INFRASTRUCTURE SERVICING ASSESSMENT

141 South Belt & 104 Townsend Road, Rangiora

For M A Clarke, J L Clarke, L M Clarke and Williams McKenzie Trustees Limited

October 2014

Eliot Sinclair

surveyors | engineers | planners

INFRASTRUCTURE SERVICING ASSESSMENT

141 South Belt & 104 Townsend Road, Rangiora

Eliot Sinclair
surveyors | engineers | planners

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Date:	October 2014	
Reference:	196916_14211140626_ENVTR_ems_Servicing Report Formatted.docx	
Status:	FINAL	
Distribution:	1 Original	M A Clarke & Williams McKenzie Trustees Limited
	1 copy	Waimakariri District Council
	File copy	Eliot Sinclair

Limitations: This report has been prepared according to the instructions from For M A Clarke, J L Clarke, L M Clarke and Williams McKenzie Trustees Limited, for the particular objectives described in the report. The information contained in the report should not be used by anyone else or for any other purposes.

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1. Introduction

1. M A Clarke, J L Clarke, L M Clarke and Williams McKenzie Trustees Limited have engaged Eliot Sinclair to undertake an infrastructure servicing assessment to support a plan change application at 141 South Belt and 104 Townsend Road, Rangiora (the Site).
2. The scope of this report includes:
    - a detailed site description relevant for reticulated servicing of the area;
    - practicable options to service the area with regard to:
        - The discharge of stormwater
        - The discharge of wastewater
        - Potable water
        - Electricity
        - Telecommunication

2. Site Description

3. The Site is located at the corner of South Belt and Townsend Road and has a gross area of approximately 14ha (refer to Figure 1).

Figure 1: Site Location (yellow outline), (Source: Google Maps January 2014).

4. The Site forms part of the land at 141 South Belt and 104 Townsend Road, Rangiora. The full legal description is given in the Private Plan Change Request document.

5. If re-zoned to the Residential 2 Zone the Site has the potential to yield approximately 140 allotments. The Outline Development Plan (ODP) is included in Appendix A.

2.1. Topography and Land Use

6. The Site comprises generally flat topography, with a slight fall down towards the southeast. The majority of the site is vegetated with grass and used for grazing horses. There is an existing horse training track and several existing dwellings, sheds and stables located to the north and west of the Site. ECan's GIS database shows a well (M35/5065) located to the northwest of 141 South Belt. The ECan well card indicates that the well is active and used for domestic and stock water supply and this was confirmed by site inspection. Though not recorded on the ECan GIS database, a second well is located at the approximate centre of 104 Townsend Road. The well is used for domestic and stock supply at that address. There is no ECan consent associated with either well.

2.2. Geology

7. The Geological Nuclear Science (GNS) geological map of Christchurch indicates most of the site is underlain by 'unweathered, brownish-grey, variable mix of gravels/sand/silt/clay in low river terraces; locally up to 2m silt (loess) cap'.
8. The geotechnical report to support the proposed plan change prepared by Eliot Sinclair, found that the soil types encountered in the upper layers were generally consistent across the site. The soils encountered comprised shallow topsoil to 0.5m below ground level over, clayey silt and sandy clayey silt to 0.9 to 2m, over silty and sandy gravels where deeper testing with hand equipment became impractical.
9. The well log for Well M36/1808, located approximately 50m north of the site encountered 'topsoil into grey silt' to 1.2m, 'grey silt, fine gravel and coarse grained sand' to 2.4m over 'fine to coarse gravel with traces of sand' to 13.2m depth below ground level where the log terminates. The initial depth to groundwater was 1m at the time of drilling.
10. Well M35/0257 located 340m southeast of the site encountered 'water-bearing gravel' to 4.6m overlying 'clay (yellow brown) with some stones' to 18.3m where the log terminates. Well logs are included in Appendix B.

2.3. Hydrogeology

11. The piezometric contours on ECan's GIS database intersect the site to the northwest at a level of 25m and to the southeast at a level of 20m, similar to the range in ground levels.

12. Well data from ECan for well M35/9001 located 750m northeast of the site records groundwater levels varying from approximately ground level to a depth of 1m. ECan records for well M35/0338 (84 Townsend Road) show groundwater levels varying between a depth of 0.6 and 1m below ground level. The Ecan data suggests that the depth to groundwater across the Site can be less than 1m. However the landowner has provided data for the wells at 141 South Belt and 104 Townsend Road that indicate groundwater can be deeper than this at up to 2m below ground level.
13. The ECan GIS database indicates that the shallow groundwater underlying the site is within an unconfined or semiconfined aquifer and that the regional groundwater flow is in a south-easterly direction.

2.4. Surface Water

14. The South Brook a tributary of the Cam River is located along the southern boundary of the site, and flows down to the east. The stream channel is around 1m to 3m wide.
15. A wet pond/wetland stormwater treatment and attenuation basin is located on land adjoining the southeast corner of the site and is operated by WDC. The basin receives stormwater from the existing developed area to the north of the site and discharges to South Brook.
16. WDC have supplied plans showing the predicted 200 year ARI Flood Hazard and Flood Depth for the Site derived from their 2014 South Ashley Model. The plans shows large parts of the site away from the South Brook to be at low or no risk of flooding in the 200 year event with flood depths predicted to be less than 250mm and with no obvious channelling or concentration of flow indicated. No specific flood mitigation measures are being considered in these areas.
17. The WDC plans also indicate that along the South Brook corridor land is at medium to high risk of inundation in the predicted 200 year flood. The proposed esplanade reserve incorporates the majority of this land. However, some of the site that is proposed to be developed for residential purposes is still affected. The extent of the 200 year medium risk zone is shown on the ODP. For the areas within the medium risk zone the land will be filled to mitigate the risk of inundation in the 200 year flood.
18. While shown as a low risk, there is land proposed for residential development that WDC's 200 year plans indicate may become part of the South Brook channel or form a breakout from that channel in the predicted 200 year flood. Along with the proposed residential land shown to be at medium risk along the South Brook corridor, this land will be filled to mitigate the risk of inundation in the 200 year flood. The extent of the proposed filling along the northern margin of the South Brook is shown on the ODP.

19. Photographs supplied by the land owner taken during the large rainfall event of June 10th and 11th 2014 appear to agree with the model data showing the site away from the South Brook to be free from flooding (see Figure 2).

Figure 2: Photograph in area of proposed cul-de-sac north of stormwater management area looking east to southeast (taken June 10th/11th 2014)

3. Reticulated Services

20. The following discussion on servicing the Site is based on information provided by WDC in their engineering code of practice, the District Plan and at a Project Advisory Group meeting on the 9th May 2013 as well as ECan's Regional Plans, Christchurch City Council's Waterways Wetlands and Drainage Guide (WWDG) and private correspondence with other service suppliers.

3.1. Discharge of Stormwater

21. The site is not serviced by a reticulated stormwater system and the depth of groundwater at less than 1m makes the Site unsuitable for the large scale disposal of stormwater to ground via soakage. Being at the lower part of the Site the WDC stormwater basins would make a suitable outfall for stormwater discharges.

3.1.1. WDC's Stormwater Basin

22. It would be possible to drain stormwater from the Site down to the southeast to discharge to WDC's basin. We understand from WDC that while the current ponds are undersized, sufficient land is available within the reserve to enlarge the system in order to accommodate stormwater from the Site. Works to enlarge the basin system would be carried out by Council and recovered from the developer at the time of subdivision.

23. WDC have indicated that this would not be their preferred means of stormwater disposal from the Site as part of the stormwater reserve is currently utilised as a dog park and this facility would have to be re-configured or lost entirely were the basins to be enlarged.

3.1.2. Stormwater Management Within the Site

24. As available capacity for treatment in WDC's basin cannot be relied upon a means of managing stormwater within the Site has been investigated.

25. NIWA's Stream-Explorer website gives the combined catchment area of the South Brook above the Site as 880ha. Using the rational method, this catchment area and a runoff coefficient of 0.3 the NIWA website predicts the peak 5yr flow in the South Brook will be approximately $5m^3/s$. This flow equates to a time of concentration of between 6 and 12 hours.

26. Given the high groundwater table, the proposed means of treating and attenuating the stormwater runoff from the developed Site is via a wet pond combined with a wetland.

27. Using the methodology and coefficients provided in the WWDG the wet pond would be sized to accept runoff generated from impervious surfaces by a rainfall depth of 25mm. This first flush volume from a typical development of the site is estimated at $1300m^3$.

28. The first flush volume would be released to the wetland for polishing treatment over 4 days. The wetland in turn would discharge to the WDC stormwater basins.

29. Based on the first flush volume and a residence time in the wetland of 2 days the required surface area of the wetland would be approximately $3,500m^2$. Calculations included in Appendix C show how the provisional sizings were arrived at.

30. Attenuation would be provided by the first flush volume in the wet pond and by allowing the wetland to surcharge to a maximum depth of 500mm. The total storage volume provided in this way would be approximately $3,000m^3$. Calculations indicate that this would be sufficient volume to maintain runoff from the site at pre-development levels for all storms up to and including the 12 hour duration 50 year return period storm.

31. Runoff from hard surfaces would be collected in roadside kerb and channel, captured by sumps and discharged to the treatment system via a piped stormwater network. The proposed stormwater treatment system would be located at the lower southeast corner of the site allowing secondary flow to be accommodated within the roading network.

3.1.3. Conclusion

32. The adjoining WDC stormwater treatment basins could be enlarged to accommodate flow from the proposed development. However this is not WDC's preference and therefore an alternative system of treatment, and attenuation has been developed that would be situated within the Site prior to discharge to the Council's basins.

33. The stormwater system can be designed in accordance with the WWDG so that flows from the Site are maintained at predevelopment levels for all storms up to and including the 12 hour duration 50 year return period.

3.2. Discharge of Wastewater

34. A 300mm diameter gravity trunk sewer that discharges to Rangiora Wastewater Treatment Plant intersects the site. The trunk sewer crosses the lower eastern part of the Site and would therefore make a suitable outfall for a gravity sewer system servicing the proposed development.

35. WDC have indicated that there are capacity issues with the trunk sewer downstream of the Site. These issues are existing and upgrading of the system is required regardless of whether the Site is developed. The Council have indicated (Appendix D) that the sewer upgrade works are in the planning stage and are budgeted for completion in the 2015-2025 LTP. We anticipate that the cost of these works will be included in the applicable development contributions.

36. The estimated average flow from the proposed 140 lots to Council's network is 95m^3/day at a peak wet weather flow rate of 8.5l/s.

37. In summary the servicing of the site with respect to wastewater does not present an impediment to the rezoning proposed under this plan change.

3.3. Potable Water

38. WDC has recently upgraded the water supply network in the area including the construction of the South Belt Water Supply Reservoir and a new 500mm diameter trunk main along Townsend Road. There is also an existing 150mm diameter main in South Belt serving the properties to the north of the road.

39. A network of water supply mains and hydrants installed within the proposed roading corridors will provide water for firefighting purposes in accordance with the New Zealand Fire Service Firefighting Water Supplies Code of Practice (SNZ PAS 4509:2008).

40. Given the level of existing infrastructure the servicing of the Site with an on demand reticulated water supply is not expected to be an impediment to the proposed rezoning.

3.4. Electricity

41. Mainpower New Zealand Ltd (Mainpower) has stated (Appendix E) that their reticulated power network can supply the potential yield of 140 lots were the site to be re-zoned.

42. We would expect Mainpower to pass on the costs for the installation of the electricity supply network to the developer at the time of application for supply.

3.5. Telecommunication

43. Enable have confirmed (Appendix F) that given the proximity of the site to the existing telecomunications network, capacity would be available to service the Site.

44. It is expected that the cost of providing telecommunications infrastructure to the Site will be passed onto the developer by Enable at the time of subdivision.

4. Staging

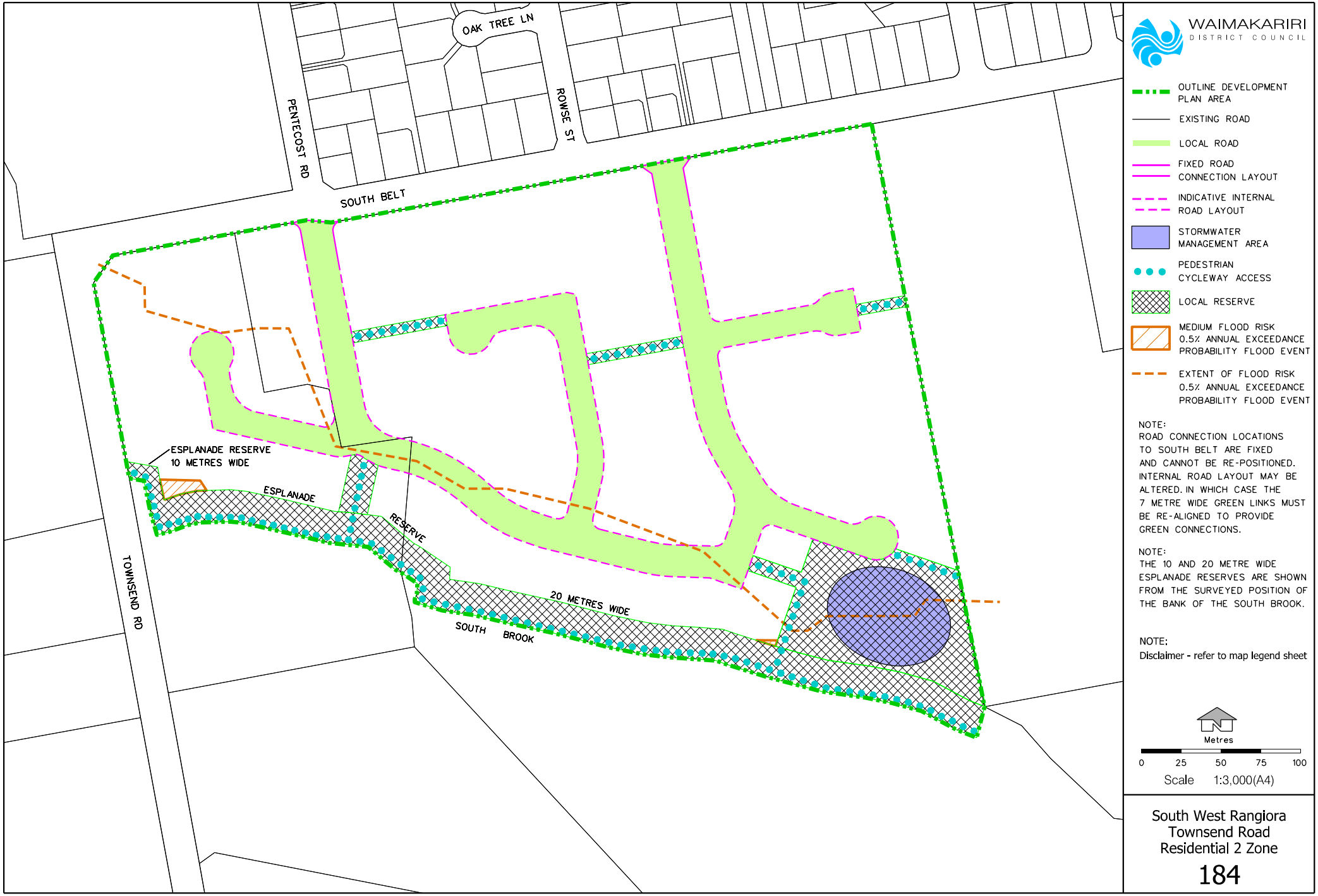
45. Any staging of the development has yet to be decided. Given the location of the stormwater treatment area and the existing sewer in the east of the site, it would be practical from a servicing perspective to progress any staging from east to west.

5. Conclusion

46. This report describes the site conditions that are relevant for servicing the area and has identified that there are no known impediments to the rezoning proposed for future residential development. This comprises servicing with regards to stormwater, sewerage, potable water, power and telecommunication.

Appendix A : Outline Development Plan

Appendix B : Well Logs



WAIMAKARIRI DISTRICT COUNCIL

- OUTLINE DEVELOPMENT PLAN AREA
- EXISTING ROAD
- LOCAL ROAD
- FIXED ROAD CONNECTION LAYOUT
- INDICATIVE INTERNAL ROAD LAYOUT
- STORMWATER MANAGEMENT AREA
- PEDESTRIAN CYCLEWAY ACCESS
- LOCAL RESERVE
- MEDIUM FLOOD RISK 0.5% ANNUAL EXCEEDANCE PROBABILITY FLOOD EVENT
- EXTENT OF FLOOD RISK 0.5% ANNUAL EXCEEDANCE PROBABILITY FLOOD EVENT

NOTE:
ROAD CONNECTION LOCATIONS TO SOUTH BELT ARE FIXED AND CANNOT BE RE-POSITIONED. INTERNAL ROAD LAYOUT MAY BE ALTERED. IN WHICH CASE THE 7 METRE WIDE GREEN LINKS MUST BE RE-ALIGNED TO PROVIDE GREEN CONNECTIONS.

NOTE:
THE 10 AND 20 METRE WIDE ESPLANADE RESERVES ARE SHOWN FROM THE SURVEYED POSITION OF THE BANK OF THE SOUTH BROOK.

NOTE:
Disclaimer - refer to map legend sheet

Metres
0 25 50 75 100
Scale 1:3,000(A4)

South West Rangiora Townsend Road Residential 2 Zone

184

../../....

Bore or Well No: M35/0257
Well Name:
Owner:

Environment Canterbury
Your regional council

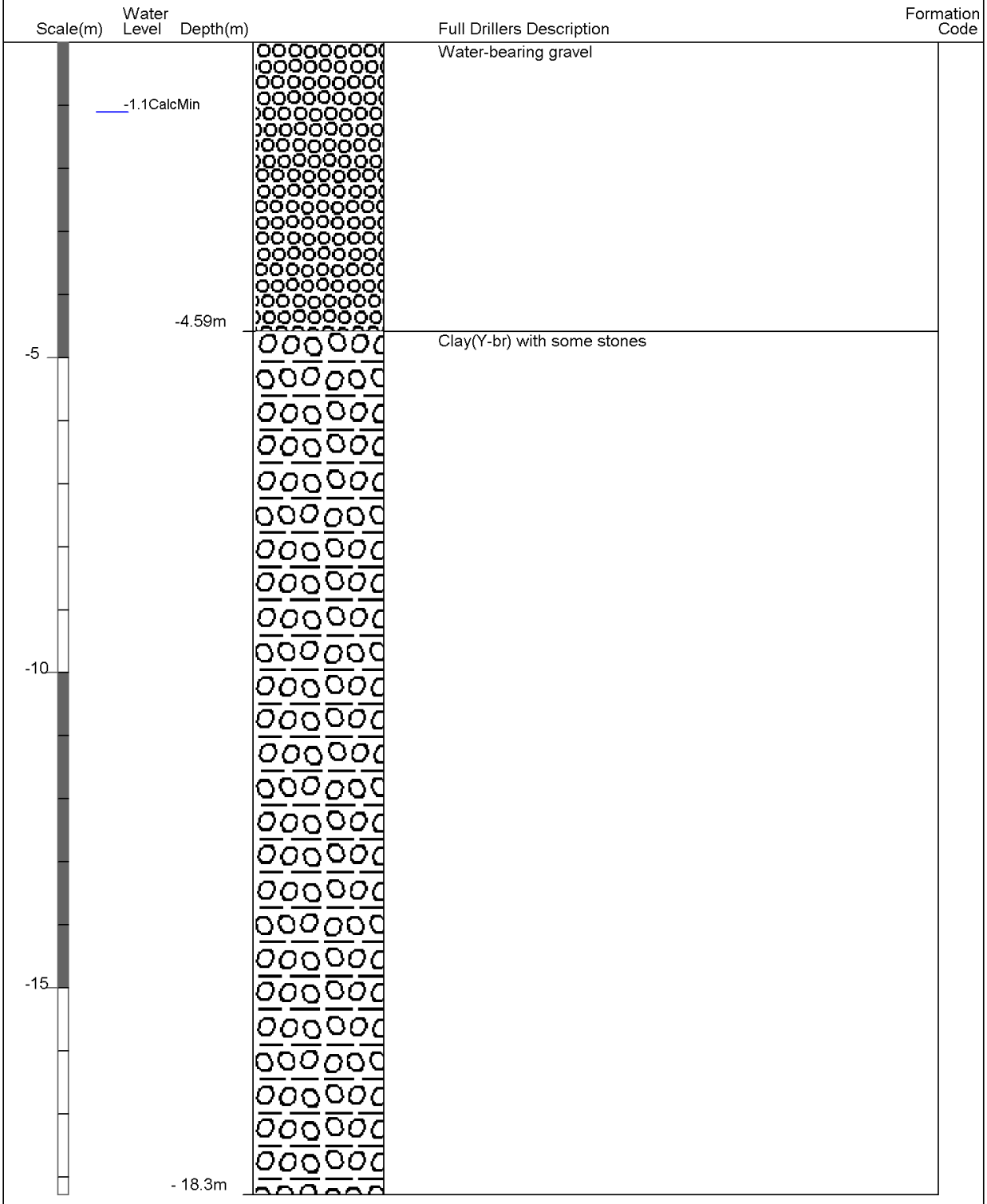
Street of Well:		**File No:**	
Locality:	SOUTHBROOK	**Allocation Zone:**	Ashley
NZGM Grid Reference:	M35:769-646 QAR 4		
NZGM X-Y:	2476900 - 5764600		
Location Description:		**Uses:**	
ECan Monitoring:			
Well Status:	Not Used		

Drill Date:	18 Nov 1968	**Water Level Count:**	0
Well Depth:	18.30m -GL	**Strata Layers:**	2
Initial Water Depth:		**Aquifer Tests:**	0
Diameter:	914mm	**Isotope Data:**	0
		Yield/Drawdown Tests:	0
Measuring Point Ait:	23.08m MSD QAR 4	**Highest GW Level:**	
GL Around Well:	0.00m -MP	**Lowest GW Level:**	
MP Description:		**First Reading:**	
		Last Reading:	
Driller:	Cashmere Drilling (1967) Ltd	**Calc. Min. GWL:**	-1.10m -MP
Drilling Method:	Driven Pipe	**Last Updated:**	26 Jan 1995
Casing Material:		**Last Field Check:**	
Pump Type:	Unknown		
Yield:	0 l/s	**Screens:**	
Drawdown:	0 m	**Screen Type:**	
Specific Capacity:		**Top GL:**	
		Bottom GL:	
Aquifer Type:	Unknown		
Aquifer Name:			

Borelog for well M35/0257

Gridref: M35:769-646 Accuracy : 4 (1=high, 5=low)
Ground Level Altitude : 23.08 +MSD
Driller : Cashmere Drilling (1967) Ltd
Drill Method : Driven Pipe
Drill Depth : -18.29m Drill Date : 18/11/1968

Environment Canterbury Regional Council



Bore or Well No: M35/0338
Well Name:
Owner: SHIPLEY, J.B.& P.M.

Environment Canterbury
Your regional council

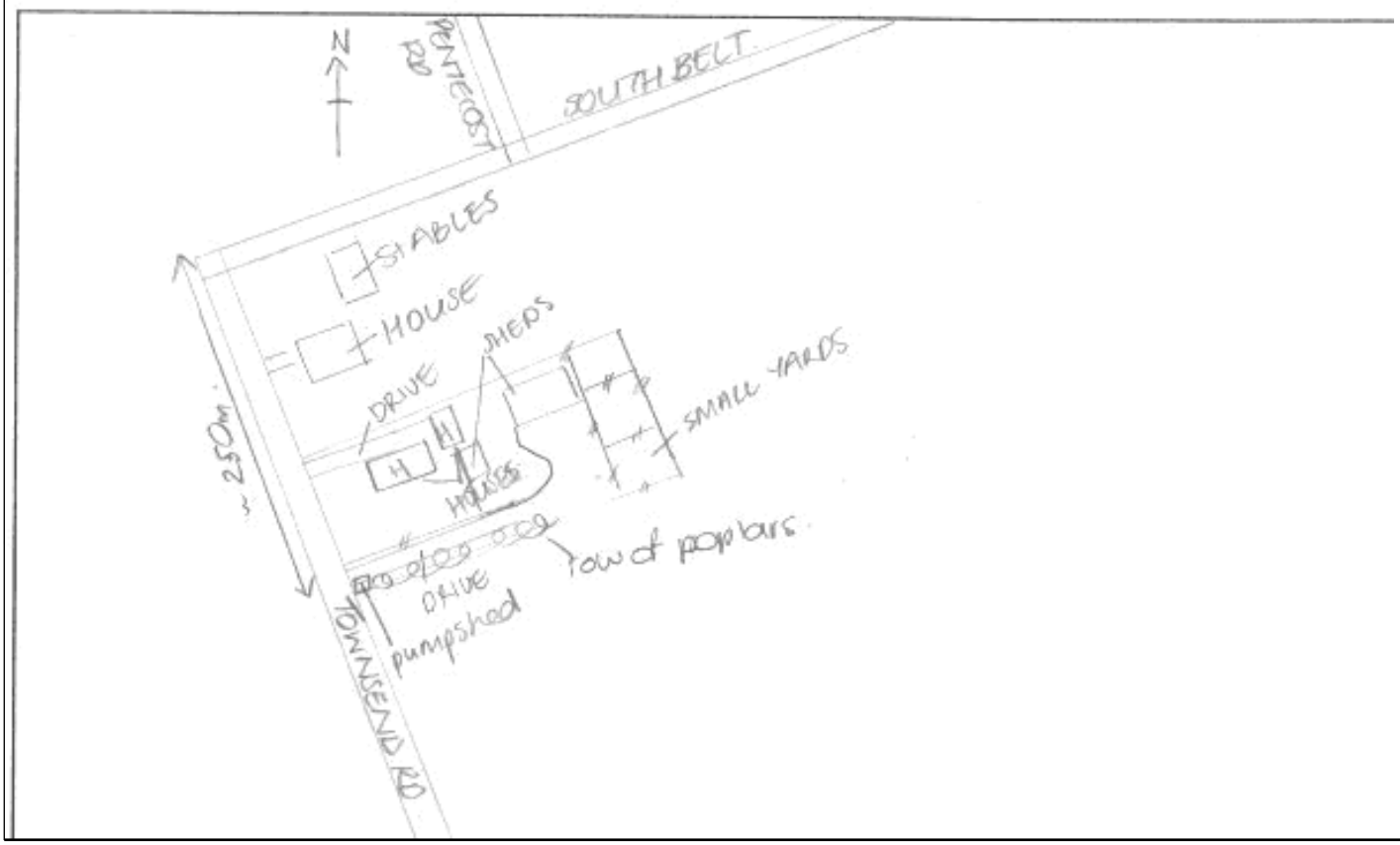
Street of Well: 84 TOWNSEND ROAD
File No:
Locality: SOUTHBROOK
Allocation Zone: Ashley
NZGM Grid Reference: M35:76269-64872 QAR 2
NZGM X-Y: 2476269 - 5764872
Location Description: NEXT TO GREEN PUMPSHED BY DRIVE
Uses: Domestic Supply
ECan Monitoring:
Well Status: Active (exist, present)

Drill Date:
Water Level Count: 57
Well Depth: 8.20m -GL
Strata Layers: 0
Initial Water Depth: -0.65m -MP
Aquifer Tests: 0
Diameter: 51mm
Isotope Data: 0
Yield/Drawdown Tests: 0

Measuring Point Ait: 26.02m MSD QAR 4
Highest GW Level: 0.57m below MP
GL Around Well: 0.00m -MP
Lowest GW Level: 1.00m below MP
MP Description:
First Reading: 20 Sep 1977
Last Reading: 30 Sep 1987
Driller: not known
Calc. Min. GWL: -0.93m -MP
Drilling Method: Unknown
Last Updated: 17 Oct 2006
Casing Material: PVC
Last Field Check: 09 Nov 1998
Pump Type: Unknown
Yield:
Screens:
Drawdown:
Screen Type:
Specific Capacity:
Top GL:
Bottom GL:
Aquifer Type: Unknown
Aquifer Name:

Date	Comments
	Previous owner Shipley.
10 May 2011	First WL reading set as ISWL

LOCATION SKETCH (roads, buildings, distances, other wells or water sources, N, gates)



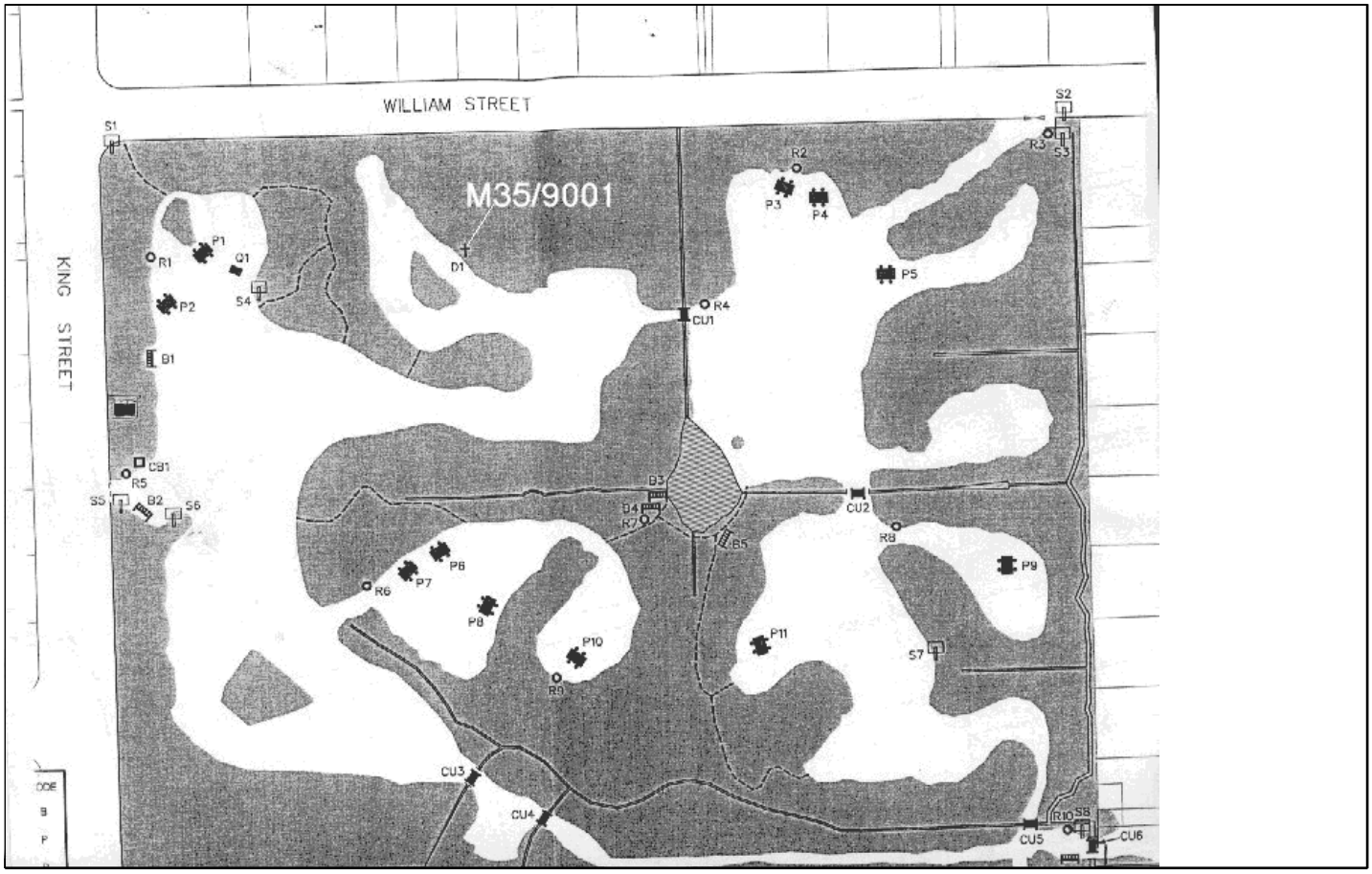
Bore or Well No: M35/9001
Well Name: MATAWAI PARK
Owner: WAIMAKARIRI DISTRICT COUNCIL

Environment Canterbury
Your regional council

Street of Well:	WILLIAM STREET	**File No:**	
Locality:	RANGIORA	**Allocation Zone:**	Ashley
NZGM Grid Reference:	M35:77113-65677 QAR 1		
NZGM X-Y:	2477113 - 5765677		
Location Description:	Matawai Park adjacent to William Street frontage	**Uses:**	Water Level Observation
ECan Monitoring:	Monthly Manual		
Well Status:	Active (exist, present)		

Drill Date:	01 May 2000	**Water Level Count:**	161
Well Depth:	1.65m -GL	**Strata Layers:**	0
Initial Water Depth:	-1.14m -MP	**Aquifer Tests:**	0
Diameter:	100mm	**Isotope Data:**	0
		Yield/Drawdown Tests:	0
Measuring Point Ait:	22.88m MSD QAR 1	**Highest GW Level:**	0.06m below MP
GL Around Well:	-0.15m -MP	**Lowest GW Level:**	1.24m below MP
MP Description:	ToC	**First Reading:**	01 Apr 2001
		Last Reading:	05 Aug 2014
Driller:	Owner	**Calc. Min. GWL:**	-1.21m -MP
Drilling Method:	Hand Dug	**Last Updated:**	18 Jan 2012
Casing Material:	STEEL	**Last Field Check:**	05 Aug 2014
Pump Type:			
Yield:		**Screens:**	
Drawdown:		**Screen Type:**	
Specific Capacity:		**Top GL:**	
		Bottom GL:	
Aquifer Type:	Water Table		
Aquifer Name:			

Date	Comments
02 Apr 2001	This well was dug by Matawai Park committee members to monitor groundwater levels at Matawai Park
02 Apr 2001	Well details collected and entered by Rossiter as a member of Matawai Park Committee
10 Aug 2010	Gridref changed from: M35:77110-65683 to M35:77113-65677
23 Aug 2010	Surveyed in 2010 as part of piezo survey. Old grid ref m35:77113-65677. Old height 22.88 m, QAR 1
10 May 2011	First WL reading set as ISWL


WILLIAM STREET
KING STREET
M35/9001
S1
S2
S3
R1
R2
R3
P1
P2
P3
P4
P5
Q1
S4
D1
R4
CU1
B1
CB1
R5
S5
B2
S6
B3
B4
R7
CU2
R8
B5
P6
P7
P8
P9
R6
P10
P11
R9
S7
CU3
CU4
CU5
R10
S8
CU6

Unknown No: M35/18081
Well Name: BH002
Owner: WAIMAKARIRI DISTRICT COUNCIL

Environment Canterbury
Your regional council

Street of Well:	Corner of South Belt and Pentecost Road	**File No:**	CO9C/69237
Locality:	Rangiora	**Allocation Zone:**	Ashley
NZGM Grid Reference:	M35:76228-65255 QAR 3		
NZGM X-Y:	2476228 - 5765255		
Location Description:		**Uses:**	Foundation/Investigation Bore
ECan Monitoring:			
Well Status:	Sealed / Grouted up		

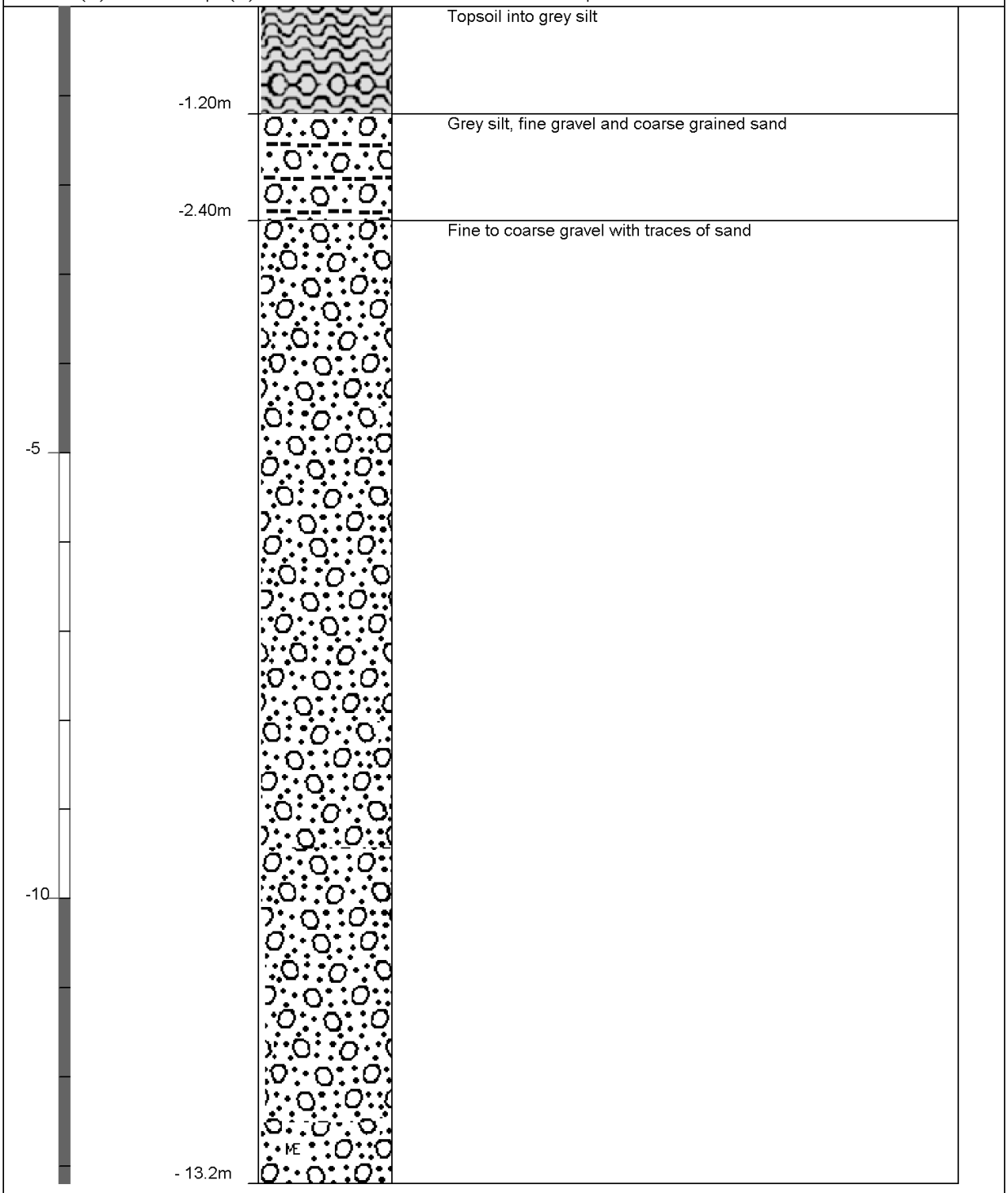
Drill Date:	29 Jul 2009	**Water Level Count:**	0
Well Depth:	13.20m -GL	**Strata Layers:**	3
Initial Water Depth:	-1.00m -MP	**Aquifer Tests:**	0
Diameter:		**Isotope Data:**	0
		Yield/Drawdown Tests:	0
Measuring Point Ait:	27.28m MSD QAR 4	**Highest GW Level:**	
GL Around Well:	0.00m -MP	**Lowest GW Level:**	
MP Description:	G.L.	**First Reading:**	
		Last Reading:	
Driller:	McMillan Water Wells Ltd	**Calc. Min. GWL:**	
Drilling Method:	Hollow Stem Auger	**Last Updated:**	08 Dec 2009
Casing Material:		**Last Field Check:**	
Pump Type:			
Yield:		**Screens:**	
Drawdown:		**Screen Type:**	
Specific Capacity:		**Top GL:**	
		Bottom GL:	
Aquifer Type:			
Aquifer Name:			

Date	Comments
14 Jul 2009	Permitted Bore
29 Sep 2009	Gridref changed from: M35:7633-6524 - Bore log received

Borelog for well M35/18081

Gridref: M35:76228-65255 Accuracy : 3 (1=high, 5=low)
Ground Level Altitude : 27.28 +MSD
Driller : McMillan Water Wells Ltd
Drill Method : Hollow Stem Auger
Drill Depth : -13.2m Drill Date : 29/07/2009

Environment Canterbury Regional Council



Appendix C : Stormwater Calculations

First Flush (FF) Volume Calculation (using WWDG Section 6.4**)**

FF Rainfall Depth =	25	mm
Gross Site Area =	13.9	ha
Esplanade Strip Area =	1.1	ha
Developed Site Area =	12.8	ha
FF Runoff Coefficient =	0.41	(WWDG, L1)

FF Volume = FF Rainfall Depth x FF Runoff Coefficient x Area

FF Volume = 1312 m3

Wetland Area Calculation (using WWDG Section 6.7.2)

$$\text{Wetland Area} = \frac{(\text{FF Volume}/\text{detention time in wet pond}) \times \text{Wetland residence time}}{\text{Flow depth} \times \text{Porosity}}$$

Wet pond detention time =	4	days
Wetland residence time =	2	days
Flow depth =	250	mm
Porosity =	0.75	

Wetland Area = 3499 m2

Eliot Sinclair
surveyors | engineers | planners

Appendix D : Correspondence from Waimakariri District Council

Edward Shaw

From: Gary Boot [mailto:gary.boot@wmk.govt.nz]
Sent: Monday, 6 October 2014 10:11 a.m.
To: Mark Allan
Cc: Kalley Simpson; Ric Barber; Grant Stowell
Subject: RE: Clarke Plan Change. Intersection of Townsend Road and South Belt.

Hi Mark,

We are working on it currently. I couldn't be too specific at this stage about the actual construction date, but we are planning on doing the work in two stages, as follows:

Stage 1: Sewer from Ravenscar Development to intersection of Rowse Street & South Belt (this has been budgeted for and will be timed to be ready for the Ravenscar Development)
Stage 2: Sewer from intersection of Rowse Street and South Belt to Southbrook Road (this will be some time in the future and will be budgeted or in the 2015-25 LTP)

I hope that helps.

On a similar note, do you have a programme for completion of Stage 1 of Ravenscar, as we would like to be a little ahead of you for the first stage of the sewer?

Regards

Gary

From: Mark Allan [mailto:Mark.Allan@eliotsinclair.co.nz]
Sent: Friday, 3 October 2014 5:16 p.m.
To: Gary Boot
Subject: Clarke Plan Change. Intersection of Townsend Road and South Belt.

Hi Gary

We are finalising the Plan Change Application for Clarke at the intersection of Townsend Road and South Belt.

We are aware that the Council are planning / proceeding with an upgrade to the wastewater sewer system in this area.

If possible can you please advise Councils program to have this work completed.

Cheers

Mark Allan
Registered Professional Surveyor
Director

mark.allan@eliotsinclair.co.nz

Eliot Sinclair
surveyors | engineers | planners

Eliot Sinclair & Partners Ltd. 20 Troup Drive, PO Box 9339, Tower Junction, Christchurch 8149, NZ
ph. 03 379 4014

Appendix E : Correspondence from Mainpower

Edward Shaw

From: Brian Heron <brian.heron@mainpower.co.nz>
Sent: Tuesday, 29 July 2014 12:14 p.m.
To: Edward Shaw
Cc: Kevin Large; Paul Oliver
Subject: RE: [#196916] 141 South Belt and 104 Townsend Road, Rangiora: Private Plan Change Request

Edward

Mainpower will be able to supply the subdivision.

A budgetary estimate to supply the lots is $2,200 plus GST per lot at todays rate

This is with the developer providing the trenching and backfilling for all the cables and ducts, including any excavation required in South Belt

Probable Time frame would be 8 to 10 weeks after acceptance of our quotation to us being able to schedule staff to lay the cables

There will also be the cost of installing Streetlights provided by the developer, presently a budget cost of $1000 plus GST per column

The developer will need to arrange a streetlight design and purchase the columns and fittings

Thanks

Brian Heron
Network Manager Customer Services

From: Edward Shaw [mailto:Edward.Shaw@eliotsinclair.co.nz]
Sent: Tuesday, 29 July 2014 11:19 a.m.
To: Brian Heron
Subject: [#196916] 141 South Belt and 104 Townsend Road, Rangiora: Private Plan Change Request

Hi Brian,

I've attached a proposed plan of a subdivision for the property at 141 South Belt & 104 Townsend Road, Rangiora (Part of Lot 1 DP 45826 & Part of Lot 3 DP 73557).

The anticipated number of allotments that would be created on the site is approximately 140.

Can you please advise whether MainPower New Zealand Ltd has the capacity to service these lots?

If upgrading of the current MainPower network would be required could you provide a broad costs and time frame to do this work?

I look forward to hearing from you.

Kind regards,

Ed.

Edward Shaw MEng(Hons)
Civil and Environmental Engineer

edward.shaw@eliotsinclair.co.nz

Eliot Sinclair
surveyors | engineers | planners

Eliot Sinclair & Partners Ltd. 20 Troup Drive, PO Box 9339, Tower Junction, Christchurch 8149, NZ
phone 03 379 4014, fax 03 365 2449

Appendix F : Correspondence from Enable

Edward Shaw

From: Rob Armstrong [mailto:Rob.Armstrong@enable.net.nz]
Sent: Monday, 11 August 2014 10:54 a.m.
To: Edward Shaw
Subject: RE: [#196916] 141 South Belt and 104 Townsend Road, Rangiora Private Plan Change Request Private Plan Change Request

Edward

The quick answer here is that this area of Rangiora has not been programmed until around 2 -3 years away

Best we update you closer to this development going ahead

If we are opposite this development in time for the construction then our pricing is $500 per lot plus GST for greenfield subdivisions, based on open trenches and our contractors laying in the microtubing

Regards

Rob Armstrong | Business Development Manager

Enable Services Limited
Phone +0800 4 FIBRE
Email sales@enable.net.nz
Web enable.net.nz

PO Box 9228, Tower Junction
Christchurch 8149

From: Rob Armstrong [mailto:Rob.Armstrong@enable.net.nz]
Sent: Friday, 8 August 2014 11:10 a.m.
To: Edward Shaw
Cc: Carl Westerman
Subject: FW: [#196916] 141 South Belt and 104 Townsend Road, Rangiora Private Plan Change Request Private Plan Change Request

Edward

I have received your email re proposed Townsend road subdivision

This sits opposite our coverage area in Rangiora so it is normally okay to feed but the coverage area in question may be some time off completion

To help us assess this project can you tell me;

1. What are the likely timeframes for build and completion
2. If this is to be staged, how large will the first stage be

Regards

Rob Armstrong | Business Development Manager

Enable Services Limited
Phone +0800 4 FIBRE
Email sales@enable.net.nz
Web enable.net.nz

PO Box 9228, Tower Junction
Christchurch 8149

From: Edward Shaw [mailto:Edward.Shaw@eliotsinclair.co.nz]
Sent: Friday, 8 August 2014 9:37 a.m.
To: Sales
Subject: 141 South Belt and 104 Townsend Road, Rangiora: Private Plan Change Request

Hi,

I'm an engineer preparing a servicing report on behalf of the owner of the land at the above address.

I've attached a proposed plan of the subdivision for the property at 141 South Belt & 104 Townsend Road, Rangiora (Part of Lot 1 DP 45826 & Part of Lot 3 DP 73557).

The anticipated number of allotments that would be created on the site is approximately 140.

Can you please advise whether Enable has the capacity to service these lots?

If upgrading of the current Enable network would be required could you provide a broad cost and time frame to do this work?

I look forward to hearing from you.

Kind regards,

Ed.

Edward Shaw MEng(Hons)
Civil and Environmental Engineer

edward.shaw@eliotsinclair.co.nz

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surveyors | engineers | planners

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phone 03 379 4014, fax 03 365 2449

Appendix H: Geotechnical Assessment

GEOTECHNICAL REPORT FOR PROPOSED PLAN CHANGE

141 South Belt & 104 Townsend Road, Rangiora

For M A Clarke and Williams McKenzie Trustees Limited

10 October 2014

Eliot Sinclair

surveyors | engineers | planners

GEOTECHNICAL REPORT FOR PROPOSED PLAN CHANGE

141 South Belt & 104 Townsend Road, Rangiora

Eliot Sinclair
surveyors | engineers | planners

20 Troup Drive, Tower Junction | PO Box 9339
Christchurch 8149 | New Zealand | 03 379 4014

Prepared by:	Sarah Harding Geotechnical Assistant	BSc (Earth Science)
Prepared and approved for release by:	John Aramowicz Associate, Senior Civil/Geotechnical Engineer	BE(Hons), MIPENZ (1008112), CPEng, IntPE(NZ)

Date:	10 October 2014
Reference:	196916_13221155431_ENVTR_geotech_jta.docx
Status:	Final

Distribution:	1 Original	M A Clarke & Williams McKenzie Trustees Limited
	File copy	Eliot Sinclair

Limitations: This report has been prepared according to the instructions from M A Clarke & Williams Mckenzie Trustees Limited, for the particular objectives described in the report. The information contained in the report should not be used by anyone else or for any other purposes.

Executive Summary

					Calculated index value
Liquefaction-induced settlement in SLS event	TC1		0-15mm	☒	EST
	TC2	Minor to	0-50mm	☐	
	TC3	Moderate	< 100mm	☐	
		Potentially Significant	> 100mm	☐	
Liquefaction-induced settlement in ULS event	TC1		0-25mm	☒	EST
	TC2		0-100mm	☐	
	TC3		> 100mm	☐	
Nearest water course	Southbrook River located along the southern boundary of the site				
Lateral stretch in ULS	TC1		NIL	☒	
	TC2	Minor	< 100mm	☐	
	TC3	Minor to Moderate	< 200mm	☐	
		Major	200-500mm	☐	
		Severe	> 500mm	☐	
Global lateral movement in ULS event	TC1		NIL	☒	
	TC2	Minor	< 100mm	☐	
	TC3	Minor to Moderate	< 300mm	☐	
		Major	300-500mm	☐	
		Severe	> 500mm	☐	
MBIE residential Foundation Technical Category as per this site specific assessment			TC1	☒	
			TC2	☐	
			TC3	☐	
			TC2/TC3 Hybrid	☐	
			N/A	☐	
NZS 1170.5 site subsoil class	A☐ B☐ C☐ D☒ E☐ i.e. deep soils				
Flood Hazard	Site within known flood hazard area?		Yes☒		No☐
	Minimum floor level		N/A mRL (CDD)		
	Inferred average ground level		N/A mRL (CDD)		
	Calc. FFL height above ground level		NZBC		
Construction limitations					
Distance from proposed foundation to nearest boundary?			N/A		
Distance from proposed foundation to nearest existing foundation or piped service?			N/A		

Recommended foundation system	Foundation system	MBIE Reference
Yes	NZS3604:2011	TC1 foundations

Table of Contents

1. INTRODUCTION

Eliot Sinclair were engaged by M A Clarke and Williams McKenzie Trustees Limited to undertake a geotechnical investigation and to prepare an interpretive report for the proposed plan change at 141 South Belt & 104 Townsend Road, Rangiora.

2. SCOPE OF WORK

The scope of work for this geotechnical interpretive report was:

- Undertake investigation and geotechnical reporting in accordance with the requirements of the Ministry for Business, Innovation and Employment's guidelines (December 2012)
- Review available data from Canterbury Geotechnical Database (CGD), Environment Canterbury, and Geological Nuclear Science (GNS)
- Undertake eleven shallow hand-auger test holes and ten Scala penetrometer tests across the site
- Review the hazards outlined by S106 of the RMA(1991)
- Comment on the geotechnical suitability of the site for the proposed plan change).

3. DISCLAIMER

Comments made in this geotechnical report are based on the site investigations undertaken by Eliot Sinclair, published geological information, and the Ministry for Business, Innovation & Employment's December 2012 guidelines.

Whilst every care was taken during Eliot Sinclair's investigation and interpretation of subsurface conditions, there may well be subsoil strata and features that were not detected. Additionally, on-going seismicity in the general area may lead to deterioration or additional ground settlement that could not have been anticipated at time of writing of this report. The exposure of such conditions, occurrence of additional strong seismicity, or any future update of MBIE's guidelines may require a review of our recommendations. Eliot Sinclair should be contacted if this occurs to confirm the recommendations of this report remain valid.

This report has been prepared for the benefit of M A Clarke and Williams McKenzie Trustees Limited and the Waimakariri District Council. No liability is accepted by Eliot Sinclair or any employee of Eliot Sinclair with respect to the use of this report by any other party.

This report is specifically prepared for the proposed plan change, and shall not be used for design of foundations and/or building consent. Any future dwelling/s will require site specific geotechnical investigation, assessment and reporting.

4. PROPOSED PLAN CHANGE

It is proposed to undertake a Plan Change (Residential 4B to Residential 2) for the area of 141 South Belt and 104 Townsend Road, Rangiora, located north of the Southbrook River.

The site is approximately 12ha and could be subdivided into approximately 150 lots, on approval of the plan change.

Refer to Appendix A for the outlined development plan (ODP).

5. SITE DESCRIPTION

5.1. Location

The site is located on the corner of South Belt and Townsend Road, southwest of central Rangiora. Refer to Figure 1.

Figure 1: Approximate site area (yellow outline), (source: Google Maps, Photograph dated 2 January 2014).

5.2. Topography

The site generally comprises flat topography, with a slight fall towards the east. Refer to Appendix B for the topographical site survey.

The majority of the site is vegetated with grass used for grazing stock. Refer to Figure 2.

Figure 2 : Photo of the southeast corner of the site, facing north, August 2013.

5.3. Buildings

There are existing dwellings, multiple sheds, and horse-stables located at the western part of the site.

5.4. Watercourses

The Southbrook River is located along the southern boundary of the site, and flows down to the east. At the time of our inspection, the river was around 2 to 3m wide but was up to 5m wide in parts, and with the water level being approximately 0.9m below the surrounding ground levels. Refer to Figure 3.

Figure 3 : The Southbrook River, near the southeast corner of the site, August 2013.

5.5. Roads

Townsend Road and South Belt are located at the west and north boundaries, respectively, and appeared to be in reasonable condition without any obvious or unusual cracking, slumping or heaving.

6. DESKTOP INVESTIGATION

6.1. Canterbury geotechnical database

The Canterbury Geotechnical Database (CGD) which contains a large range of photographic, topographic, geological, geotechnical, land classification, survey records and field observations that relate to the Canterbury earthquake sequence, however the coverage of this data does not extend to this site.

6.2. CERA land classification

The Ministry of Business, Innovation and Employment (MBIE) defines three technical categories for residential foundation design described in its guidance for repairing and rebuilding earthquake damaged homes in Canterbury. These categories apply to liquefaction prone flat land in the green zone in the greater Christchurch urban area and surrounding communities.

This site has been classified by CERA as 'Green Zone, Technical Category Not Applicable, Rural & Unmapped', that indicates that 'Properties in rural areas or beyond the extent of land damage mapping, and properties in parts of the Port Hills and Banks Peninsula have not been given a Technical Category'.

6.3. Geological maps

The Geological Nuclear Science (GNS) geological map of indicates most of the site is underlain by 'Unweathered, brownish-grey, variable mix of gravels/sand/silt/clay in low river terraces; locally up to 2m silt (loess) cap '[1]. Refer to Figure 4.

[1] Geological Nuclear Science (GNS), New Zealand Geology Web Map. Retrieved September 12, 2013, from http://data.gns.cri.nz/geology/

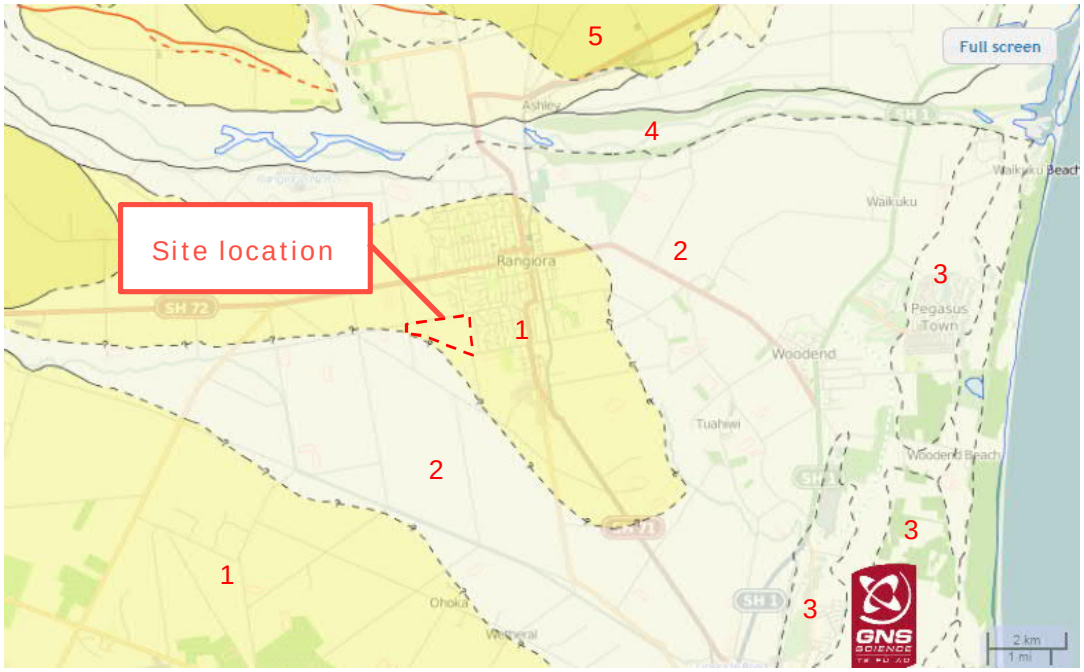


Figure 4 : Geological map of Christchurch.

1	"Unweathered, brownish-grey, variable mix of gravels/sand/silt/clay in low river terraces; locally up to 2m silt (?loess) cap."
2	"Modern river floodplain/low-level degradation tce. Unweathered, variably sorted gravel/sand/silt/clay. Surfaces <2 degree slope."
3	"Dunes of unweathered, wind-deposited beach sand."
4	"Active flood plain. Unweathered; rounded-subangular; variably sorted loose gravel/sand/silt. Associated with surfaces <2 deg. Slope"
5	"Brown, weathered, mod to poorly sorted silty subangular gravel & sand fan alluvium in dissected fan terraces (slope 1-20deg)."

6.4. Active faults

Geological & Nuclear Science's (GNS) Active Faults Database[2] notes the closest active fault is the Ashley Fault, located approximately 6.5km northwest of the site, and has an east-west orientation.

The Loburn Fault is located approximately 6.7km northwest of the site, and also has an east-west orientation.

Refer to Figure 5.

[2] Geology Nuclear Science (GNS) New Zealand Active Faults Database. Retrieved September 12, 2013, from http://maps.gns.cri.nz/website/af/viewer.htm, September 2013

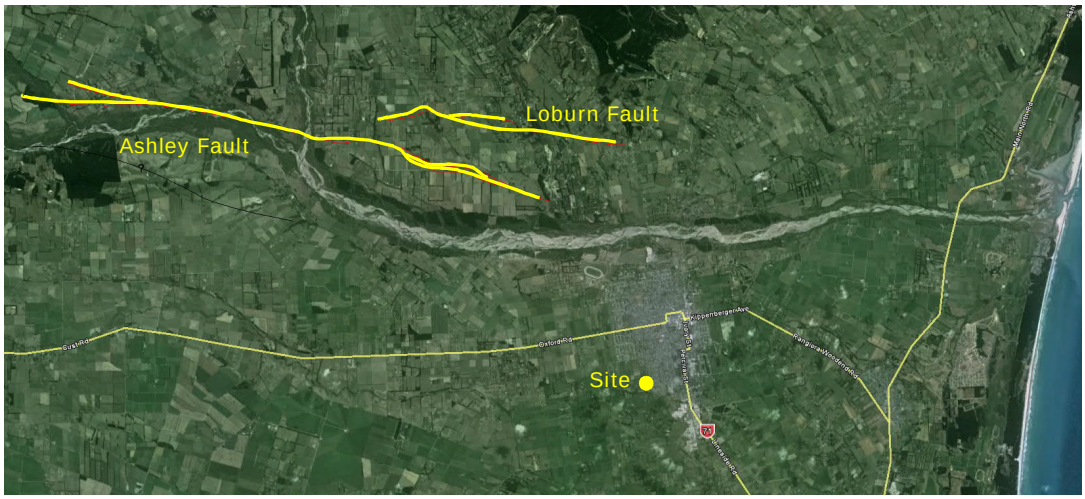


Figure 5 : Aerial photo of showing faults in the surrounding area. Source: CGD 2013

6.5. Conditional PGA for liquefaction assessment

The Ministry for Business, Innovation and Employment's (MBIE) 'Guidance for repairing and rebuilding houses affected by the Canterbury earthquakes' (December 2012) specifies, for residential land, the peak ground acceleration ($PGA_{M7.5}$) to be adopted for liquefaction assessment in a serviceability limit state (SLS) event as $PGA_{M7.5}$ = 0.13g, and $PGA_{M7.5}$= 0.35g in an ultimate limit state (ULS) event.

The conditional median peak horizontal ground accelerations recorded in the general area in the September 2010 event were likely to be close to a Serviceability Limit State (SLS, $PGA_{M7.5}$=0.13g), but below the Ultimate Limit State (ULS, $PGA_{M7.5}$=0.35g). Refer to Table 1.

Table 1: Comparison of peak horizontal ground accelerations close to site

PGA (horizontal)	SLS (1/25, M7.5)	ULS (1/500, M7.5)	04 Sept 2010 (M7.1)	22 Feb 2011 (M6.2)	13 June 2011 (M6.0)
Design (as of April 2012)	0.13g	0.35g			
Conditional Median PGA			0.14g	0.11g	0.06g
Magnitude Scaling Factor (MSF)			1.11	1.41	1.48
Equivalent to $PGA_{M7.5}$			0.13g	0.08g	0.04g

6.6. Liquefaction hazard mapping

Environment Canterbury's recently completed review of the liquefaction hazard information[3] for eastern Canterbury notes that 'damaging liquefaction unlikely' at this site.

6.7. Flood hazard

Flood hazard data provided by the Waimakariri District Council titled 'Clark Property South Belt' generally indicates that the site is not at risk from flood hazard. However, a small area of land southwest of the site, and near the Southbrook River has a 'low' to 'medium' risk of flooding in a 200 year event and indicates flood depths up to 0.25 to 0.50m could occur close to the Southbrook River.

Flood hazard data for a 500 year event generally indicates there will be a small increase in the extent of flooding compared to that of a 200 year event, predominately at the south part of the site along the Southbrook River. We note flood risk in this area is still classed 'low' risk in a 500 year ARI event.

Refer to Appendix C for flood hazard data.

6.7.1. June 2014 rainfall event

During June 2014, the Waimakariri District experienced lengthy periods of rainfall.

Rainfall data (ARI) provided by the Waimakariri District Council (WDC) recorded in Rangiora between 9 to 11 July 2014 indicates that at the duration of 24 to 28 hours, the amount of rainfall was between a 50 and 100 year rainfall event.

Refer to Appendix D for WDC rainfall data.

6.8. Existing well logs

Well M36/1808, located approximately 50m north of the site encountered 'topsoil into grey silt' to 1.2m, 'grey silt, fine gravel and coarse grained sand' to 2.4m over 'fine to coarse gravel with traces of sand' to 13.2m depth below ground level where the log terminates. The initial depth to groundwater was 1m at the time of drilling.

Well M35/0257 located 340m southeast of the site encountered 'water-bearing gravel' to 4.6m overlying 'clay (yellow brown) with some stones' to 18.3m where the log terminates.

Refer to Appendix E.

[3] Brackley, H.I. (2012): Review of liquefaction hazard information in eastern Canterbury, including Christchurch City and parts of Selwyn, Waimakariri and Hurunui Districts – Environment Canterbury, Report No. R12/83

7. SITE INVESTIGATION

7.1. Shallow testing

Ten Scala penetrometer tests and eleven shallow hand-auger boreholes were undertaken across the site in order to identify the nature of the shallow subsoil materials.

The soil type and penetration resistances encountered in the upper layers were generally consistent, comprising shallow topsoil up to 0.5m deep over, clayey silt and sandy clayey silt to 0.9 to 2m, over silty and sandy gravels where deeper testing with a hand equipment was impractical.

Based on our experience in other parts of western Rangiora, we are aware that the clayey silty soils in the upper layers can be expected to be slightly expansive and be subject to some shrinkage and swelling with changes in moisture content.

Scala penetrometer testing below 0.6m depth returned penetration resistances well in excess of 2 blows per 100mm.

Refer to Appendix F.

7.2. MBIE investigation guidelines

Section 16.2 of MBIE's guidelines advise appropriate geotechnical investigations be carried out to enable the ground forming materials to at least 15m depth to be characterised, unless the ground is known to be of acceptable quality from lesser depths, for example in areas known to be underlain by competent gravels or deep groundwater profiles.

At this site, the underlying geology comprises topsoil up to 0.5m depth, clayey silt and sandy, clayey silt overlying sand and gravel to at least 2m depth. Well logs indicate the gravels extend to considerable depth. Liquefaction of these materials is not likely.

Therefore, given that liquefaction is not a likely risk, and the shallow test holes and Scala penetrometers indicate relatively acceptable ground conditions, we consider that additional deep geotechnical investigation is not required at this site.

8. LIQUEFACTION ASSESSMENT

Due to the presence of shallow clayey silts overlying deep, silty and sandy gravels, the site is not likely to be at risk of liquefaction.

8.1. Provisional land classification

Based on the nature of the subsoil materials and depth to groundwater, we conservatively assess the underlying soils across proposed lots to be consistent

with the TC1 land classification (i.e. <15mm settlement in a SLS event, and <25mm in a ULS event).

9. RMA (1991) Section 106 Assessment

9.1. Performance philosophy

In determining the requirement for future ground performance it is useful to outline the requirements of the New Zealand Building Code, Clause B1-Structure which advises that buildings, building elements and site work must;

(B.1.3.1) have a low probability of rupturing, becoming unstable, losing equilibrium, or collapsing during construction or alteration and throughout their lives. (Generally referred to as the Ultimate Limit State, ULS).

(B.1.3.2) have a low probability of causing loss of amenity through undue deformations, vibratory response, degradation or other physical characteristics throughout their lives, or during construction or alteration when the building is in use (generally referred to as the Serviceability Limit State , SLS).

9.2. Erosion

Due to the flat topography, location and geology of the site, we consider the majority of the site is not likely to be subject to material damage due to erosion.

However, the margin along the river comprises sub-vertical banks up to 1m high with some signs of occasional slumping and meandering of the river. Historic aerial photography shows that the river is largely confined to the same alignment along the south boundary, however, further east of the site within Council land meandering has occurred over time.

There is a small risk that erosion could occur where over steepened banks or changes in direction occur. The true left bank (north side) of the river should be armoured or vegetated to reduce the risk of erosion or changes in the direction of flow. The outer corners of any banks of any bends may require armouring. This risk, and any mitigation requirements, shall be addressed at the time of subdivision engineering.

9.3. Falling debris

The site is flat and is not at risk of rockfall.

9.4. Landsliding

The site is flat and not at risk of landsliding.

9.5. Inundation

Other than the area bordering the Southbrook River, there are no significant topographical features that form large concentrations of overland surface stormwater onto or across the site.

Ground levels in the area just north of the Southbrook River are likely to be raised by filling to mitigate the risk of inundation, and this will need to be addressed at time of subdivision consent and construction. Filling in the order of 0.5m depth may be required, but will depend on any future subdivision scheme plan.

We note that we have not investigated the change in rate of runoff from a residential development of the site, however, stormwater analysis and design would be undertaken at the time of subdivision engineering.

Refer to Appendix C.

9.5.1. Natural hazards

The objectives of Chapter 11 (Natural Hazards) in the Canterbury Regional Policy Statement 2013 are that 'risks from natural hazards are avoided in the first instance and otherwise mitigated. Avoiding these impacts involves ensuring that development does not occur in high hazard risk areas (where avoidance is not possible), mitigation measures may provide an alternate means of achieving the overall objective'.

The majority of the site is at no or low risk of flooding. There is a small area at the southwest of the site and near the Southbrook River that is at low to medium risk of flooding, however, this can be mitigated at the time of subdivision engineering, by filling or raising ground levels, or by improving channel flow capacity, etc.

9.6. Subsidence

9.6.1. Liquefaction and lateral spreading

The Ministry for Business, Innovation and Employment's guidance document[4] specified the values to be adopted for liquefaction assessment. The peak ground accelerations to be used for liquefaction assessment are 0.13g for a Serviceability Limit State (SLS) event, and 0.35g for a Ultimate Limit State (ULS) event.

The site was subjected to peak ground accelerations of 0.14g ($PGA_{M7.5}$=0.13g) in the M7.1 September 2010 earthquake, 0.11g ($PGA_{M7.5}$=0.08g) in the M6.2 February 2011 earthquake, and 0.06g ($PGA_{M7.5}$=0.04g) in the M6.0 June 2011

[4] Ministry for Business, Innovation & Employment "Guidance: Repairing and Rebuilding houses affected by the Canterbury earthquakes "Version 3, December 2012 (released 31 January 2013)

earthquake. The September 2010 event was close to a serviceability limit state event with no record of ground damage at the site.

Based on ground performance, and the nature of the underlying geology, we consider that subsidence due to liquefaction is unlikely at the site.

As with liquefaction and based on the ground performance at the site, we consider that lateral spreading at the site is not likely.

9.6.2. Expansive soils

The insitu clayey silts encountered just north of the site have been found in the upper layers to be slightly expansive. This requires careful detailing of road and driveway formations and care at the time of construction to reduce the risk of shrinkage and swelling causing damage to roads, driveways, foundations and floor slabs, although these measures are typically straight forward and not costly.

9.7. Others

9.7.1. Stormwater disposal

The site topography will allow all roof and driveway stormwater to drain down to an on-site stormwater management area and then to the WDC network.

Discharge of treated stormwater into the ground is not likely to be practical.

9.7.2. Effluent disposal

Effluent shall be piped to the Council's sewerage network.

9.7.3. Vehicle access

There are no specific geotechnical requirements for formation of vehicle access to each lot, other than road formation requirements shall take the presence of any expansive clayey soils, if present, into account. This can be undertaken as part of subdivision design and engineering approval.

10. TYPICAL REQUIREMENTS FOR RESIDENTIAL BUILDING FOUNDATIONS

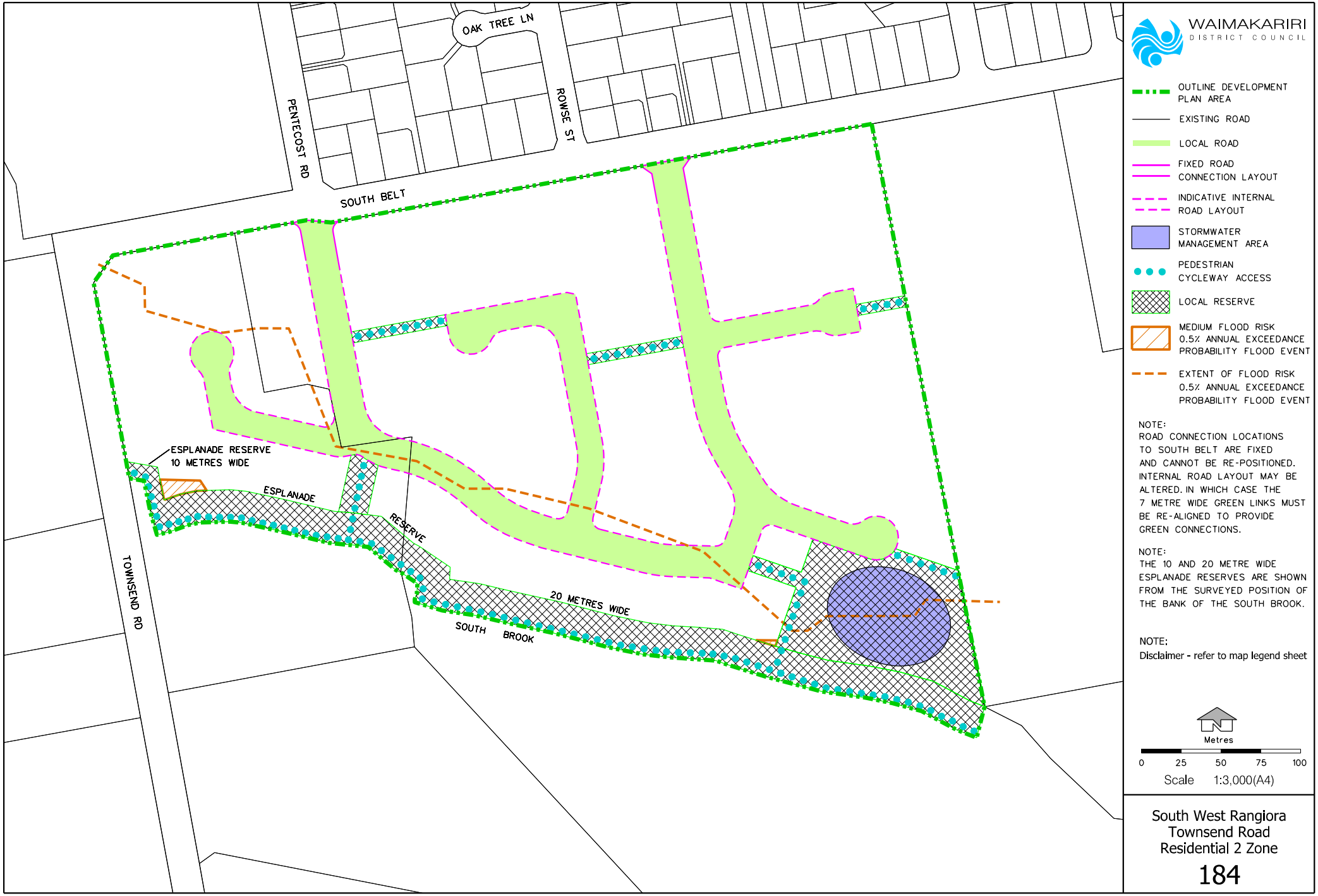
Based on our assessment, all foundations for future dwellings will be able to be designed to comply with the requirements set out in MBIE's guidelines for TC1 land.

11. SUMMARY

We consider the site is not likely to be subject to liquefaction induced subsidence.

We are satisfied that from a geotechnical perspective, the site is suitable for the plan change request, and that a future residential subdivision of the land could occur subject to suitable mitigation measures to address the risks of erosion, inundation, and subsidence as would be a normal part of subdivision engineering and design.

Appendix A : OUTLINED DEVELOPMENT PLAN (ODP)



WAIMAKARIRI DISTRICT COUNCIL

- OUTLINE DEVELOPMENT PLAN AREA
- EXISTING ROAD
- LOCAL ROAD
- FIXED ROAD CONNECTION LAYOUT
- INDICATIVE INTERNAL ROAD LAYOUT
- STORMWATER MANAGEMENT AREA
- PEDESTRIAN CYCLEWAY ACCESS
- LOCAL RESERVE
- MEDIUM FLOOD RISK 0.5% ANNUAL EXCEEDANCE PROBABILITY FLOOD EVENT
- EXTENT OF FLOOD RISK 0.5% ANNUAL EXCEEDANCE PROBABILITY FLOOD EVENT

NOTE:
ROAD CONNECTION LOCATIONS TO SOUTH BELT ARE FIXED AND CANNOT BE RE-POSITIONED. INTERNAL ROAD LAYOUT MAY BE ALTERED. IN WHICH CASE THE 7 METRE WIDE GREEN LINKS MUST BE RE-ALIGNED TO PROVIDE GREEN CONNECTIONS.

NOTE:
THE 10 AND 20 METRE WIDE ESPLANADE RESERVES ARE SHOWN FROM THE SURVEYED POSITION OF THE BANK OF THE SOUTH BROOK.

NOTE:
Disclaimer - refer to map legend sheet

Metres
0 25 50 75 100
Scale 1:3,000(A4)

South West Rangiora Townsend Road Residential 2 Zone

184

../../....

Appendix B : TOPOGRAPHICAL SURVEY

Site Benchmark ES11
Masonry Nail in Kerb
R.L. 26.282

Site Benchmark ES9
Masonry Nail in Kerb
R.L. 26.198

TOWNSEND ROAD
Legal Road
(20.12)

SOUTH BELT
Legal Road
(20.12)

Lot 1
DP 45826
Eb 3677 f 170
3677m²

Lot 1
DP 23261

Lot 3
DP 73557
CB40A/812
23040m²

Lot 1
DP 73557

Right to drain Sewage In gross by A274256.9

NOTES:

Boundary dimensions and areas have been adopted from underlying cadastral information and have not been confirmed by field survey.
Abutting Lot information was derived from LINZ Digital Cadastral Data Base (DCDB.LoL XML).

Legend
Boundary
Edge of Road
Watermain (Top of Pipe)
Bottom of Wall
Edge of Concrete
Bottom of bank
Edge of Seal
Edge of Bridge
Road Centreline
Drain Invert
Fence
Edge of Vegetation
Kerb & Channel
Top of Bank
Fire hydrant
Site Benchmark
Wastewater Manhole
Power Pole
Field Point

0 50 100 150 200 300 400 500 metres

Scale Bar

Final

no.	amendment	initial	date

designed		surveyed	R.C.Paulsen
manager	L.S.Ironside		
drawn	R.C.Paulsen	surv.date	05 Sept 2014
checked			

origin of levels
BM V99 (AG41)
Corner of West Belt & High Street
R.L.34.943
datum Lyttelton 1937

Projection: NZGD2000
Circuit: Mt Pleasant
other notes

Scale: 1:1000 (A1)
Date: 15/09/2014

Drawing Set
196916 T1
PLOT 196916 T1 050914 sht 1.PDF

Sheet
1 of 1
rev.

Topographical Survey
Lot 1 DP 45826 & Lot 3 DP 73557
Townsend Road - Rangiora
For Murray Clarke

Eliot Sinclair
surveyors | engineers | planners

20 Troup Drive, PO Box 9339, Tower Junction, Christchurch 8149, Phone: 03 379-4014, Fax: 03 365-2449, info@eliotsinclair.co.nz www.eliotsinclair.co.nz

Original size mm

Appendix C : FLOOD HAZARD MAPPING