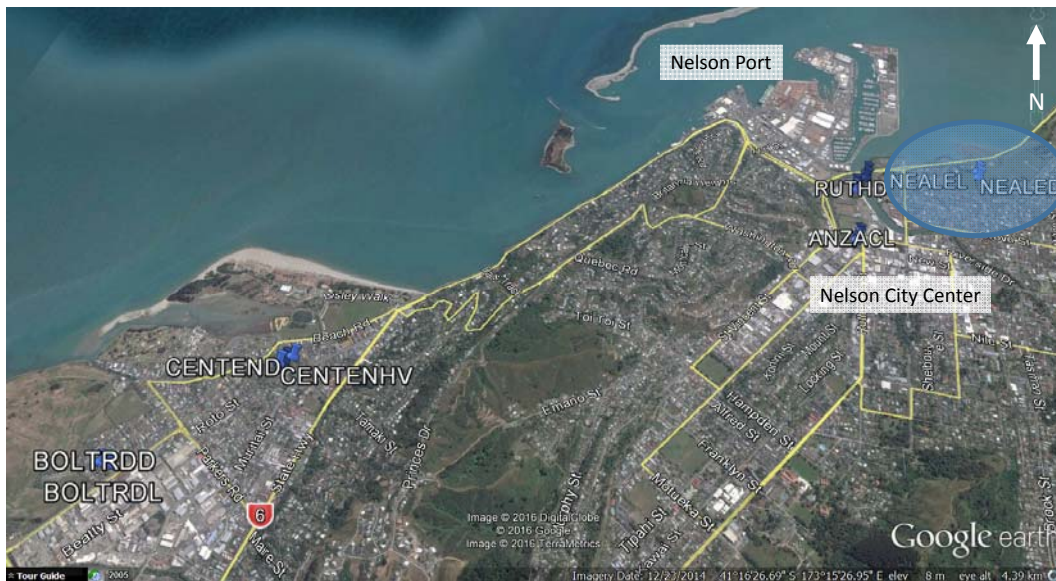


Geophysical Studies

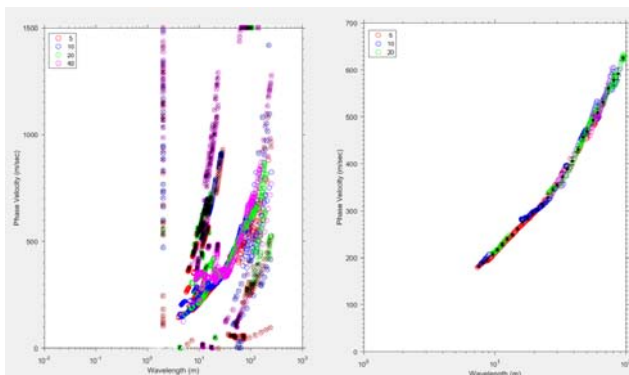
- Testing methods to include active and passive approaches
- In January 2016 we completed a round of testing at 6 Council owned parks in Nelson, we are planning the next round of testing at present.



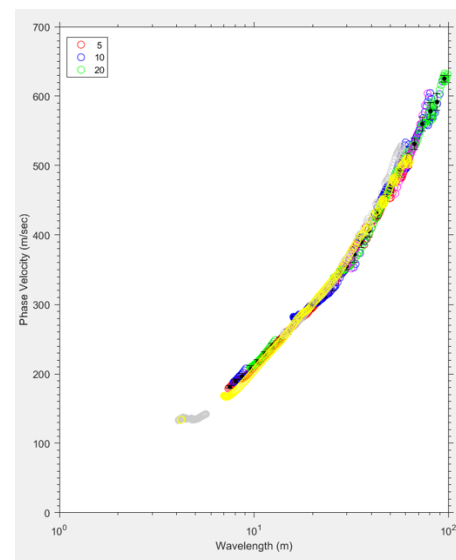
Testing information to date:



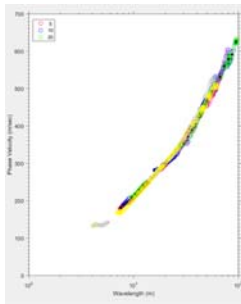
Testing information to date:



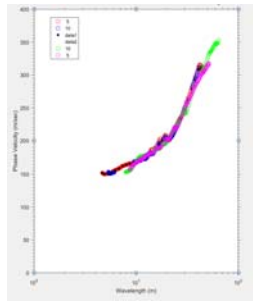
Neale Park (reclaimed land) – MASW data
'Live' data



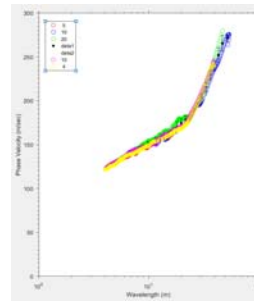
Overlay of live and dead MASW data



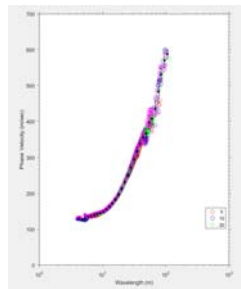
Neale Park – Reclaimed land



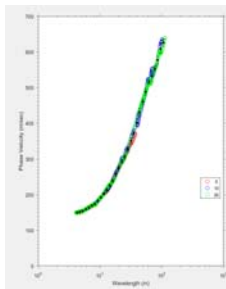
ANZAC Park – Reclaimed land



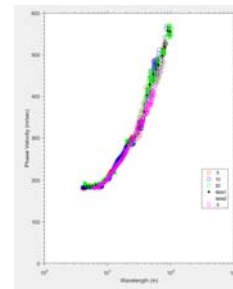
Bolt Road – Tahunanui Sand



Centennial Park – Tahunanui Sand

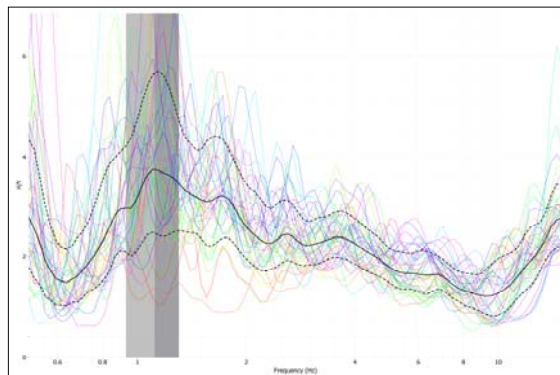


Rutherford Park – Reclaimed land



Trafalgar Park – Reclaimed land

Testing information to date:



Site Period Data – example from Neale Park

Next steps for Nelson-Tasman Region Study

- Identify sites for further testing (Council parks and reserves shown in green)
- Complete Surface wave testing and sub-surface investigations
- Map bedrock topography
- Deep site period investigations
- Compile information –
Thesis and Mapping outputs

