

**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

**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

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.

Sjoerd van Ballegooy, Chris Thurlow, Tony Reynolds
Tonkin and Taylor Limited, P O Box 5271, Auckland

Simon Cox
GNS Science, Private Bag 1930, Dunedin

Helen Rutter
Aqualinc Research Ltd, PO Box 20-462, Christchurch

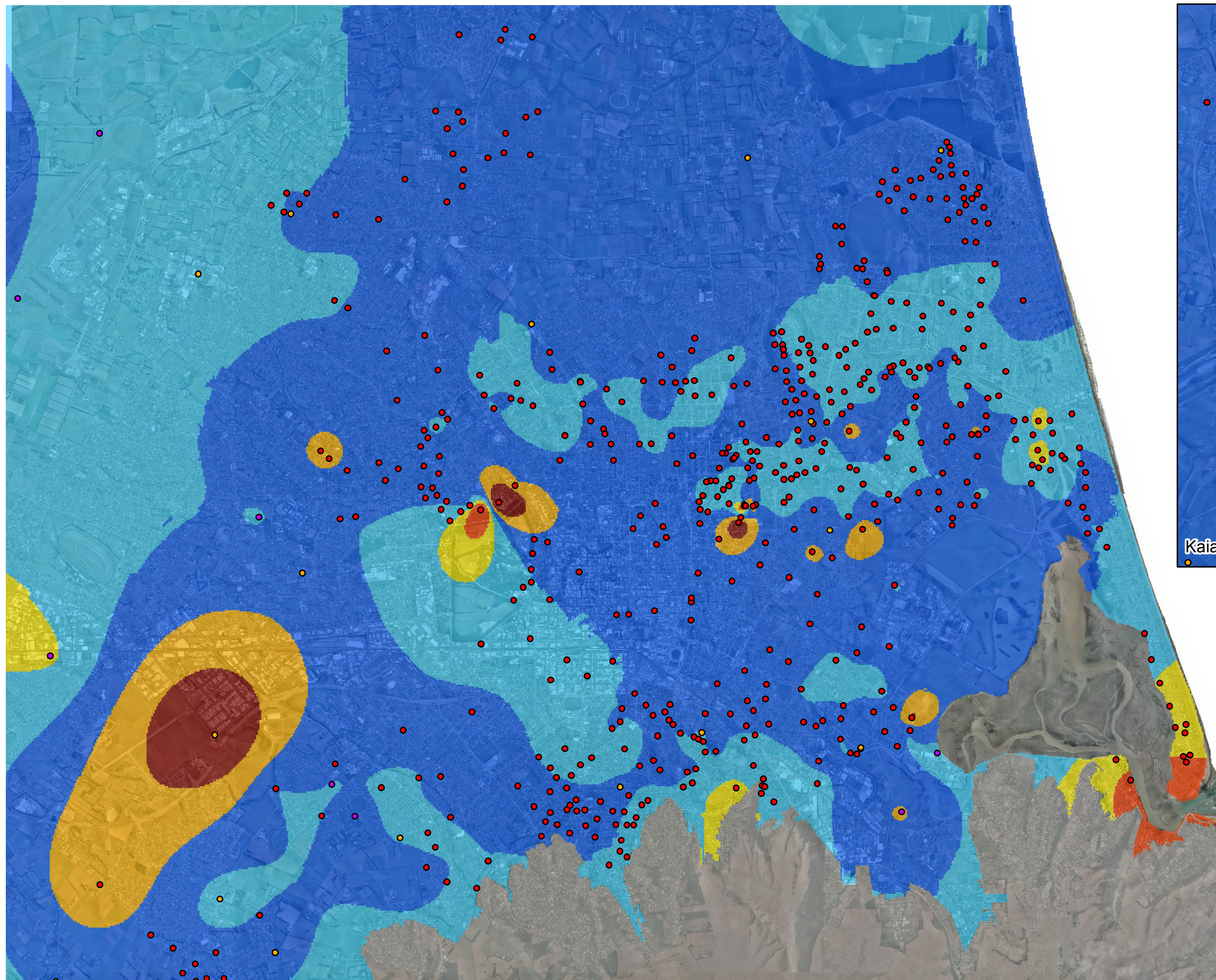
Graham Harrington
Christchurch City Council, PO Box 73014, Christchurch

Jeff Fraser
Golder Associates (NZ) Limited, PO Box 2281, Christchurch

Titus Smith
Riley Consultants Ltd, PO Box 4355, Christchurch

APPENDIX G: POST-DARFIELD EARTHQUAKE WATER TABLE SURFACES, INCLUDING SURROGATE MEDIANS FROM SHORT-TERM DATA

- Figure G.1** Offset plot for December 2012
- Figure G.2** Median water table elevation (reduced level), including surrogate medians from <12 month data and river strings, excluding drawdown points
- Figure G.3** Median water table elevation (reduced level), including surrogate medians from <12 month data, including river strings and drawdown points
- Figure G.4** Depth to median water table, including surrogate medians from <12 month data
- Figure G.5** Difference between 12+ median groundwater surface and 12+ median with surrogate groundwater surface
- Figure G.6** Confidence index for water table elevation



LEGEND

Monitoring Wells

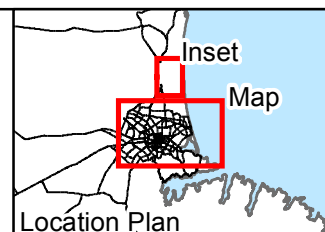
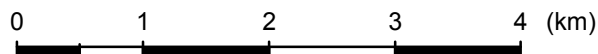
- EQC Monitoring Well ≥ 12 Data Readings (Red dot)
- CCC Monitoring Well (Yellow dot)
- ECan Monitoring Well (Purple dot)

Offset (m)

< -0.5	0.0 - 0.25
-0.5 - -0.25	0.25 - 0.5
-0.25 - 0	> 0.5
No Data	

Notes: Aerial Imagery supplied by New Zealand Aerial Mapping Ltd (2012/02/24).
Contains data sourced from Land Information New Zealand under CC-BY.
<http://creativecommons.org/licenses/by/3.0/nz/>

A3 SCALE 1:60,000



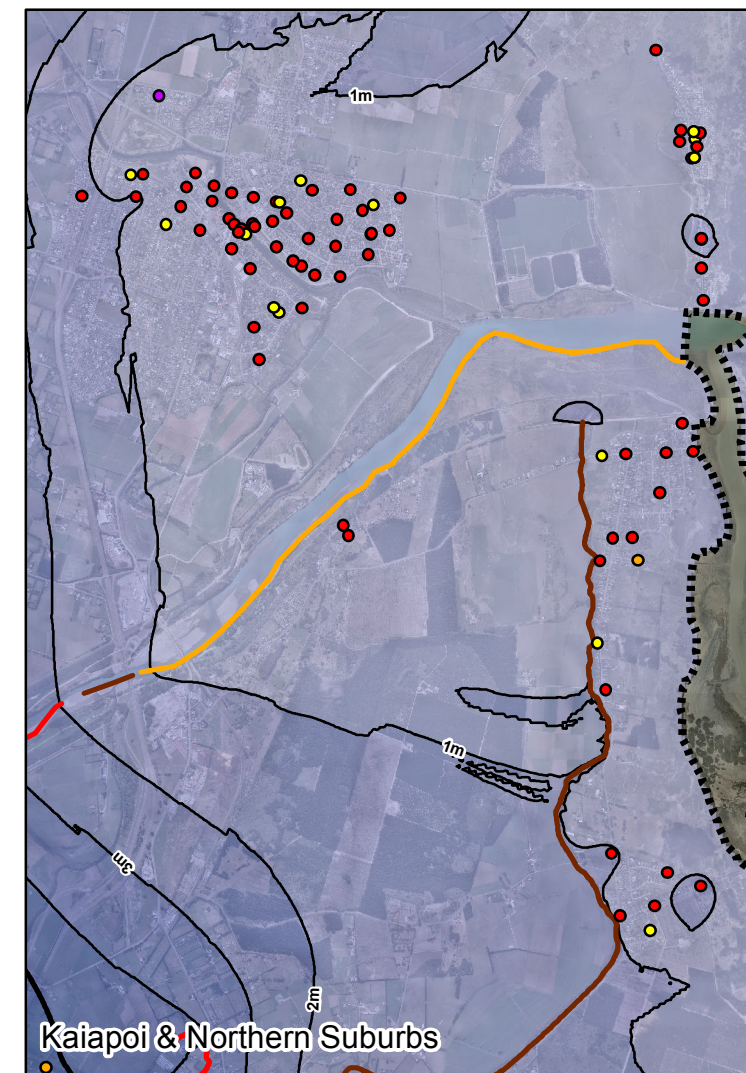
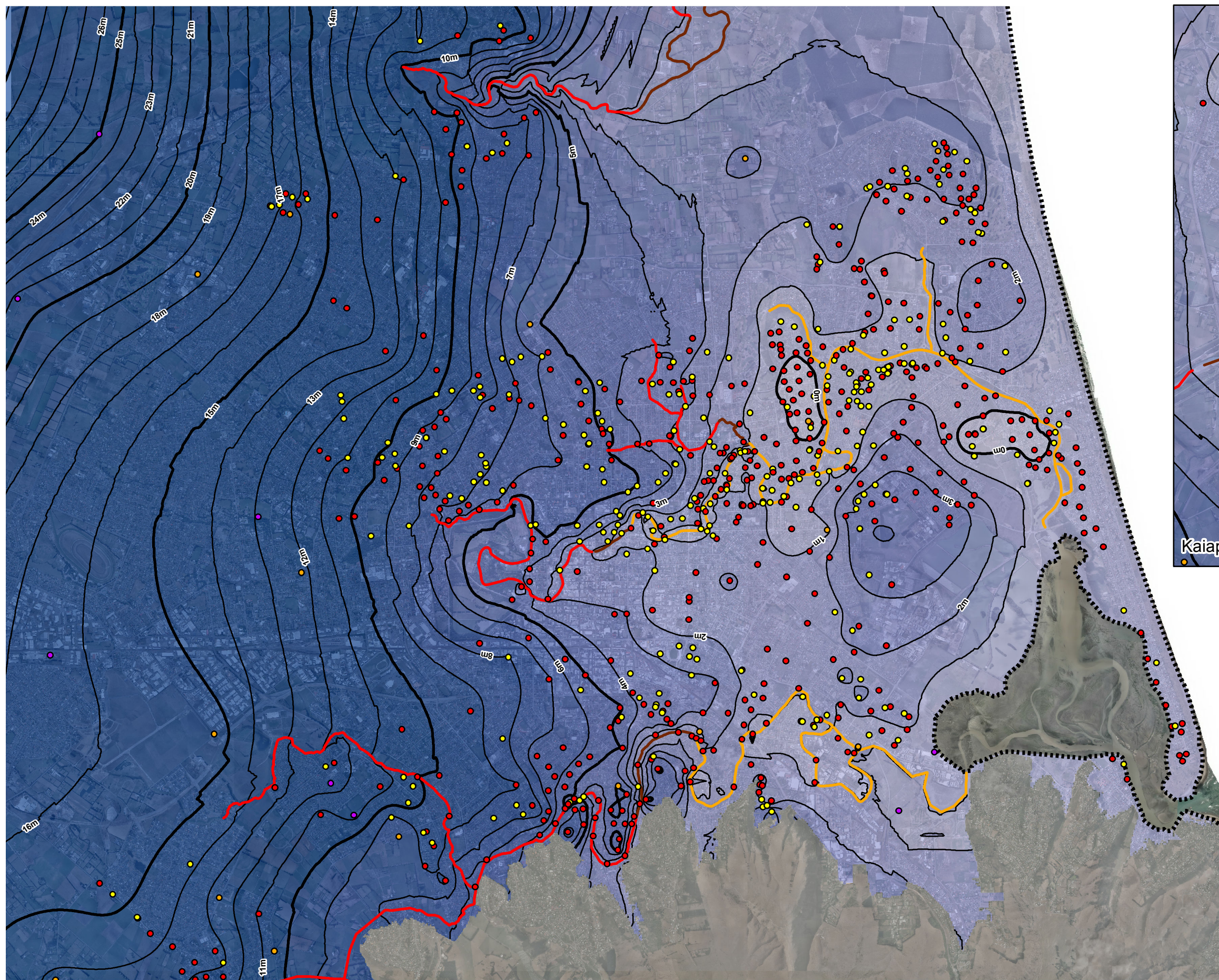
Tonkin & Taylor

DRAWN	JEL	Apr.14
CHECKED		
APPROVED		
ARCFILE 52020-0200-GWM60		
SCALE (AT A3 SIZE) 1:60,000		
Prepared by Tonkin & Taylor Ltd		
Ref: 52020-0200		

CHRISTCHURCH MEDIAN WATER TABLE ELEVATION REPORT December 2012 Offset Plot

FIGURE No. Figure G.1

Rev.



LEGEND

Monitoring Wells

- EQC Monitoring Well ≥ 12 Data Readings
- EQC Monitoring Well < 12 Data Readings
- ECan Monitoring Well
- CCC Monitoring Well

Other Analyses Data

- Coast
- Transitional
- Tidal
- Non Tidal

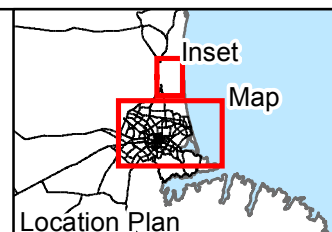
Level (m RL)

< 0	5 - 6
0 - 1	6 - 7
1 - 2	7 - 8
2 - 3	8 - 9
3 - 4	9 - 10
4 - 5	> 10
No Data	Level Contour

Notes: Aerial Imagery supplied by New Zealand Aerial Mapping Ltd (2012/02/24).
Contains data sourced from Land Information New Zealand under CC-BY.
<http://creativecommons.org/licenses/by/3.0/nz/>

A3 SCALE 1:60,000

0 1 2 3 4 (km)



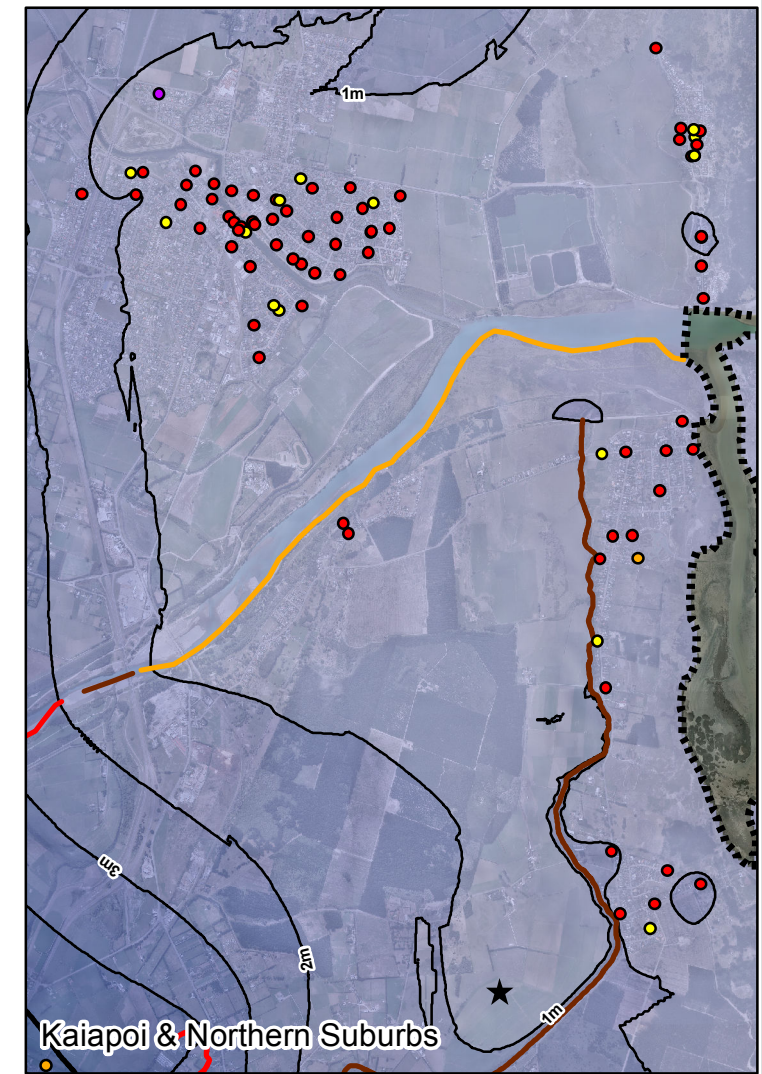
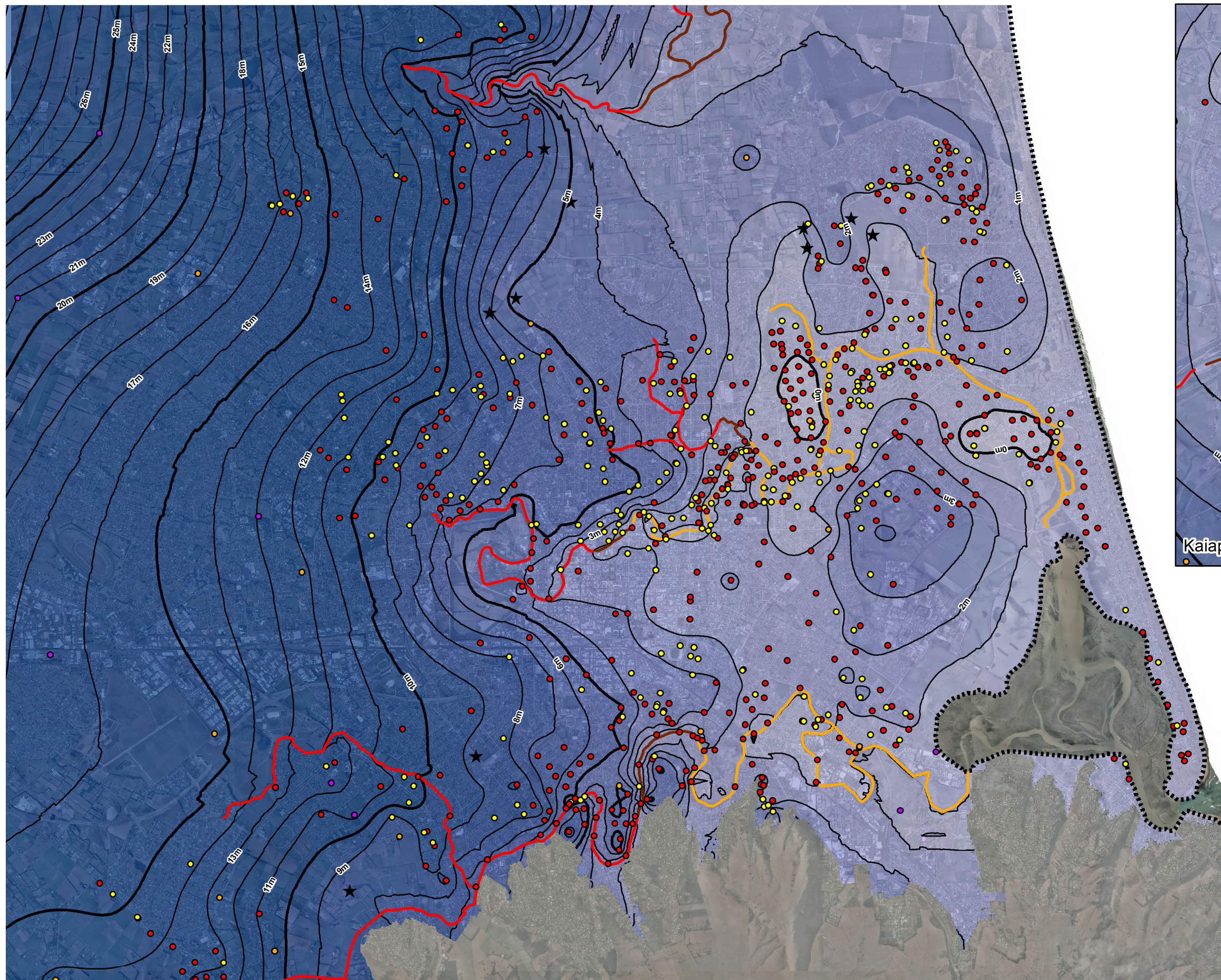
Tonkin & Taylor

DRAWN	CXP	May.14
CHECKED		
APPROVED		
ARCFILE	52020-0200-GWM61	
SCALE (AT A3 SIZE)	1:60,000	
Prepared by	Tonkin & Taylor Ltd	
Ref:	52020-0200	

**CHRISTCHURCH MEDIAN WATER
TABLE ELEVATION REPORT**
Median Water Table Reduced Level, Including
Data <12 Months. (Excluding Drawdown Points)

FIGURE No. Figure G.2

Rev.



LEGEND

Monitoring Wells

- EQC Monitoring Well ≥ 12 Data Readings
- EQC Monitoring Well < 12 Data Readings
- ECan Monitoring Well
- CCC Monitoring Well

Other Analyses Data

- Coast
- Transitional
- Drawdown Points
- Tidal
- Non Tidal

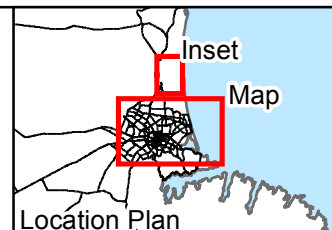
Level (m RL)

< 0	5 - 6
0 - 1	6 - 7
1 - 2	7 - 8
2 - 3	8 - 9
3 - 4	9 - 10
4 - 5	> 10
No Data	Level Contour

Notes: Aerial Imagery supplied by New Zealand Aerial Mapping Ltd (2012/02/24).
Contains data sourced from Land Information New Zealand under CC-BY
<http://creativecommons.org/licenses/by/3.0/nz/>

A3 SCALE 1:60,000

0 1 2 3 4 (km)



Tonkin & Taylor

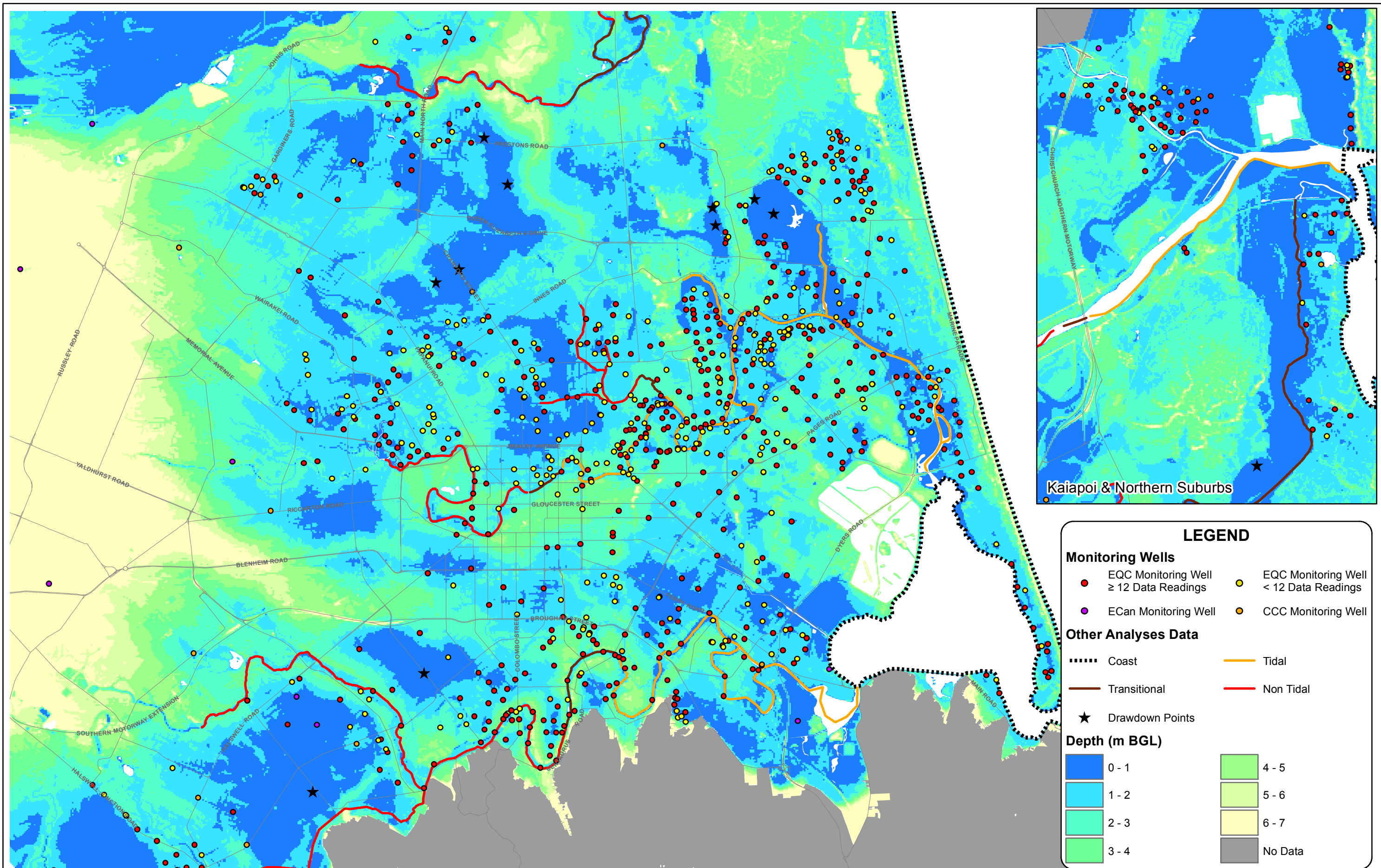
DRAWN	CXP	May.14
CHECKED		
APPROVED		
ARCFILE	52020-0200-GWM41	
SCALE (AT A3 SIZE)	1:60,000	
Prepared by	Tonkin & Taylor Ltd	
Ref:	52020-0200	

CHRISTCHURCH MEDIAN WATER TABLE ELEVATION REPORT Median Water Table Reduced Level, Including Data <12 Months

FIGURE No. Figure G.3

Rev.

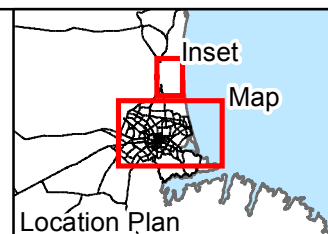
Date: 9/05/2014 Time: 3:15:13 p.m.



Notes: Road Database supplied by Terralink International Ltd.
Contains data sourced from Land Information New Zealand under CC-BY.
<http://creativecommons.org/licenses/by/3.0/nz/>

A3 SCALE 1:60,000

0 1 2 3 4 (km)



Tonkin & Taylor

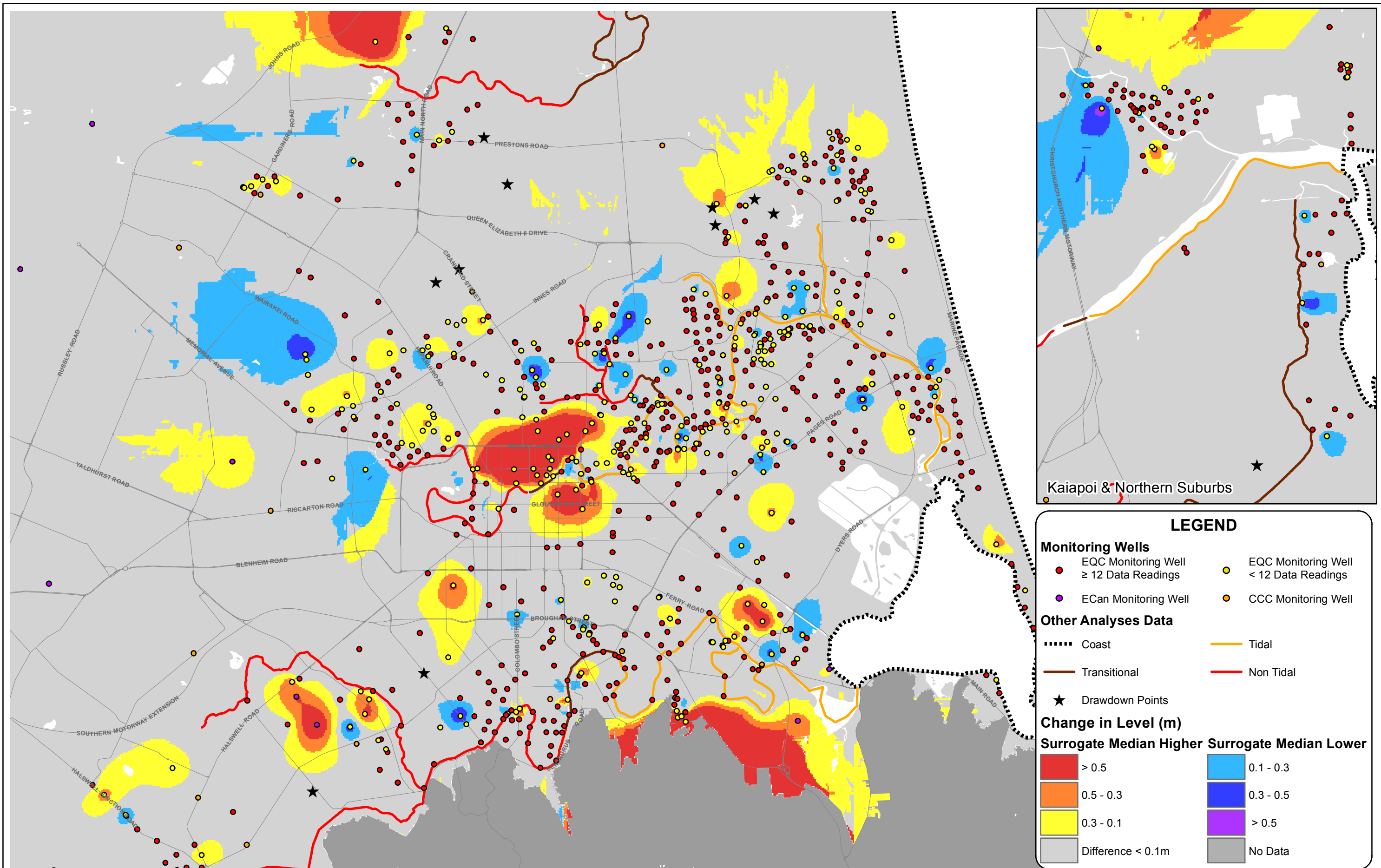
DRAWN	CXP	May.14
CHECKED		
APPROVED		
ARCFILE	52020-0200-GWM40	
SCALE (AT A3 SIZE)	1:60,000	
PROJECT No.	52020-0200	

CHRISTCHURCH MEDIAN WATER TABLE ELEVATION REPORT Depth to Median Water Table, Including Data <12 Months

FIGURE No. Figure G.4

Rev.

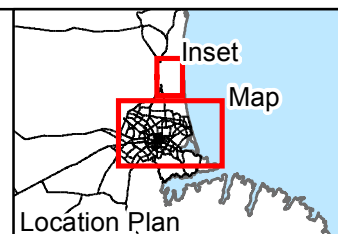
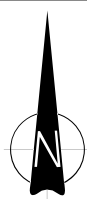
Date: 16/05/2014 Time: 4:12:37 p.m.



Notes: Road Database supplied by Terralink International Ltd.
Contains data sourced from Land Information New Zealand under CC-BY.
<http://creativecommons.org/licenses/by/3.0/nz/>

A3 SCALE 1:60,000

0 1 2 3 4 (km)



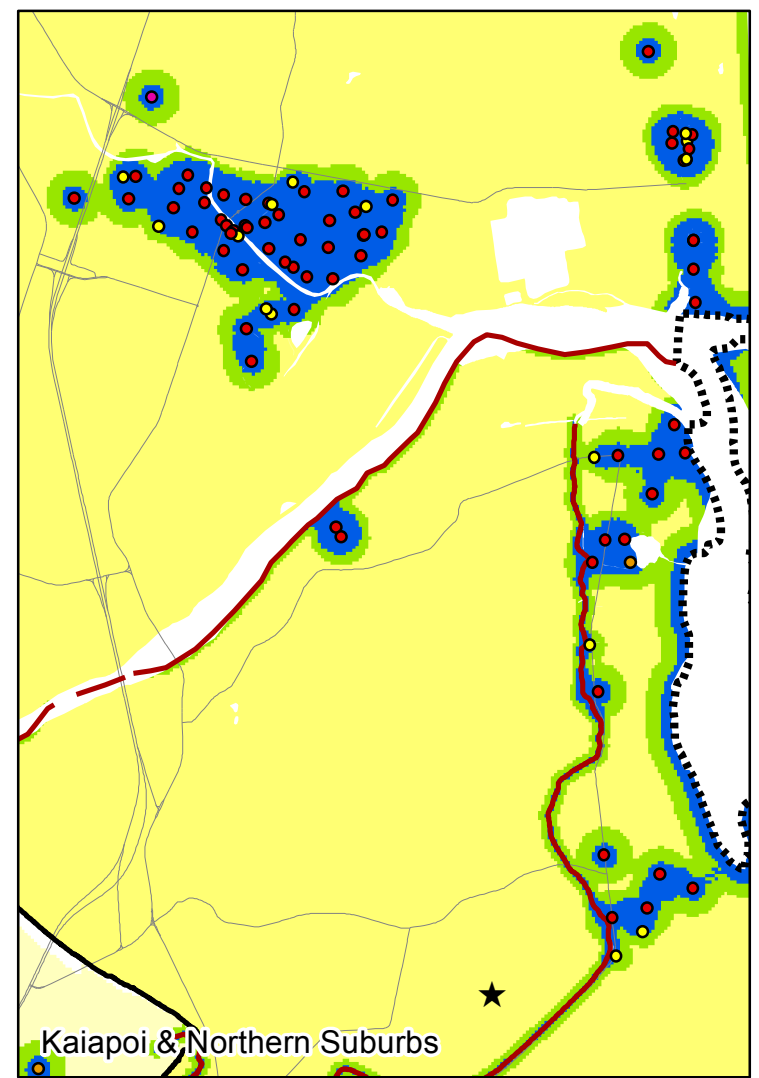
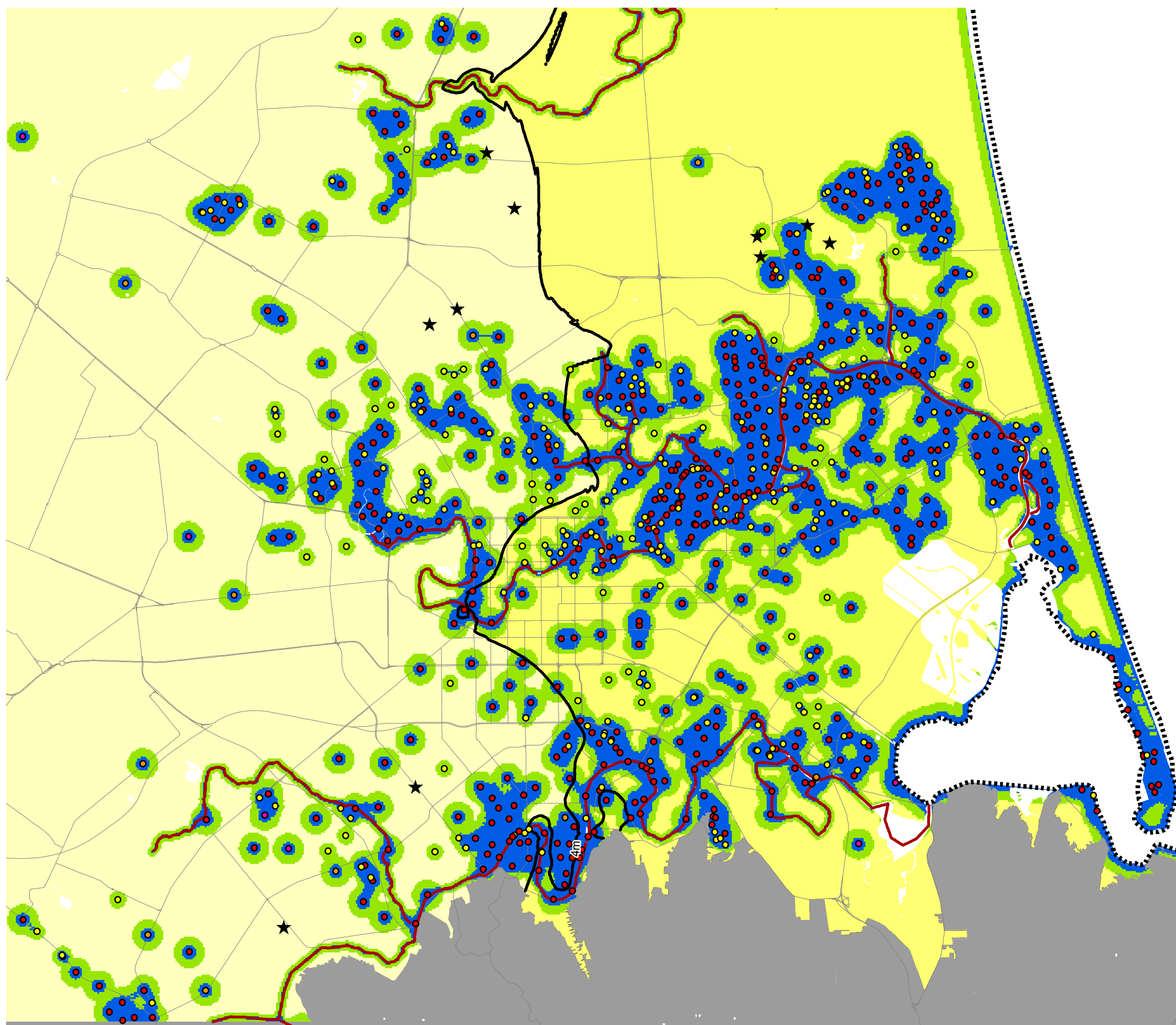
Tonkin & Taylor

DRAWN	CXP	May.14
CHECKED		
APPROVED		
ARCFILE	52020-0200-GWM99	
SCALE (AT A3 SIZE)	1:60,000	
PROJECT No.	52020-0200	

**CHRISTCHURCH MEDIAN WATER
TABLE ELEVATION REPORT**
Difference between 12+ Median GW Surface
and 12+ Median with Surrogate GW Surface

FIGURE No. Figure G.5

Rev.



LEGEND

Monitoring Wells

- EQC Monitoring Well ≥ 12 Data Readings
- EQC Monitoring Well < 12 Data Readings
- ECan Monitoring Well
- CCC Monitoring Well

Other Analysis Data

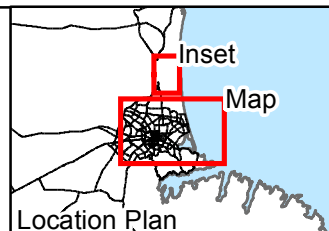
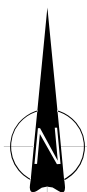
- Coastal Strings
- River Strings
- Drawdown points
- 4m Contour line

Confidence Index

- Lower - west of 4m Median groundwater contour
- Lower - groundwater table surface based on widely spread monitoring wells
- Medium
- Higher - groundwater table surface based on closely spread monitoring wells with longer duration monitoring records
- Excluded from confidence index

Notes: Road Database supplied by Terralink International Ltd. Rivers, lagoons and coastline licensed under Creative Commons Attribution 3.0 New Zealand and sourced from LINZ

A3 SCALE 1:60,000



DRAWN	JJXC	May 14
CHECKED		
APPROVED		
ARCFILE	52020-0200-GWM98	
SCALE (AT A3 SIZE)	1:60,000	
PROJECT No.	52020-0200	

CHRISTCHURCH MEDIAN WATER TABLE ELEVATION REPORT Confidence index for water table elevation and water table depth

FIGURE No. Figure G.6

Rev.



www.gns.cri.nz

Principal Location

1 Fairway Drive
Avalon
PO Box 30368
Lower Hutt
New Zealand
T +64-4-570 1444
F +64-4-570 4600

Other Locations

Dunedin Research Centre
764 Cumberland Street
Private Bag 1930
Dunedin
New Zealand
T +64-3-477 4050
F +64-3-477 5232

Wairakei Research Centre
114 Karetoto Road
Wairakei
Private Bag 2000, Taupo
New Zealand
T +64-7-374 8211
F +64-7-374 8199

National Isotope Centre
30 Gracefield Road
PO Box 31312
Lower Hutt
New Zealand
T +64-4-570 1444
F +64-4-570 4657