

**Median water table elevation in
Christchurch and surrounding area
after the 4 September 2010 Darfield Earthquake
Version 2**

S. van Ballegooy, S. C. Cox, C. Thurlow,
H. K. Rutter, T. Reynolds, G. Harrington,
J. Fraser, T. Smith

GNS Science Report 2014/18 May 2014



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The following report is an update of the median water table elevation report for Christchurch and surrounding areas released in March 2013 (GNS Report 2013/01). The revision encompasses an extension of the period of groundwater monitoring (4 September 2010 to 30 November 2013) and new surfaces for improved definition of water table fluctuation.

BIBLIOGRAPHIC REFERENCE

S. van Ballegooy, S. C. Cox, C. Thurlow, H. K. Rutter, T. Reynolds, G. Harrington, J. Fraser, T. Smith, 2014. Median water table elevation in Christchurch and surrounding area after the 4 September 2010 Darfield Earthquake: Version 2. GNS Science Report 2014/18, 79 pages plus 8 appendices.

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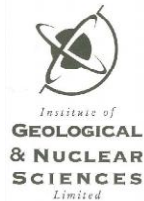
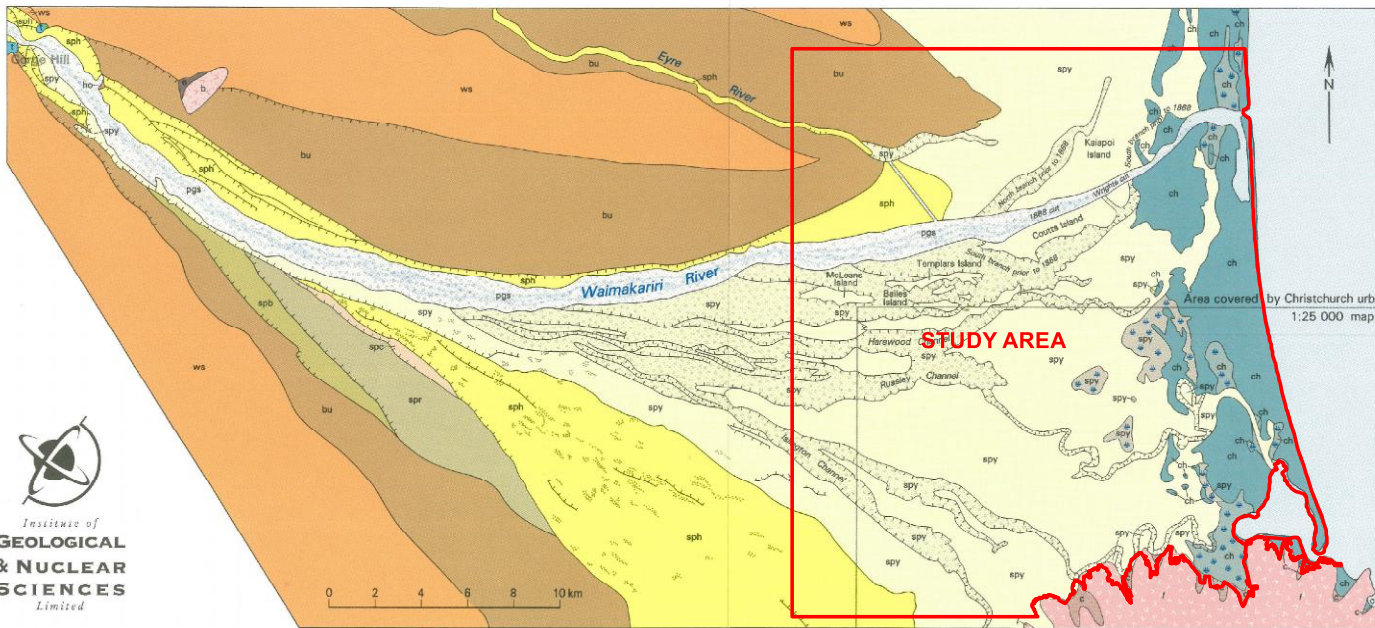
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APPENDICES

APPENDIX A: BACKGROUND FIGURES

- | | |
|-------------------|---|
| Figure A.1 | Extract from geological map of Christchurch area |
| Figure A.2 | Schematic geological cross-section of aquifers |
| Figure A.3 | Christchurch groundwater protection zones |
| Figure A.4 | Earthquake epicentres, 4 September 2010 – 4 April 2012 |



GEOLOGICAL LEGEND

FORMATION	MEMBER	Description	Terrestrial	Marine	Description	FORMATION/GROUP	STAGE	SERIES	EPOCH	YEARS
		Reclamation deposits. Dominantly volcanic rip-rap and demolition rubble.	ra							
		Silt, sand, and gravel of present day river channels.	pgs	ps	Sand of active dunes and present day beaches.					
		Alluvial gravel, sand, and silt of historic river flood channels.	spy	ch	Dominantly sand of fixed and semi-fixed dunes and beaches.					
	Yaldhurst Member (spy)	Peat swamps, now drained.	spy	ch	Sand, silt, and peat of drained lagoons and estuaries.	Christchurch Formation (ch)	ARAUANIAN			
		Dominantly alluvial sand and silt overbank deposits.	spy	ch						
	Halkett Member (sph)	Older alluvial gravel, sand, and silt.	sph							10 000
Springston Formation (sp)	Courtenay Member (spc)	Higher elevation, older alluvial gravel, sand, and silt.	spc					HAWERA	HOLOCENE	
	Riverview Member (spr)	Undifferentiated subsurface alluvial gravel, sand, silt, clay, and peat.	spr							
	Bleak House Member (spb)	Loess (in situ) and loess colluvium and mixed loess-volcanic derived colluvium overlying volcanic rock.	spb							
		Valley fill and slope wash of loess-volcanic derived colluvium.	sp							
Burnham Formation (bu)		Blue and brown alluvial gravel with some sand and silt. Capped by loess averaging 0.7m thick.	bu							14 000
Windwhistle Formation (ws)		Brown alluvial gravel with some sand and silt. Capped by loess averaging 1m thick.	ws					OTIRAN	QUATERNARY	
Riccarton Gravel (rg)		Brown and blue alluvial gravel with some sand and silt.	rg							70 000

Notes: Figure above is sourced from: "Geology of the Christchurch Urban Area", (Brown & Weeber, 1992)
Institute of Geological and Nuclear Sciences.



DRAWN	CXP	Feb,14
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ARCFILE	52020-0200-CPT023	
SCALE (AT A3 SIZE)		
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Ref.	52020.0200	

CHRISTCHURCH MEDIAN WATER TABLE ELEVATION REPORT
Extract from Geological Map (Brown & Weeber, 1992)

FIGURE No. Figure A.1

Rev. 0

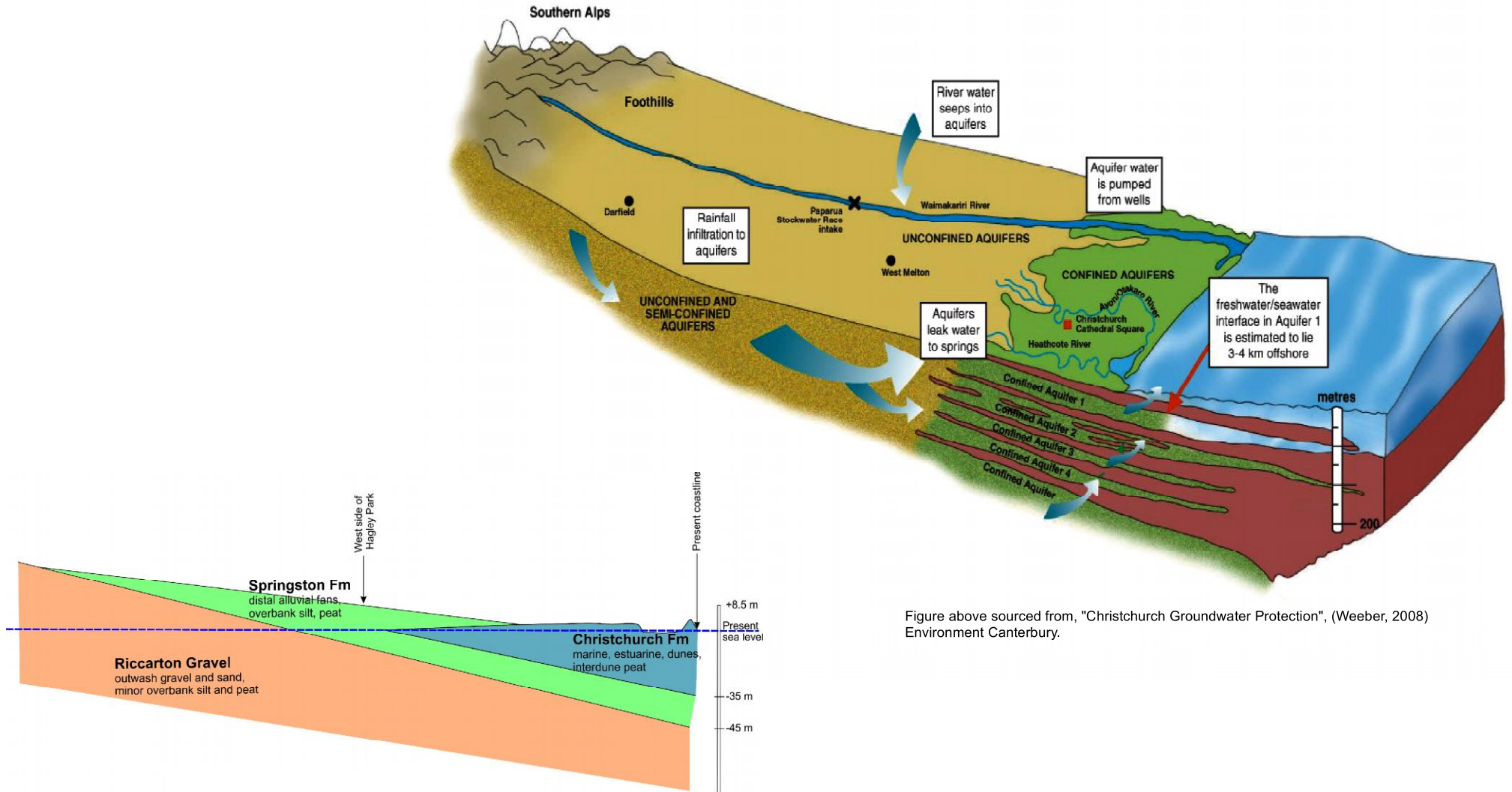


Figure above sourced from, "Christchurch Groundwater Protection", (Weeber, 2008) Environment Canterbury.

Notes:

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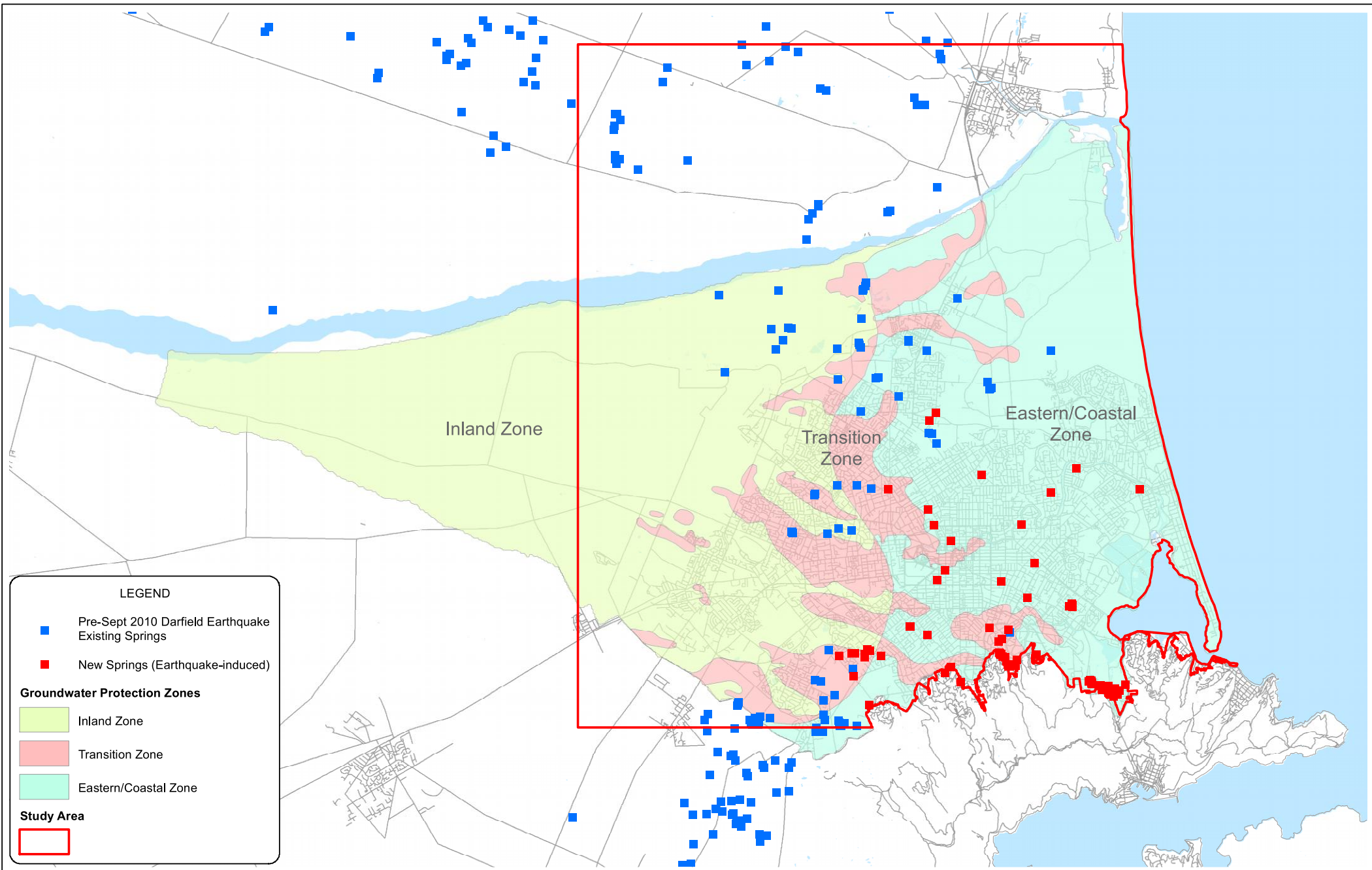
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Ref:	52020.0200	

**CHRISTCHURCH MEDIAN WATER
TABLE ELEVATION REPORT**

Schematic Geological Cross-Section of Aquifers

FIGURE No. Figure A.2

Rev. 0



LEGEND

- Pre-Sept 2010 Darfield Earthquake Existing Springs
- New Springs (Earthquake-induced)

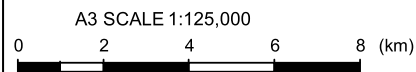
Groundwater Protection Zones

- Inland Zone
- Transition Zone
- Eastern/Coastal Zone

Study Area

-

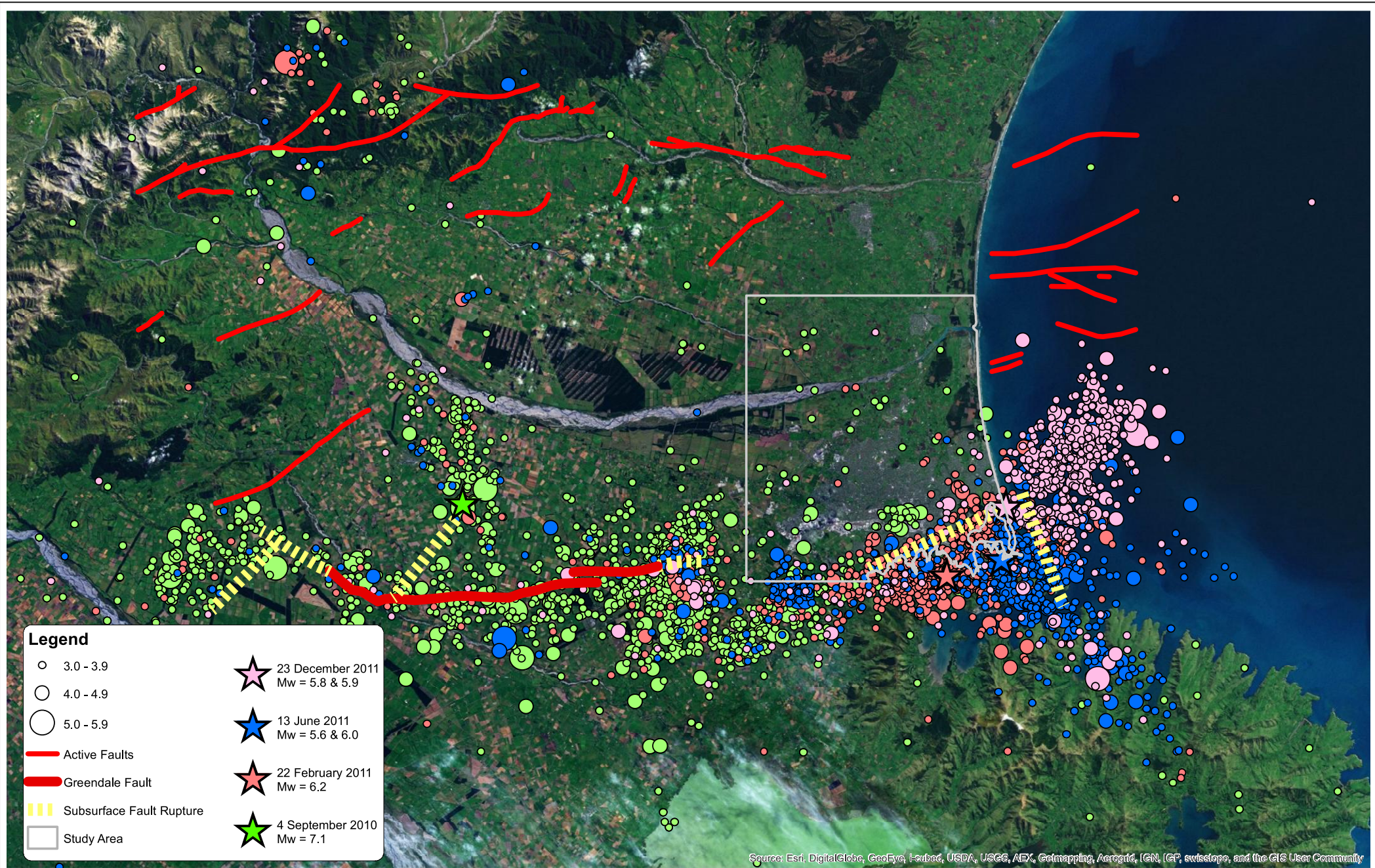
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ARCFILE 52020-0200-CPT034		
SCALE (AT A3 SIZE) 1:125,000		
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Ref: 52020.0200		

CHRISTCHURCH MEDIAN WATER TABLE ELEVATION REPORT
Christchurch Groundwater Protection Zones

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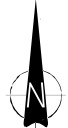
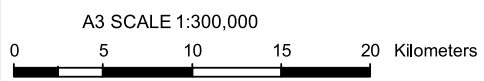


Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Legend

- 3.0 - 3.9
- 4.0 - 4.9
- 5.0 - 5.9
- Active Faults
- Greendale Fault
- Subsurface Fault Rupture
- Study Area
- ★ 23 December 2011
Mw = 5.8 & 5.9
- ★ 13 June 2011
Mw = 5.6 & 6.0
- ★ 22 February 2011
Mw = 6.2
- ★ 4 September 2010
Mw = 7.1

Notes: We acknowledge the New Zealand geonet project and its sponsors EQC, GNS and LINZ for providing data



DRAWN	Feb,14
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SCALE (AT A3 SIZE)	1:300,000
Prepared By	Tonkin & Taylor Ltd.
Ref:	52000.200

**CHRISTCHURCH MEDIAN WATER
TABLE ELEVATION REPORT**
 Earthquake Epicentres
 4 September 2010 - 4 April 2012

FIGURE No. Figure A.4

Rev. 0

Date: 17/02/2014 Time: 9:06:57 a.m.



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