
Mar 28, 2011
Roscrea Place
McHughs Rd
Bradleys Rd
Mandeville Rd
Pinus radiata plantation
Stockpiled soil from pool excavation at 169 McHughs Rd
Grazed/cropped (hay)
Grazed/cropped (hay)
Water tank
116
Grazed/cropped (hay)
Hay barn (1990)
horse dressage pad
McHughs Rd
Mandeville Park Dr
Truro Close
N

28/03/2011


Location of burn pad
(established after Feb 3013)
Stockpiled soil from pool
excavation at 169 McHughs Rd
Pinus radiata plantation
Grazed/cropped (hay)
Grazed
Well head
Water tank
Hay barn
(1990)
Hay bales
Horse arena
Grazed/cropped (hay)
N

28/02/2013

Attachment E: Environment Canterbury Resource Consents

Record Summary Generated 11-Sep-2013

Record Number CRC990745
Record Type Renewal
Permit Type Water Permit
Record Holder Peter Gerard Harris
Record Status Terminated - Surrendered

Location Cnr Mchughs & Mandeville Roads, MANDEVILLE NORTH
Description to take groundwater via bore M35/0597 at or about map reference NZMS 260 M35:7210-5830 for irrigation of up to 10 hectares
Trim File No CO6C/04106

Commencement Date 26 Apr 1999
Given Effect To 26 Apr 1995
Lapses 26 Apr 2001
Expires 22 Apr 2014
Termination Date 31 Jan 2013

Cond No	Text
1	The rate at which water is taken from bore M35/0597, 100 millimetres diameter and 18.3 metres deep, shall not exceed 19 litres per second, with a volume not exceeding 5,746 cubic metres in any period of 14 consecutive days.
2	When requested in writing by the Canterbury Regional Council, the rate at which water is taken shall be measured to within an accuracy of 10 percent, and the measurement and the hours during which water is taken shall be recorded. A copy of the records shall be provided to the Canterbury Regional Council in accordance with the request.
3	The Canterbury Regional Council may, on the last working day of June, serve notice of its intention to review the conditions of this consent for the purposes of:(a) dealing with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage; or(b) complying with the requirements of a relevant rule in an operative regional plan.
4	Charges, set in accordance with section 36 of the Resource Management Act 1991, shall be paid to the Regional Council for the carrying out of its functions in relation to the administration, monitoring and supervision of resource consents and for the carrying out of its functions under section 35 of the Act.

Appendix F:

Transportation Assessment

Please note that as this assessment was finalised before 4 February 2016 and as such refers to the legal descriptions and post addresses for the subject site that were in existence at that time.

CCL Ref: 14059-100216-thompson

10 February 2016

CARRIAGEWAY CONSULTING
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Paul Thompson
Eliot Sinclair and Partners

By e-mail only: Paul.Thompson@eliotsinclair.co.nz

Dear Paul

Waimakariri District Plan: Proposed Plan Change 28

As you know, in September 2014 we prepared a Transportation Assessment which evaluated the traffic and transport implications of a proposal to rezone approximately 15.6ha of land at 116 and 148 McHughs Road from Rural to Residential 4A. Since that time, two changes have occurred which mean that the Transportation Assessment is now slightly outdated. This letter provides an update to that report.

Revised Outline Development Plan

We understand that since the Transportation Assessment was issued, the Outline Development Plan (shown as Figure 12 within our report) has been revised to omit an area of land that was previously included for rezoning.

Figure 1: Current Proposed Outline Development Plan

Our earlier analysis allowed for up to 38 allotments to be formed within the plan change area but we understand that one outcome of the reduced size is that fewer residential allotments would be formed. However, our evaluation of 38 allotments found that:

- the development of the proposed plan change area would result in no changes to levels of service at the Tram Road / McHughs Road / Bradleys Road intersection, with queues and delays remaining comparatively low;

- no adverse effects on non-car modes of travel were anticipated as a result of the proposed plan change; and
- It was not considered that the presence of development-related traffic will result in any road safety matters arising, or exacerbate an existing issue.

On this basis, we concluded that "*the plan change request can be supported from a traffic and transportation perspective and it is considered that there are no traffic and transportation reasons why the plan change could not be recommended for approval*".

If fewer allotments are now allowed, any effects of the rezoning upon road efficiency and road safety will be less than previously identified. Consequently, we remain of the same view expressed previously - that there are no traffic and transportation reasons why the plan change could not be recommended for approval.

District Plan Rule Numbering

We are also aware that since our report was produced, the transportation-related rules of the Waimakariri District Plan have been renumbered. As a result, there are three paragraphs within our Transportation Assessment where the rule references should be updated:

- Paragraph 8.6.5 refers to Rule 30.6.1.21. This is now renumbered as Rule 30.6.1.25;
- Paragraph 8.6.6 refers to Rule 30.6.1.26. This is now renumbered as Rule 30.6.1.31; and
- Paragraph 8.6.7 refers to both Rule 30.6.1.21 and Rule 30.6.1.26. These are now renumbered as Rule 30.6.1.25 and Rule 30.6.1.31 respectively.

We trust that this addresses the relevant matters that require updating, but please do not hesitate to contact me if there are any issues that you wish to discuss or if you would like clarification of any matters.

Kind regards
Carriageway Consulting Limited

Andy Carr
Traffic Engineer | Director

Mobile 027 561 1967
Email andy.carr@carriageway.co.nz

PG Harris

Proposed Plan Change
McHughs Road, Mandeville

Transportation Assessment

CARRIAGEWAY
CONSULTING
traffic engineering | transport planning

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CCL file reference	14059 mandeville plan change ta final
Status	Final
Issued	26 September 2014

1. Introduction

1.1. PG Harris proposes to request a change to the Waimakariri District Plan. If approved, the plan change would result in the rezoning of approximately 15.6ha of land to the south of McHughs Road, Mandeville, from Rural to Residential 4A. This would facilitate the development of up to 38 residences.

1.2. This Transportation Assessment sets out a detailed analysis of the transportation issues associated with the proposed plan change, and addresses changes in travel patterns that are likely to arise. Where potential adverse effects are identified, ways in which these can be addressed are set out. The report is cognisant of the guidance specified in the New Zealand Transport Agency's 'Integrated Transport Assessment Guidelines' and although travel by private motor vehicle is addressed within this report, in accordance with best practice the importance of other transport modes is also recognised. Consequently, travel by walking, cycling and public transport is also considered.

2. Site Overview

2.1. Location

2.1.1. The plan change area is situated approximately 10km southwest of Rangiora, at Mandeville. The site is broadly rectangular in shape, and is bounded by McHughs Road to the north and Mandeville Road to the east. Private property boundaries abut the southern and eastern boundaries.

2.1.2. The location of the site in the context of the local area is shown in Figure 1 and in more detail in Figure 2. It is currently zoned as "Rural" in the District Plan.

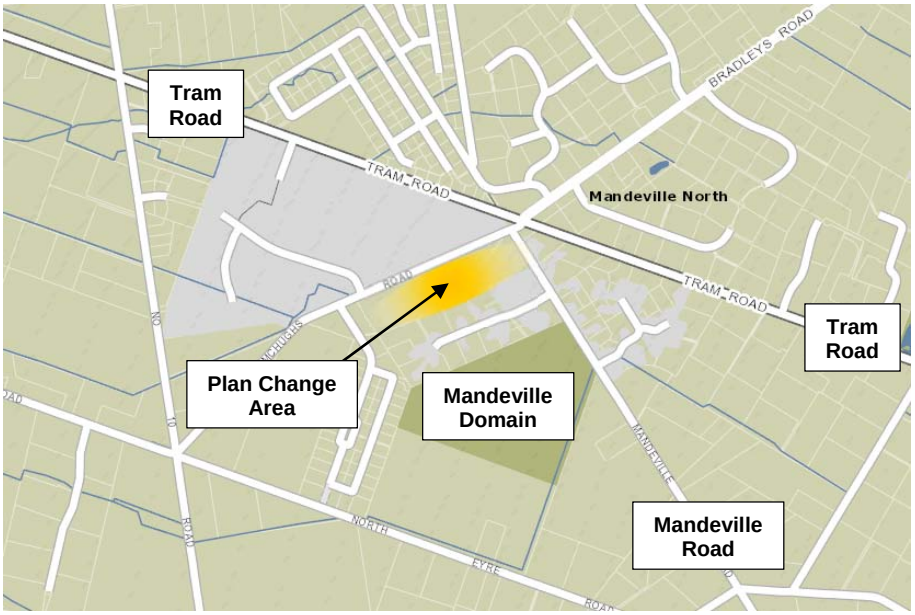

Figure 1: General Location of Proposed Plan Change Area

Figure 2: Aerial Photograph of Proposed Plan Change Area and Environs

2.2. Road Hierarchy

2.2.1. The District Plan classifies Tram Road as an Arterial Road, meaning that it is a "*road that is of major importance in the District serving significant populations and functioning as a prime access to other major centres inside and outside the District*" (District Plan 'Definitions' section). As such a route, it can be expected that the road will carry a large proportion of through traffic.

2.2.2. McHughs Road, Bradleys Road, Roscrea Place and Mandeville Park Drive are all Local Roads "*whose primary function is property access*" (District Plan 'Definitions' section).

3. Current Transportation Networks

3.1. Roading Network

3.1.1. To the immediate north of the plan change area, McHughs Road runs through a predominantly rural-residential environment, with a small number of private driveways on the northern side. The road has a southwest-northeast alignment and in the vicinity of the site is flat and straight, and is subject to an 80km/h speed limit. It has a 6.6m wide carriageway without edgeline markings and it is not kerbed on either side. Rather, there is a grassed verge on the northern side of the road of 5m width, and a grassed verge with a swale on the southern side which is 9m wide.

Photograph 1: McHughs Road (Plan Change Area on Left)

3.1.2. Towards the southwest of the plan change area, McHughs Road turns to have a more north-south orientation and meets North Eyre Road and No.10 Road at a five-arm priority intersection.

3.1.3. To the northeast of the plan change area, McHughs Road meets Tram Road and Bradleys Road at a priority ('stop') controlled intersection. Approximately 50m southeast of this intersection, Mandeville Road meets McHughs Road from the south but the proximity is such that the two intersections are essentially designed as one integrated layout.

Figure 3: Tram Road / McHughs Road / Bradleys Road Intersection

3.1.4. Traffic on Tram Road retains priority as it passes through the intersection, and the through traffic lanes are 3.4m wide. There are auxiliary right-turn lanes for vehicles turning from Tram Road onto both Bradleys Road and McHughs Road which are both 20m long and 2.1m wide. There are also auxiliary lanes for left-turning vehicles which are 2.7m wide and in the order of 70m long, and both lanes terminate at a hatched area, which provide positive direction for vehicles onto the minor arms.

Photograph 2: Left Turn Lane, Tram Road / McHughs Road / Bradleys Road Intersection

3.1.5. There are two traffic lanes of around 20m length on the immediate approach to Tram Road from McHughs Road, separated by a wide hatched area. However there is only one traffic lane for traffic heading northeast past Mandeville Road, although there is a seal extension on the northern side of McHughs Road which can be used by vehicles wishing to drive past any stationary vehicles waiting to turn into Mandeville Road.

Photograph 3: McHughs Road Approach to Tram Road / McHughs Road / Bradleys Road Intersection

3.1.6. Vehicles that have turned off Tram Road onto McHughs Road are provided with one wide (6m) traffic lane over a short distance of around 30m, before this becomes marked as a 10m long left-turn lane into Mandeville Road and a through traffic lane for McHughs Road.

Photograph 4: Approach to Mandeville Road from Tram Road / McHughs Road / Bradleys Road Intersection

3.1.7. Tram Road itself has a flat and straight alignment, running with a broadly east-west orientation. Towards the west, it ultimately joins Oxford Road which provides a route to inland areas of Canterbury. Towards the east, it meets State Highway 1 (known in this location as the Christchurch Northern Motorway) which provides a link to Christchurch and the wider state highway network. Tram Road is subject to a 100km/h speed limit.

3.1.8. Mandeville Road is subject to an 80km/h speed limit. It has a 6.4m wide carriageway marked with a centreline but no edgeline markings, and has grassed verges of 6m on each side.

Photograph 5: Mandeville Road Looking South

3.2. Non-Car Modes of Travel

3.2.1. Given the predominantly rural-residential nature of environs of the plan change area, there is little specific infrastructure provided for non-car modes of travel. There are wide grassed verges that can be used by pedestrians or cyclists, but no footpaths or cycle lanes. There is also no infrastructure provided for public transport, and no bus services that operate in the immediate area.

3.3. Future Changes

3.3.1. A number of plan changes have recently been approved in the vicinity of the proposed plan change area and in each case the Transportation Assessment accompanying the plan change requests set out that most of the generated traffic was expected to pass through the Tram Road / McHughs Road / Bradleys Road intersection.

3.3.2. Plan Change 6 (North Eyre Road, Mandeville) rezoned around 24ha of land to Residential 4A, which would allow for 51 residential allotments to be formed. An internal road network was proposed (and carried forwards into the Outline Development Plan (ODP)) which included a through route between McHughs Road and North Eyre Road, with new intersections formed onto both. The ODP included in the District Plan is set out below.

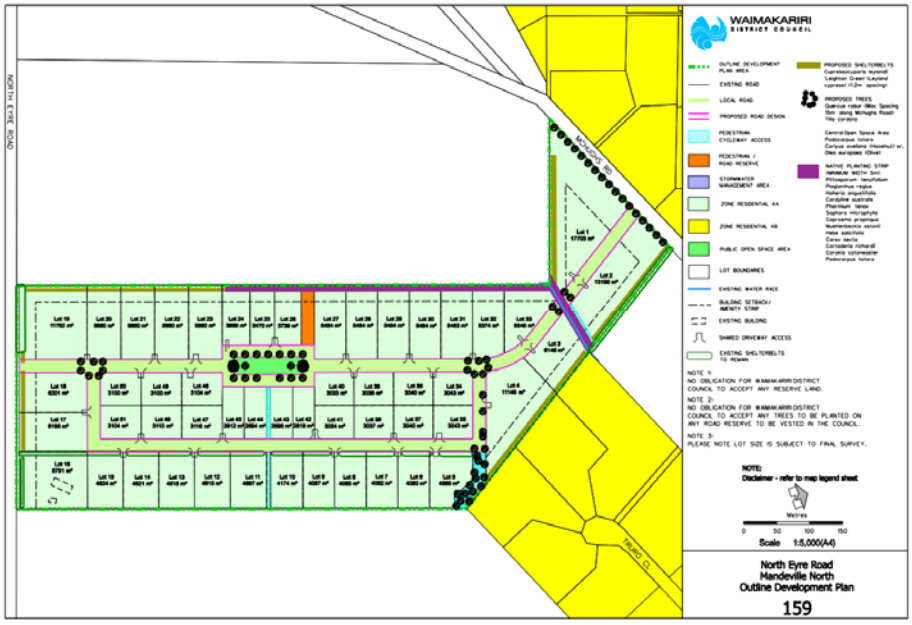

Figure 4: Outline Development Plan, Plan Change 6

3.3.3. Plan Change 10 (Wards Road, Mandeville North) also rezoned land to Residential 4A and the 80ha area would permit up to 142 allotments to be formed. This plan change area lies to the north of the proposed plan change, and so although it will not affect traffic flows on McHughs Road, it results in increased movements to and from Bradleys Road passing through the Tram Road / McHughs Road / Bradleys Road intersection.

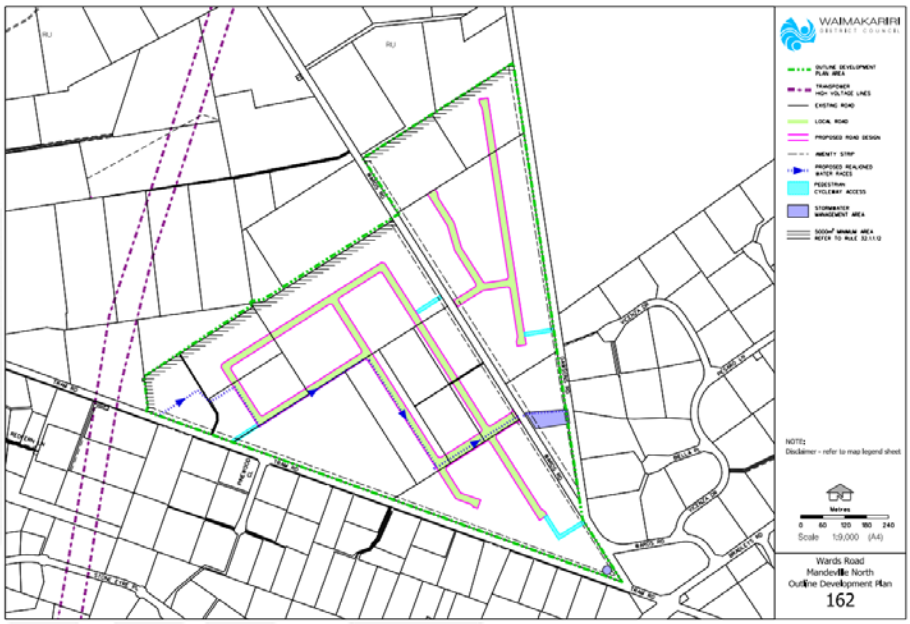

Figure 5: Outline Development Plan, Plan Change 10

3.3.4. Finally, Plan Change 22 (McHughs Road, Mandeville) rezoned land adjacent to the southern section of McHughs Road. In total, up to 90 allotments could be created through this land being rezoned as Residential 4A, and as this site lies to the immediate south of the proposed plan change area, it would result in increased traffic flows turning between Tram Road and McHughs Road.

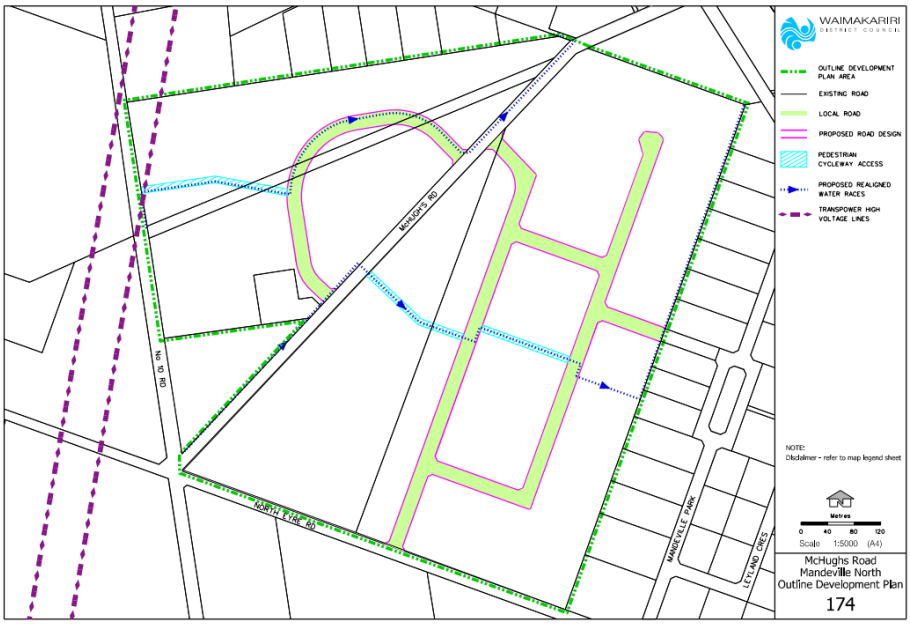

Figure 6: Outline Development Plan, Plan Change 22

3.3.5. The expected increases in traffic at the Tram Road / McHughs Road / Bradleys Road intersection have been extracted from the Transportation Assessments for these three plan changes and are set out below.

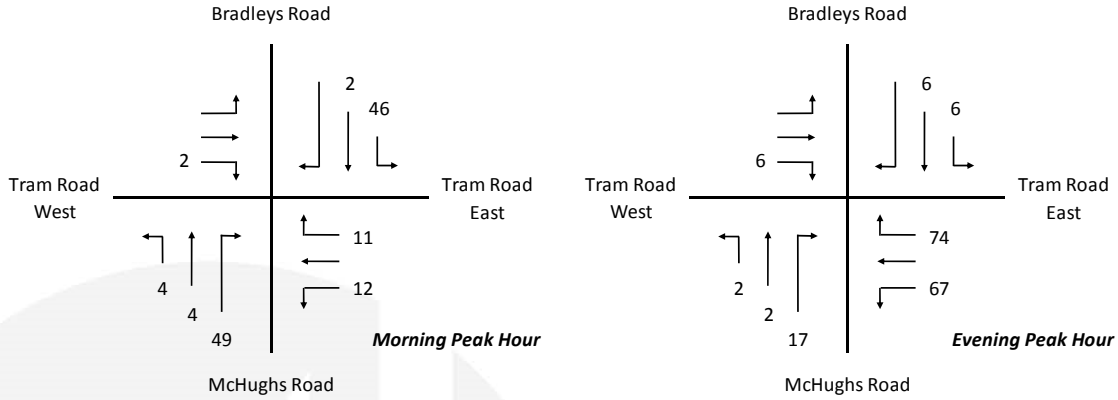

Figure 7: Expected Increases In Traffic Flows due to Plan Change 6, 10 and 22

4. Current and Future Transportation Patterns

4.1. Traffic Flows

4.1.1. Due to the presence of the approved plan changes in the area meaning that traffic flows in the area may evolve relatively quickly, new traffic surveys were carried out at the Tram Road / McHughs Road / Bradleys Road intersection. These took place on Thursday 3 July 2014, between 7:00am to 9:30am, and 4:00pm to 6:30pm. In each case the survey period was slightly extended from the two-hour period which had been initially arranged to ensure that the peak hour volumes were captured. The weather on the day of the survey was clear but cold, and there were no indications that traffic volumes were unduly affected by any unusual occurrences.

4.1.2. The volumes observed in the peak hours are set out below.

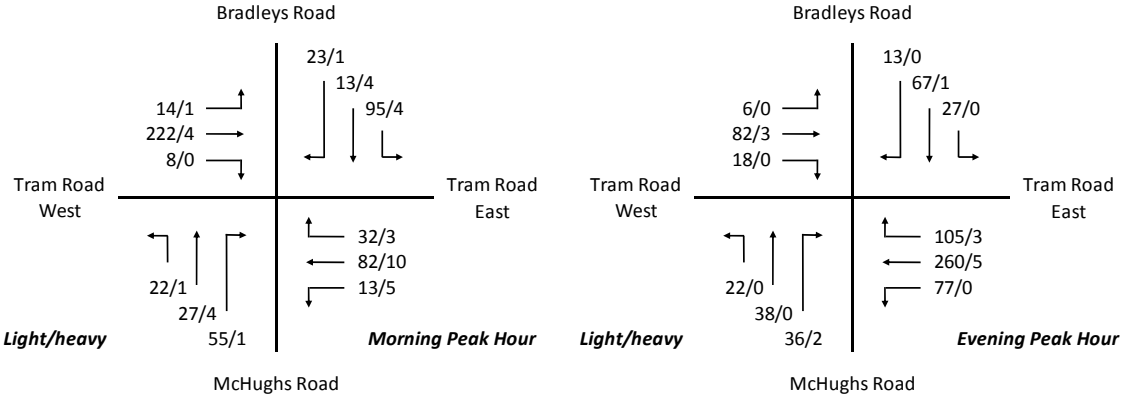

Figure 8: Observed Traffic Flows in 2014, Tram Road / McHughs Road / Bradleys Road Intersection

4.1.3. Helpfully, as part of Plan Change 22, a survey was also carried out of the traffic flows at the same intersection in 2010. The volumes observed are set out below.

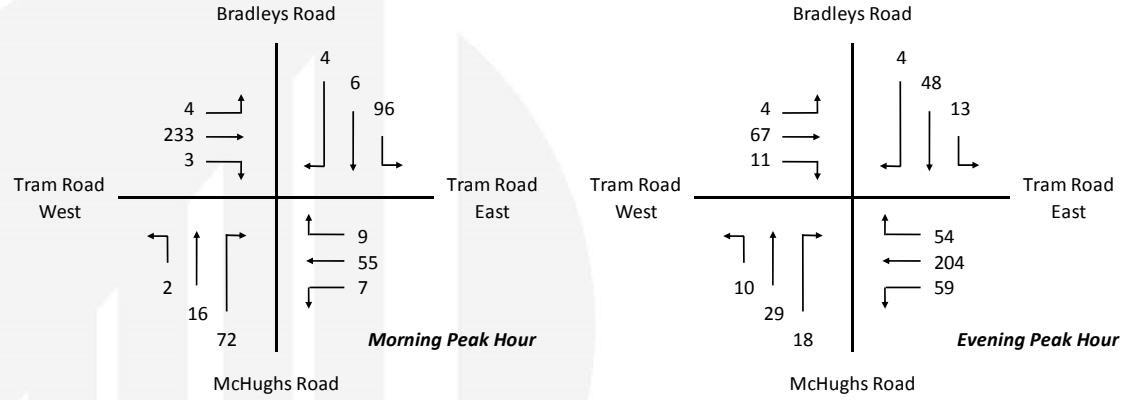

Figure 9: Observed Traffic Flows in 2010, Tram Road / McHughs Road / Bradleys Road Intersection

4.1.4. It can be seen that there have been significant changes to certain of the turning movements over the past four years. This is discussed further below.

4.1.5. The computer software package Sidra Intersection has been used to evaluate the performance of the intersection with the 2014 traffic volumes, and the results are summarised below for the critical right-turn movement of each approach.

Approach (Right-Turn Lane Only)	Morning Peak Hour			Evening Peak Hour		
	Average Delay (secs)	Queue Length (veh)	Level of Service	Average Delay (secs)	Queue Length (veh)	Level of Service
McHughs Road	24.4	1.2	C	28.8	1.3	D
Tram Road East	13.8	0.2	B	12.7	0.4	B
Bradleys Road	21.3	0.5	C	23.6	1.1	C
Tram Road West	12.8	0.0	B	14.1	0.1	B

Table 1: Delays and Levels of Service at Tram Road / McHughs Road / Bradleys Road Intersection, 2014, No Development of Proposed Plan Change Area

4.1.6. The results show that delays are relatively low on each approach, at less than 30 seconds per turning vehicle. Queues of turning vehicles are also low, which indicates that it is not the volume of turning vehicles per se which is giving rise to the queues, but that the volume of through traffic is resulting in a reduced number of turning opportunities. However, the lowest level of service seen (D) still represents an acceptable level of service, and in most cases the level of service is better than this.

4.1.7. The traffic flows anticipated in a nominal design year of 2024 have been calculated and the model run again. Plan Change 22 identified that ambient traffic growth on Tram Road was in the order of 3% per annum, and thus the through traffic on this road has been factored by 30% (allowing for ten years of growth at 3%). To account for the development of the three approved plan change areas, the 2010 volumes have been compared to the 2014 volumes, and the difference taken to be reflective of the extent of current extent of development at these sites. The balance has then been added to the appropriate turning movements, as this can be considered to represent the traffic that would be generated by the undeveloped areas of the plan change sites.

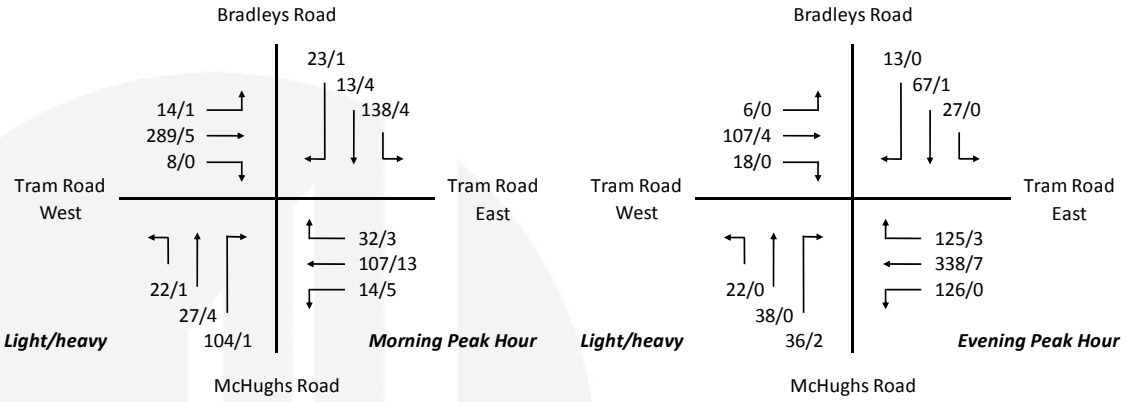

Figure 10: Expected Traffic Flows in 2024, Tram Road / McHughs Road / Bradleys Road Intersection, No Development of Proposed Plan Change Area

Approach (Right-Turn Lane Only)	Morning Peak Hour			Evening Peak Hour		
	Average Delay (secs)	Queue Length (veh)	Level of Service	Average Delay (secs)	Queue Length (veh)	Level of Service
McHughs Road	40.3	3.6	E	40.8	1.9	E
Tram Road East	14.4	0.2	B	12.9	0.5	B
Bradleys Road	24.9	0.6	C	29.9	1.5	D
Tram Road West	13.0	0.0	B	14.8	0.1	B

Table 2: Delays and Levels of Service at Tram Road / McHughs Road / Bradleys Road Intersection, 2024, No Development of Proposed Plan Change Area

4.1.8. As would be expected, delays and queues increase due to the greater traffic volumes and there is also a reduction in the level of service for vehicles turning right out of both McHughs Road and Bradleys Road. However such a level of service remains acceptable.

4.2. Non-Car Modes of Travel

4.2.1. There are no formal counts of walking or cycling movements in the area, but informal on-site observations suggest that pedestrian volumes are commensurate with the rural-residential development which fronts the surrounding roads. During site visits, negligible numbers of pedestrians and cyclists were observed, although volumes at the weekend may be higher due to a greater amount of recreational journeys.

4.2.2. The extent of footpath provision is commensurate with the rural nature of the area, and in view of the lack of destinations within a viable walking distance, is not unreasonable. Given that traffic flows on McHughs Road are low, it would not be unreasonable to anticipate that cyclists will be able to share the carriageway with motorised vehicles.

4.2.3. No bus services operate in the immediate area of the plan change area.

4.3. Road Safety

4.3.1. The NZTA Crash Analysis System has been used to identify the location and nature of the recorded traffic accidents in the vicinity of the plan change area. All reported accidents between 2009 and 2014 were identified on McHughs Road, between and including the intersections with Mandeville Park Road and Tram Road. The analysis showed that six accidents had been reported, as summarised below.

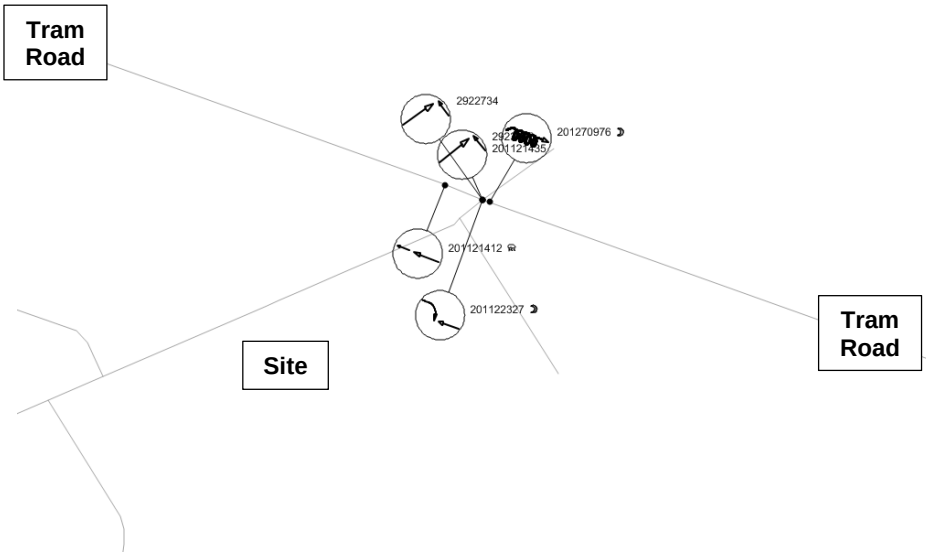

Figure 11: Location and Type of Reported Accidents in Area

4.3.2. All recorded accidents were associated with movements at the Tram Road / McHughs Road / Bradleys Road intersection, with none occurring on McHughs Road itself.

4.3.3. One accident resulted in serious injuries, and occurred when a vehicle turned right from McHughs Road into the path of a westbound vehicle travelling on Tram Road. A further two accidents occurred under similar circumstances and these resulted in slight injuries.

4.3.4. The remaining three accidents had different contributing factors. One involved only a single vehicle where the driver lost control, one involved a slow-moving vehicle (a lost driver) which was struck from behind by another vehicle, and one involved a driver who suffered a sudden illness.

4.3.5. The accident prediction equations in the NZTA Economic Evaluation manual have been used to calculate the anticipated number of accidents at this location, based on the performance of 'typical' high speed crossroad intersections. For the volumes of traffic involved, this shows that over a five-year period, three accidents could be expected. The number of reported accidents is slightly greater than this, but taking account of the two anomalous accidents that were due to the lost driver and the driver who suffered a sudden illness, the safety performance of the intersection is not unusually greater than would be expected and there is no evidence of any safety-related deficiencies in the intersection geometry.

5. Proposed Plan Change

5.1. The proposed private plan change seeks to rezone approximately 15.6ha of land to the immediate south of McHughs Road from Rural to Residential 4A, which would facilitate the development of up to 38 residences. The proposed Outline Development Plan (ODP) is shown below.

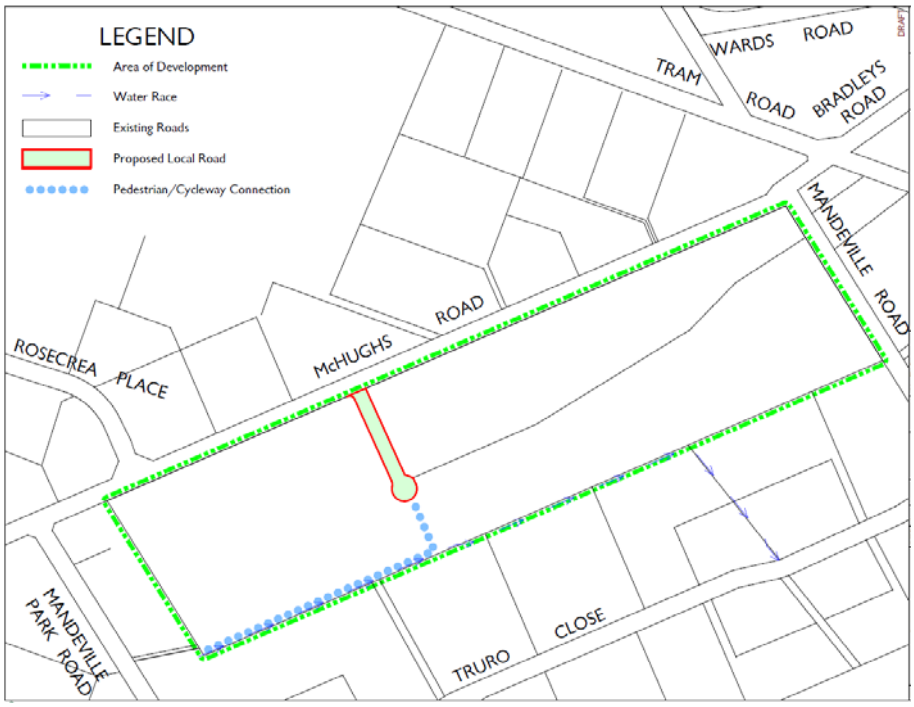

Figure 12: Proposed Outline Development Plan (Extract from Eliot Sinclair Plan 348678 C15)

5.2. The plan shows that it is envisaged that the plan change area will have one roading link onto McHughs Road, approximately 65m east of Roscrea Place, and this will be a cul-de-sac. However, given the size of the site, it is expected that some of the allotments formed would have direct access onto McHughs Road and/or Mandeville Road, either by way of a private driveway or shared accessway.

5.3. A pedestrian and cycleway connection is shown from the head of the cul-de-sac which links through to Mandeville Park Road to the west. As shown in Figure 4 above, this aligns with a similar provision made through Plan Change 6 and therefore will result in a continuous route being provided between the two areas.

5.4. It can also be seen from the land parcels shown on the ODP that the site represents 'infill' development, since it is surrounded on each side by rural-residential development.

6. Traffic Generation and Distribution

6.1. Traffic Generation

6.1.1. Traffic generation rates for the development of the plan change area under the proposed rezoning have been sourced from the rates used for other plan changes in the district which have been accepted by Council. In particular, Plan Changes 6 and 10 used rates of 8 vehicle movements per day per residence, with 1 vehicle movement per residence in each of the morning and evening peak hours. The plan changes also allowed for an 80/20 bias between inbound and outbound vehicles.

6.1.2. For the 38 residences that could potentially occur within the plan change area, this yields the following traffic generation.

Period	Trip Rate Per Residence			Anticipated Traffic Generation		
	In	Out	Total	In	Out	Total
Morning Peak Hour	0.2	0.8	1.0	8	30	38
Evening Peak Hour	0.8	0.2	1.0	30	8	38
Daily	4.0	4.0	8.0	152	152	304

Table 3: Anticipated Traffic Generation of Development of Proposed Plan Change Area

6.2. Traffic Distribution

6.2.1. The previous plan changes in the area have assumed that 60% to 65% of generated traffic would use Tram Road towards the east due to the convenience of this as a route to Christchurch. A further 5% of generated traffic has been assessed to use Bradleys Road, and Tram Road west, with the balance of traffic using routes towards the south. For consistency, the same distribution has been used within this assessment also, and the resultant traffic flows are set out below.

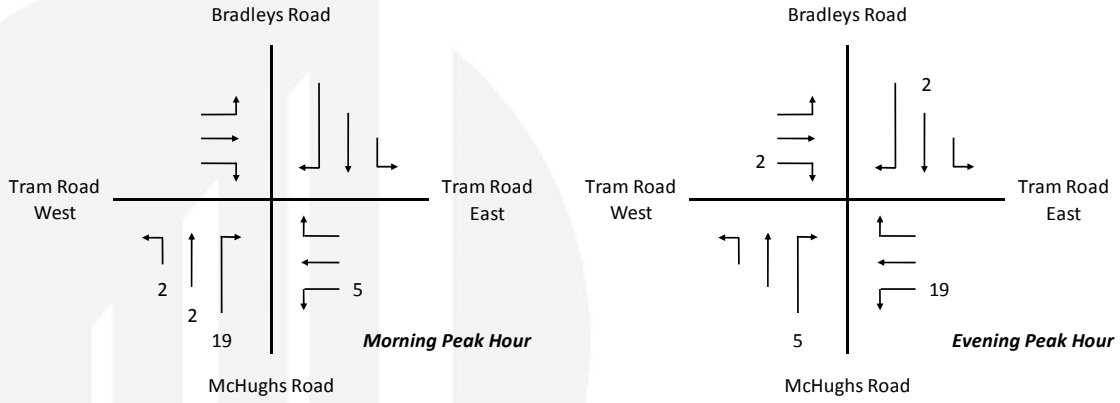

Figure 13: Traffic Generation of Proposed Plan Change at the Tram Road / McHughs Road / Bradleys Road Intersection

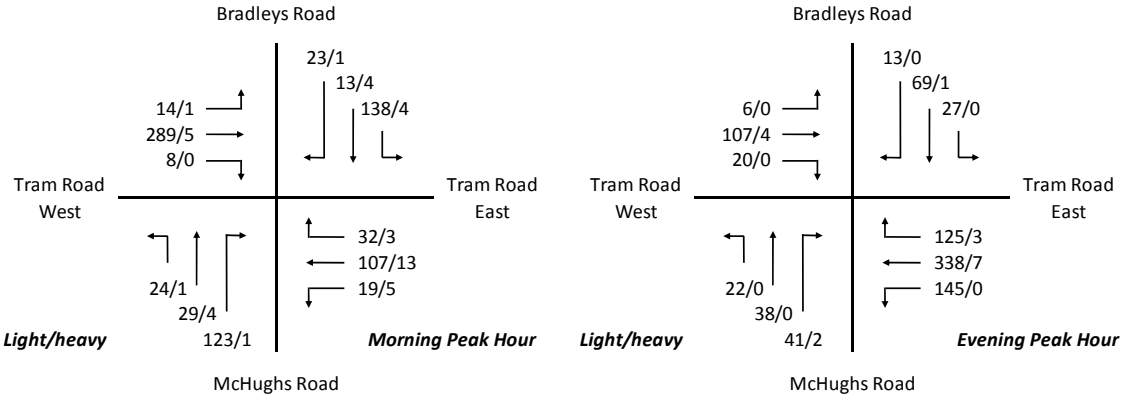

Figure 14: Expected Traffic Flows in 2024, Tram Road / McHughs Road / Bradleys Road Intersection, with Proposed Plan Change

7. Effects on the Transportation Networks

7.1. Roading Network Capacity

7.1.1. The Sidra Intersection model for the Tram Road / McHughs Road / Bradleys Road intersection has been re-run, allowing for full development of the proposed plan change area for a design year of 2024. This includes for ambient traffic growth on Tram Road, as well as full development of the approved plan change areas in the immediate vicinity. The results are set out below.

Approach (Right-Turn Lane Only)	Morning Peak Hour			Evening Peak Hour		
	Average Delay (secs)	Queue Length (veh)	Level of Service	Average Delay (secs)	Queue Length (veh)	Level of Service
McHughs Road	47.0	5.1	E	43.8	2.2	E
Tram Road East	14.4	0.2	B	13.1	0.5	B
Bradleys Road	25.0	0.6	C	30.1	1.5	D
Tram Road West	13.0	0.0	B	14.8	0.1	B

Table 4: Delays and Levels of Service at Tram Road / McHughs Road / Bradleys Road Intersection, 2024, with Full Development of Proposed Change Area

7.1.2. It can be seen that the greatest changes occur in the morning peak hour at McHughs Road, where each vehicle would experience an increased delay of seven seconds and the queue length would increase by 1.5 vehicles. The level of service does not change however. Changes in the evening peak hour are even less, with an increase in delay of three seconds per vehicle and a queue length increase of 0.3 vehicles.

7.1.3. Overall, the intersection performance shows minimal differences with or without development of the plan change area with no changes in the level of service, and when considered in the context of the whole journey, such changes are likely to be imperceptible.

7.1.4. The Austroads Guide to Traffic Management Part 3 ('Traffic Studies and Analysis') sets out thresholds regarding the need for detailed traffic analyses at intersections, and the traffic flows below which detailed analyses of unsignalised intersections are unnecessary. An extract from this is replicated below.

Major Road Type	Traffic Volumes (Vehicles Per Hour)	
	Major Road	Minor Road
Two lane road	400	250
	500	200
	600	100

Table 5: Extract from Table 6.1 of Austroads Guide to Traffic Management Part 3 (Intersection Volumes below which Capacity Analysis is Unnecessary)

7.1.5. The traffic flows expected to pass the new Local Road serving the plan change area fall below these thresholds meaning that a detailed analysis of the intersection performance is not required. Any delays at the intersection are therefore likely to be as a result of the prevailing geometry rather than vehicle queuing.

7.2. Non-Car Modes of Travel

7.2.1. As the proposed road within the plan change area will be designed to meet the District Plan rules, it is expected that walking movements that are undertaken wholly within the site will be able to be made efficiently and safely through the provision of an appropriate level of footpaths and footpath width. Although the McHughs Road does not have a footpath, the number of walking trips generated by development of the plan change area is unlikely to result in the need for such infrastructure. The permeability of the plan change area is further enhanced by the provision of the walking and cycling link to the development towards the southwest which creates a convenient route between the two areas.

7.2.2. The proposed road within the plan change area will also provide the appropriate level of infrastructure for cyclists under the District Plan. For longer cycling distances, McHughs Road and the other Local Roads in the immediate area are relatively lightly-trafficked and suitable for on-road cycling, and the likely increase in cycle movements arising from development of the plan change area is extremely unlikely to result in an increased level of provision being required.

7.2.3. The extent of development within the site is such that it is unlikely that there will be an increase in demand for public transport services that is sufficient to justify a diversion of an existing service into the site or the provision of a wholly new service. However if bus services are provided in response to the larger plan changes in the area, all of the site lies within 200m of McHughs Road, meaning that it is likely that the bulk of the residences will be within a 400m walking distance of a bus stop (the distance desired under the Canterbury Regional Public Transport Plan).

7.2.4. Taking these features of the site into account, it is considered that appropriate levels of provision will be made for those using non-car travel modes.

7.3. Road Safety

7.3.1. It is considered that the existing good safety record in the vicinity of the site is unlikely to be adversely affected by the traffic travelling to and from the plan change area.

7.3.2. The new Local Road and likely individual site accesses will introduce turning traffic at locations where presently traffic does not turn, and therefore potentially will increase accident risk at those locations. However these will be designed to appropriate standards, and the flat and straight alignment of McHughs Road means that excellent sight distances will be achieved. Consequently, it is not considered that the proposed new accesses will have any noticeable effect on road safety.

7.4. Summary and Conclusions

7.4.1. Overall, it is considered that traffic associated with the proposed plan change can be accommodated on the roading network without any adverse efficiency or safety-related issues arising.

8. Strategic Planning Documents

8.1. Introduction

8.1.1. There are a number of strategic planning documents with which any land rezoning is expected to comply. An assessment of the proposed development of the site against these documents has been undertaken and the results are summarised below.

8.2. Canterbury Regional Policy Statement

8.2.1. The Canterbury Regional Policy Statement 2013 (RPS) sets out an overview of the significant resource management issues in the region, and sets out ways to resolve those issues and achieve the integrated management of the natural and physical resources. Chapter 5 of the RPS ('Land Use and Infrastructure') highlights a number of polices relating to the transportation networks:

Policy 5.3.7 *– In relation to strategic land transport network and arterial roads, the avoidance of development which:*

(1) adversely affects the safe efficient and effective functioning of this network and these roads, including the ability of this infrastructure to support freight and passenger transport services; and

(2) in relation to the strategic land transport network and arterial roads, to avoid development which forecloses the opportunity for the development of this network and these roads to meet future strategic transport requirements.

Policy 5.3.8 *– Integrate land use and transport planning in a way:*

(1) that promotes:

(a) the use of transport modes which have low adverse effects;

(b) the safe, efficient and effective use of transport infrastructure, and reduces where appropriate the demand for transport;

(2) that avoids or mitigates conflicts with incompatible activities; and

(3) where the adverse effects from the development, operation and expansion of the transport system:

(a) on significant natural and physical resources and cultural values are avoided, or where this is not practicable, remedied or mitigated; and

(b) are otherwise appropriately controlled.

Policy 5.3.9 *– In relation to regionally significant infrastructure (including transport hubs):*

(1) avoid development which constrains the ability of this infrastructure to be developed and used without time or other operational constraints that may arise from adverse effects relating to reverse sensitivity or safety;

Policy 6.3.2 *– Business development, residential development (including rural residential development) and the establishment of public space is to give effect to the principles of good urban design below, and those of the NZ Urban Design Protocol 2005, to the extent appropriate to the context:*

(2) Integration – recognition of the need for well-integrated places, infrastructure, movement routes and networks, spaces, land uses and the natural and built environment. These elements should be overlaid to provide an appropriate form and pattern of use and development.

(3) Connectivity – the provision of efficient and safe high quality, barrier free, multimodal connections within a development, to surrounding areas, and to local facilities and services, with emphasis at a local level placed on walking, cycling and public transport as more sustainable forms of transport

***Policy 6.3.4** – Ensure that an efficient and effective transport network that supports business and residential recovery is restored, protected and enhanced so that it maintains and improves movement of people and goods around Greater Christchurch by:*

(1) avoiding development that will overload strategic freight routes;

(2) providing patterns of development that optimise use of existing network capacity and ensuring that, where possible, new building projects support increased uptake of active and public transport, and provide opportunities for modal choice;

3) providing opportunities for travel demand management;

(4) requiring integrated transport assessment for substantial developments; and

(5) improving road user safety.

8.2.2. The analysis carried out shows that the traffic generated by the proposed plan change does not adversely affect the effective or safe functioning of the arterial road (Tram Road) in the immediate area, and the resultant levels of service do not preclude the arterial network from being developed further in future. There is no regionally significant infrastructure in the immediate vicinity that could be affected by the proposal.

8.2.3. The site accommodates non-car modes of travel and the provision made for walking and cycling journeys is considered to be appropriate for the nature of the proposed zoning. A walking and cycling link is provided to connect to development towards the southwest, and the likely number of walking and cycling trips is unlikely to result in the need for additional infrastructure on the frontage road (McHughs Road).

8.2.4. The safety records in the area do not indicate that the plan change request would result in any adverse effects arising on the adjacent network, and the infrastructure within the site will be designed to meet current standards.

8.3. Canterbury Regional Land Transport Strategy

8.3.1. The Canterbury Regional Land Transport Strategy (2012-2042) (RLTS) identifies the region's transport needs and the roles of all land transport modes and has a vision of the region having "an accessible, affordable, integrated, safe, resilient and sustainable transport system". This is supported by five objectives, of ensuring a resilient, environmentally sustainable and integrated transport system, increasing transport safety for all users, protecting and promoting public health, assisting economic development and improving levels of accessibility for all.

8.3.2. The strategy also sets out 16 outcomes that are expected to be achieved. These are set out below, together with the ways in which the proposed rezoning contributes to them.

a. *Reduced greenhouse gas emissions from use of the domestic transport system:* The plan change area represents infill development, and therefore creates the opportunity for a consolidation of land uses, which in turn mean that bus services become more viable. It is also linked to a number of lightly-trafficked Local Roads, suitable for walking and cycling.

b. *Improved resilience of the transport network to infrastructure damage or emergencies:* The site is close to an arterial road (Tram Road) which can be expected to be constructed to a high standards and thus be highly resilient.

c. *Improved resilience of the transport system to external changes:* Given that the plan change area will be used for rural-residential uses, the extent to which it is accessible by non-car modes of travel is limited, but it does not preclude the provision of a bus service on the frontage road to serve the (larger) existing residential developments nearby.

d. *Improved land use and transport integration:* As set out elsewhere in this report, the site is considered to be well-integrated with the transportation networks.

e. *Reduction in fatal and serious injuries for all modes:* The accident records do not indicate that there are any safety-related deficiencies on the road network, and new infrastructure will be designed to meet current standards.

f. *Improved personal safety and reduced security risks to all transport users:* (See (e) above).

g. *Improved health from increase in time spent travelling by active means:* The plan change area provides for walking and cycling, including a link to the development area towards the southwest.

h. *Increased proportion of the population travelling by active means:* (See (g) above)

i. *Reduced community exposure to vehicle pollutants, noise and vibration:* Vehicles travelling to the site will use McHughs Road, which is a Local Road. However the plan change will increase traffic flows on this road by at most 8% and the resultant traffic flows remain low.

j. *Improved journey time reliability on the strategic transport network:* The modelling exercise carried out shows that the capacity of the strategic road network (in this case Tram Road) would not be exceeded, even when the plan change area is fully developed.

k. *Increased energy efficiency per trip:* As noted above, the consolidation of land use creates the opportunity for public transport services.

l. *Regional and inter-regional journey time reliability on key freight routes is maintained:* There are no defined key freight route in the immediate area, but freight is likely to be carried along Tram Road (as it is an arterial road) and this would not experience any significant change in journey times.

m. *Freight hubs are protected and maintained:* There are no freight hub in the vicinity of the plan change area.

n. *Connectedness is enhanced:* The proposal provides a walking and cycling link to the development towards the southwest, and is well connected to the adjacent roading network.

o. *Increased travel choices for households to access urban and suburban centres:* The nature of rural-residential development is such that car travel is generally the most viable

mode of transport, but the proposal does not preclude walking or cycling trips from being made.

p. *Improved mobility for the transport disadvantaged:* Suitable provision will be made for non-car travel to and within the site in accordance with the District Plan requirements.

8.3.3. On balance, the plan change request is not considered to be contrary to the RLTS.

8.4. Canterbury Regional Public Transport Plan

8.4.1. The Canterbury Regional Passenger Transport Plan (2012) sets out Environment Canterbury's objectives and policies for delivering public transport in the region. These fall within five areas of the network of services, vehicle quality and service performance standards, fares and ticketing, branding/marketing/information, and infrastructure.

8.4.2. One aspect of the strategy is to ensure that bus stops are located no more than 400m from potential patrons, and are spaced no more than 300m to 400m apart. At present there are no bus services in the immediate area and thus it is not possible to confirm whether this spacing can be achieved. However, the linear shape of the plan change area suggests that it is possible, although to an extent it depends on the location of property accesses and the number of location of future bus stops on McHughs Road.

8.5. Canterbury Regional Travel Demand Management Strategy

8.5.1. The Canterbury Regional Travel Demand Management Strategy (2008) describes methods that affect whether, how, when and where travel occurs, with a view to maximising the efficiency of the land transport system. Integrating land use planning and transportation is noted by the strategy as being an important influence in managing travel demand.

8.5.2. The Travel Demand Management Strategy is a high-level strategy which focuses upon providing a background to travel demand management, but nevertheless it is considered that the proposed plan change is not inconsistent with the strategy in that the site is presently surrounded by residential land use and its rezoning contributes to achieving a greater population density and thus public transport services become more viable.

8.6. Waimakariri District Plan

8.6.1. There are three policies within the District Plan which are particularly relevant to consideration of a plan change request:

- ***Policy 11.1.1.5*** *- New developments and activities in relation to their traffic generation characteristics should:*
  - *Locate on or establish primary access to an appropriate level of road within the road hierarchy*
  - *Not have vehicular access to an inappropriate level of road within the hierarchy*
  - *Provide cycleways along arterial, strategic and collector roads*
- ***Policy 11.1.1.6*** *- Every site should have access that provides safe entry and exit for vehicles to and from the site to a road without compromising the safety or efficiency of the road or road network.*

- ***Policy 11.1.1.7*** *-Sites shall provide on-site parking, loading, turning for vehicles, or have safe and efficient access to those facilities. Any use of off-site facilities should not compromise pedestrian and vehicle safety, or the safe and efficient operation of the road network.*

8.6.2. McHughs Road is a Local Road and therefore intended to provide for property access rather than through travel. Accordingly, it is a suitable category of road to accommodate the accesses to the residences within the plan change area. The roading network will not be overloaded and therefore the safe and efficient operation of the network will not be compromised.

8.6.3. The new Local Road and individual site accesses will be designed to meet current standards, and the flat and straight alignment of McHughs Road means that sight distances in each direction are very good, and thus the access can be expected to operate safely. The residences within the plan change area will have appropriate off-street parking.

8.6.4. The District Plan has a number of rules with which any new development is expected to comply. The proposed ODP has been reviewed against these rules, and either complies or is very likely to comply with all of but two of them.

8.6.5. Rule 30.6.1.21 requires a distance of 60m between any vehicle crossing and the closest intersection between two Local Roads. Depending on the ultimate subdivision of the site, it is likely that one or more allotments may have a separation that falls below this distance, particular in respect of the McHughs Road / Roscrea Place and McHughs Road / Mandeville Road intersections. However, the roads are very lightly trafficked, the accesses will carry minimal traffic volumes, and as they are all Local Roads the majority of drivers will be familiar with the layout and thus it is unlikely that any will be confused by the arrangement.

8.6.6. Under Rule 30.6.1.26, intersections within an 80km/h speed limit area are expected to have a separation of 550m. This is not achieved between the proposed new Local Road linking the site to McHughs Road, and the McHughs Road / Roscrea Place and McHughs Road / Mandeville Park Drive intersections. However this separation distance does not take into account the benefits of a well-designed but reduced distance creating higher permeability, and accordingly there are a series of exemptions for other areas (set out in Rules 30.6.2.4 to 30.6.2.7 of the District Plan).

8.6.7. On this basis, it is considered that this plan change request should include two rules which would exempt the site from Rules 30.6.1.21 and 30.6.1.26.

8.6.8. No further departures from the operative traffic and transportation rules within the District Plan and no new transportation-related Objectives, Policies or Rules are proposed. If there are any deviations from this, these will be identified when land use and/or subdivision consents are sought and the acceptability of these non-compliances determined at that time.

9. Conclusions

9.1. This report has identified, evaluated and assessed the various transport and access elements of a plan change request for land to the south of McHughs Road, Mandeville, which would facilitate the development of up to 38 residences.

9.2. The current levels of service provided by the surrounding roading network have been assessed, taking into account ambient traffic growth and also that there are a number of plan changes in the immediate area that can be expected to create additional traffic as they are developed. This analysis shows that the development of the proposed plan change would result in no changes to levels of service at the Tram Road / McHughs Road / Bradleys Road intersection, with queues and delays remaining comparatively low. No adverse effects on non-car modes of travel are anticipated as a result of the proposed plan change.

9.3. The current safety record in the area of the site is good, and there is no evidence to suggest there are any deficiencies on the roading network. Further, the proposed new internal road and accesses onto McHughs Road will be designed to meet current standards. Accordingly, it is not considered that the presence of development-related traffic will result in any road safety matters arising, or exacerbate an existing issue.

9.4. The proposed plan change is in accordance with the transportation aspects of relevant overarching strategic planning documents and is also likely to comply with various transportation-related rules of the District Plan, other than in regard to Rule 30.6.1.21 (separation of intersections and vehicle crossings) and Rule 30.6.1.26 (intersection separation). Having evaluated the likely outcomes of these probably non-compliances, it is considered that the plan change area could be exempted from these rules without efficiency or safety issues arising and that appropriate rules to achieve this should be proposed as part of the plan change request.

9.5. Overall, and subject to the preceding comments, the plan change request can be supported from a traffic and transportation perspective and it is considered that there are no traffic and transportation reasons why the plan change could not be recommended for approval.

Carriageway Consulting Limited
September 2014

CARRIAGEWAY
CONSULTING

traffic engineering | transport planning

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Appendix G:

Infrastructure Servicing Assessment

Please note that as this assessment was finalised before 4 February 2016 and as such refers to the legal descriptions and post addresses for the subject site that were in existence at that time.

INFRASTRUCTURE SERVICING ASSESSMENT

116 & 148 McHughs Road, Mandeville, Canterbury

P.G.Harris

Eliot Sinclair
surveyors | engineers | planners

INFRASTRUCTURE SERVICING ASSESSMENT

116 & 148 McHughs Road, Mandeville, Canterbury
On behalf of P.G.Harris

Eliot Sinclair
surveyors | engineers | planners

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

QUALITY CONTROL CERTIFICATE

All relevant information is identified, has been reviewed and is approved for release.

Prepared by:	..... Edward Shaw Environmental Engineer	MEng
Reviewed by:	..... Paul Thompson Planner	MA (Planning) MSc (Hons) Assoc. NZPI
Directed and approved for release by:	..... Mark Allan Director	BSurv, NZCLS, MNZIS

Date: Reference: Status:	4 December 2015. 348678_14148163024_ENVTR_ems_servicing RevB.docx Final	
Distribution:	1 copy 1 copy File copy	Waimakariri District Council P.G.Harris Eliot Sinclair Ltd.

Limitations
This report has been prepared for Mr P.G.Harris according to his instructions, 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.

Table of Contents

1 Introduction

1. Mr P.G. Harris has engaged Eliot Sinclair to undertake an infrastructure servicing assessment to support a plan change application for 116 & 148 McHughs Road, Mandeville North, Canterbury.
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 McHughs and Mandeville Roads and has a gross area of 16.19ha. Refer to Figure 1.
4. The site address is 116 and 148 McHughs Rd, Mandeville North. The full legal description is given in the Private Plan Change Request document.

Figure 1. Site Location (source: Google Maps, September 2013)

5. If the entirety of the subject site is re-zoned to the Residential 4A Zone the site has the potential to yield a total of 38 lots however the proposal seeks to rezone only part of the site which will provide a maximum of 22 lots. The Outline Development Plan is included as Attachment A

2.1 Topography and Land Use

6. 116 McHughs Road generally comprises flat topography, with a slight fall down towards the east. The majority of the site is vegetated with grass and used for grazing stock. There is a single agricultural building and a horse training pad on the site. ECan's GIS database shows a well (M35/0576) located at the approximate centre of 116 McHughs Road, however the well card indicates that the well has been filled in and this was confirmed by site inspection.

7. 148 McHughs Road is a former gravel quarry and has been excavated to a depth of between 3 to 4m below surrounding ground levels. The area is planted in forestry. ECan's GIS database shows a well (M35/0597) located at the southwest corner of the site. The well head is evident on site and was used to supply irrigation water. The consent to take water from the well (CRC990745) was surrendered on 31st January 2013.

2.2 Geology

8. The Geological Nuclear Science (GNS) geological map of the area indicates the site is underlain by an 'unweathered, brownish-grey, variable mix of gravels/sand/silt/clay in low river terraces; with locally up to a 2m silt (loess) cap'.

9. The geotechnical report for the proposed plan change prepared by Eliot Sinclair, November 2013 found that the soil types encountered in the upper layers were generally consistent across the site. The soils encountered comprised shallow topsoil to 0.2m below ground level, over silty gravels to around 0.6m, over sandy gravels.

2.3 Hydrogeology

10. Groundwater levels in the area around the Site typically range from 5 to 11m below ground level according to well log information contained within the Environment Canterbury GIS database. Groundwater was not encountered in any of the trial holes or test pits undertaken as part of Eliot Sinclair's site investigation in September 2013. However, the water level in the well on 148 McHughs road (M35/0597) was recorded at approximately 300mm below ground level during the investigation. The ECan well log for M35/0597 (Attachment B) has water level records for the period between July 1983 and August 1987. The highest recorded groundwater level during this period was 0.5m above ground level.

11. 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.

12. Following the 200mm rainfall event of June 10th and 11th 2014 water was observed by the landowner to be ponding within the excavated part of 116 McHughs Road to within 1m of the adjacent ground levels. At a low point along the boundary of the Site with McHughs Road close to the junction with Mandeville Road water was observed to flow out of the ponded area and onto McHughs Road. Analysis of groundwater levels provided by WDC in their "Mandeville Area Flooding" presentation showed that ground water at the time was at its highest level since 1977 (when the records being analysed began). Therefore, such shallow depths to ground water are not typical of those experienced at the Site. The Landowner did not report surface flooding of 116 McHughs Road during this storm.

13. At 116 McHughs Road no features such as channels or depressions were observed that would be likely to be inundated by groundwater given the typical groundwater levels recorded by ECan.

14. At 148 McHughs Road ECan records indicate that groundwater can typically rise to 0.5m above existing ground levels. However, this part of the site would be filled to match the levels of the adjoining land as part of any development of the site for residential purposes.

2.4 Surface Water

15. A shallow water race flows along the southern boundary of the site in an easterly direction before turning to the south approximately 575m from the southwest corner of the site. The water race is mainly contained within the neighbouring properties except for a section of approximately 75m to the south of the horse training pad which is within the site.

16. The water race is around 0.4m deep and 1.5m wide at its narrowest at the southwest part of the site, widening to between 2 to 3m.

17. 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 show 116 McHughs Road to be generally at low or no risk of flooding in the 200 year event with flood depths typically in the order of 250mm predicted. Floor levels of any future buildings could be set at the 200 year flood level with a suitable freeboard to mitigate the flood risk. A freeboard of 400mm was required for the adjacent Plan Change P022 site and it is recommended that this freeboard is provisionally adopted for this application. For 148 McHughs Road the plans indicate a high risk of flooding in the 200 year event with flood depths in excess of 1m predicted. To achieve floor levels above the predicted 200 year flood level this part of the Site would have to be filled.

3 Reticulated Services

18. The following discussion on servicing the Site is based on information provided by WDC in their engineering code of practice, the District Plan and provided at a Project Advisory Group meeting on the 30th July 2013 as well as ECan's Regional Plans, Christchurch City Council's Waterways Wetlands and Drainage Guide and private correspondence with service suppliers.

3.1 Discharge of Stormwater

19. The site is not serviced by a reticulated stormwater system and there are no existing dwellings on the site. There are no watercourses or drains adjoining the site that would make a suitable outfall for stormwater discharges. The water race along the southern boundary is not suitable for stormwater disposal.

20. ECan's well log data and the geotechnical site investigation undertaken by Eliot Sinclair indicate that the Site is suitable for the large-scale discharge of stormwater to ground due to the significant depth of the groundwater table and the presence of well-draining sandy gravel soils at shallow depths across the site.

3.1.1 Soakage Testing

21. Three soakage test were carried out in September 2013. The tests were evenly distributed over the length of the site as shown on Eliot Sinclair Drawing 348678 G1 included in Attachment C. The tests were undertaken in sandy gravels at between 1.6 and 2m below ground level. Of the three tests, the lowest measured infiltration rate tended toward 500mm/hour. To allow for a reduction in the infiltration rate over time a design rate of 170mm/hour has been adopted for soak pits.

22. For soakage swales which will need to drain down through surficial soils a design infiltration rate of 20mm/hour has been adopted.

3.1.2 Stormwater Management System

23. A combination of roof water soak pits on each lot, and soakage swales and rapid soakage chambers within the RoW and road reserves can be used to manage stormwater from the impermeable surfaces of the developed site. A stormwater management system can be designed that will maintain runoff from the developed site at existing levels for all storm events up to and including the 50year return period 24hour event. Calculations included in Attachment D show typical sizings for Road and RoW Swales and soakpits assuming sumps spaced at 50m centres. Attachment E shows how the stormwater system could be incorporated into the road reserves and RoWs.

3.1.3 Conclusion

A stormwater management system can be designed that will soak run-off from the site to ground such that the development will not increase flow from the site in events up to the 50 year return period 24 hour storm.

3.2 Discharge of Wastewater

24. The site is serviced by the Mandeville area Septic Tank Effluent Pumping (STEP) system. A 150mm rising main in McHughs Road connects the existing properties to the central pump station at the corner of Bradleys Road and Tram Road from where it is pumped to the Rangiora Wastewater Treatment Plant. It is understood from WDC that this system has the capacity to accept the wastewater flows from the developed site. The estimated average flow to the STEP system from the proposed 38 lots is 40m^3/day at a peak wet weather flow rate of 4.5l/s.
25. In order to utilise the STEP system each lot will have its own septic tank fitted with a pump, to pump into the main in McHughs Road.
26. In summary the servicing of the site with respect to wastewater does not present an impediment to the proposed rezoning.

3.3 Potable Water

27. The Mandeville Water Supply services the site. The supply is restricted and provides properties with 2,000l per day, trickle fed at 1.4l/s. A 150mm diameter water main extends along McHughs Road to service existing properties. It is understood from WDC that this system has the capacity to supply the developed site.
28. To connect to the Mandeville Water Supply each lot will be required to have its own 4,500m^3 tank to meet the minimum requirements of the Council's code of practice and a pump to boost the supply pressure.
29. In order to guarantee a secure groundwater supply to the scheme WDC are understood to be carrying out works to the supply well. However, this is unlikely to effect continuation of supply.

3.3.1 Firefighting Water Supply

30. The site is on a restricted supply and outside a gazetted fire-fighting district. Therefore, the placement of hydrants within the development is at the discretion of Council.
31. Hydrants already exist on the 150mm diameter main in McHughs Road at the junction with Mandeville Road and at the entrance to the Mandeville Park Development.
32. If required by WDC a 100mm water main could be installed in the proposed road to supply a new hydrant within the development.

33. Any hydrant installed within the site, in common with the hydrants in McHughs Road, would not provide firefighting pressures and flows to SNZ PAS 4509:2008 requirements. However, the hydrants would provide some limited firefighting capacity and would act as tanker filling points.

34. The size of water tanks installed on each lot could also be increased to 20,000l tanks to provide additional capacity for firefighting purposes however this is not a requirement within other areas of Mandeville and is a matter that individual property owners may wish to determine.

3.3.2 Conclusion

35. In summary the secure supply of water for both domestic and firefighting purposes does not present a restriction to the rezoning of the Site.

3.4 Electricity

36. Mainpower New Zealand Ltd (Mainpower) has stated (Attachment F) that their reticulated power network can supply the potential yield of 38 lots were the site to be re-zoned. However, this will require reinforcement of their existing network.

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

3.5 Telecommunication

38. Chorus have confirmed (Attachment G) that the capacity of their network requires investigation and design work is required before the cost of any upgrading necessary to service the Site can be estimated.

39. It is expected that the cost of upgrading the network will be passed onto the developer by Chorus at the time of subdivision.

4 Staging

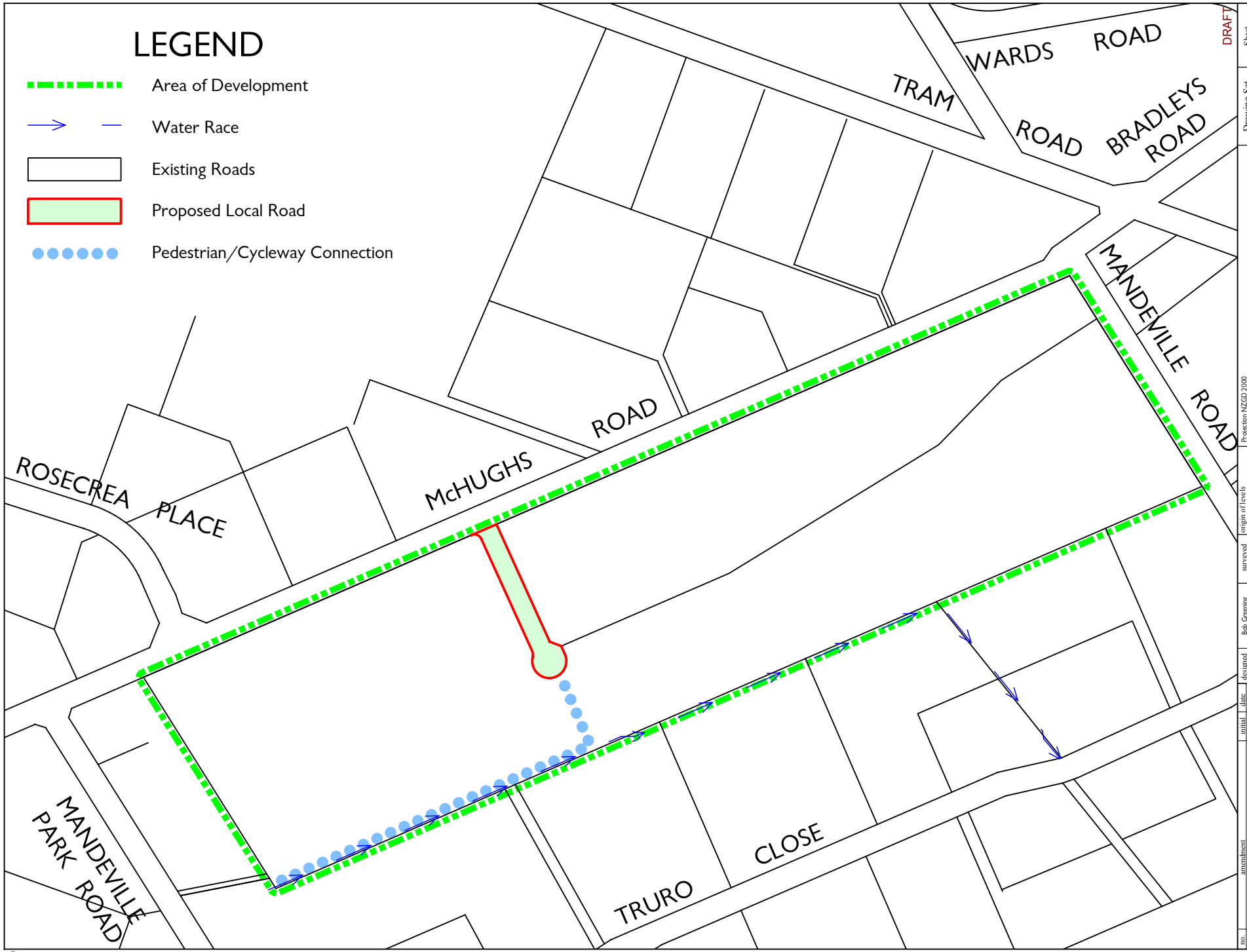
40. No servicing constraints exist that would require the development of the Site to be staged in any particular order, other than the requirement to provide legal access.

41. Prior to any residential housing being provided on 148 McHughs Road the land will be filled to match adjacent ground levels.

5 Conclusion

42. 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.

Attachment A: Outline Development Plan



Sheet 1 of 1

Drawing Set 348678 C15

PLOT 348678 C15 140811.vtx

Scale: 1:4000 (A4)

Date: 8/8/2014

Projection NZGD 2000
Circuit Mt Pleasant 2000

origin of levels

datum CDD December 2013

surveyed	Various	surv.date	Various
designed	Bob Greening		
manager	Mark Allan	drawn	Bob Greening
checked			

no.	amendment	initial	date

Eliot Sinclair
surveyors | engineers | planners

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Proposed Outline Development Plan
Mandeville North
for P G Harris

Attachment B: Well Logs

Bore or Well No: M35/0597
Well Name:
Owner: Mr Peter G Harris

Environment Canterbury
Your regional council

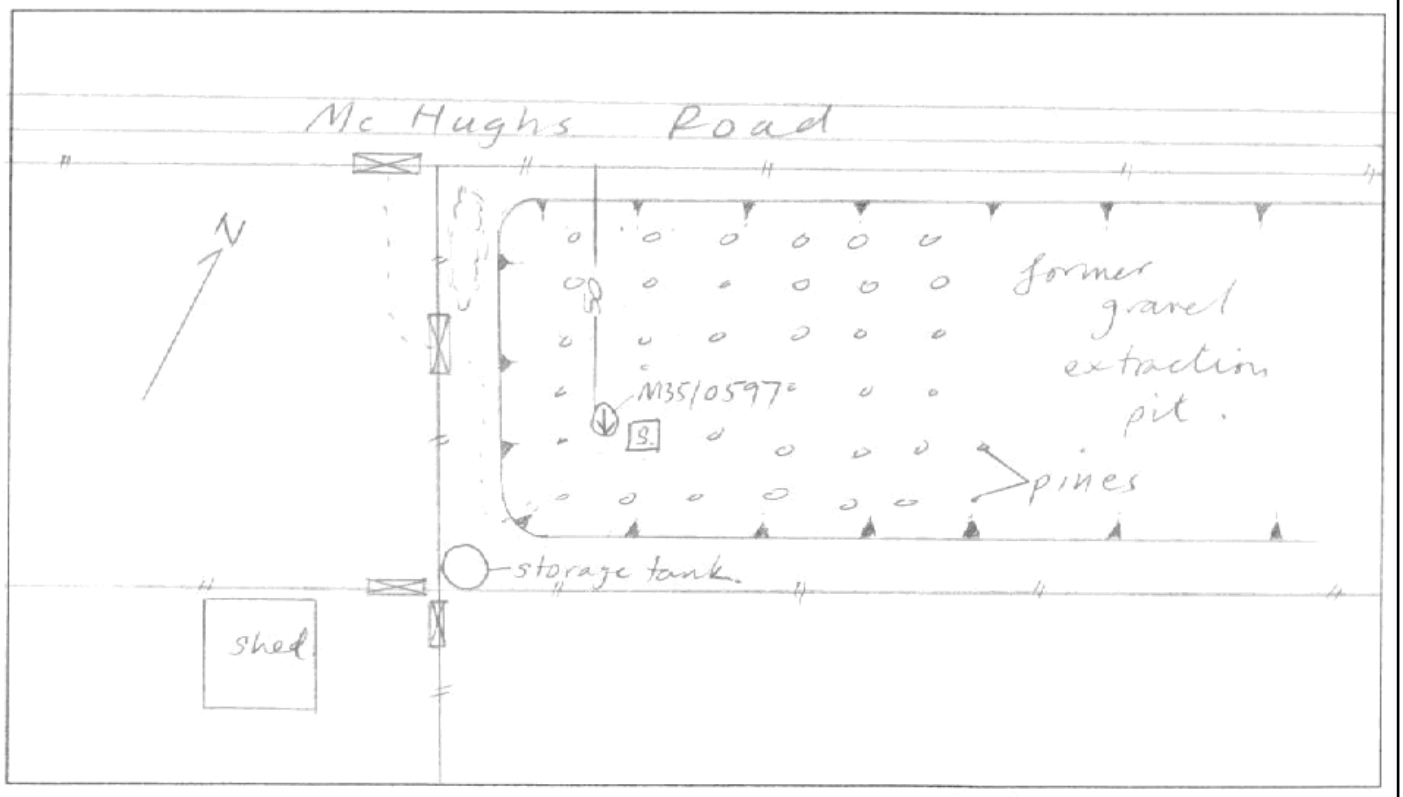
Street of Well: MCHUGHS ROAD
File No: CO6C/04106
Locality: MANDEVILLE
Allocation Zone: Eyre River
NZGM Grid Reference: M35:71835-58257 QAR 1
NZGM X-Y: 2471835 - 5758257
Location Description: WEST END OF GRAVEL PIT
Uses: Irrigation
ECan Monitoring: Piezo Survey
Well Status: Active (exist, present)

Drill Date:
Water Level Count: 41
Well Depth: 17.40m -GL
Strata Layers: 0
Initial Water Depth: -8.55m -MP
Aquifer Tests: 0
Diameter: 830mm
Isotope Data: 0
Yield/Drawdown Tests: 0

Measuring Point Ait: 36.31m MSD QAR 1
Highest GW Level: 0.05m from MP
GL Around Well: -0.50m -MP
Lowest GW Level: 9.40m below MP
MP Description: ToC
First Reading: 28 Jul 1983
Last Reading: 20 May 2011
Driller: not known
Calc. Min. GWL: -9.00m -MP
Drilling Method: Unknown
Last Updated: 20 Dec 2011
Casing Material:
Last Field Check: 20 May 2011
Pump Type: Centrifugal (Surface)
Yield:
Screens:
Drawdown:
Screen Type:
Specific Capacity:
Top GL:
Bottom GL:
Aquifer Type: Water Table
Aquifer Name:

Date	Comments
04 Feb 1999	west end of gravel pit
04 Feb 1999	some wells likely to cause interference effects in a Piezo. survey M35;1835,3172,5301,6309,7162,7620,7351,5314,6182,6009,7537,5313,8188
21 Aug 2003	WELL SITUATED IN A PIT. TOP OF WELL LINERS ABOUT 5.2M B.G.L NCCB 1020/S76 20N.
01 Jun 2010	Transferred water level from M35/0576, see comments on this well
22 Jun 2010	Well visited as part of piezo survey 17/6/10, could not locate owner or letterbox. Left letter in shed beside well.
23 Aug 2010	Surveyed in 2010 as part of piezo survey. Old grid ref m35:71816-58261. Old height 45.7 m, QAR 4
10 May 2011	First WL reading set as ISWL
21 Jul 2011	Previous owner LESLIE, DH & MA

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



Attachment C: Soakage Test Location Plan

Application for Subdivision Consent

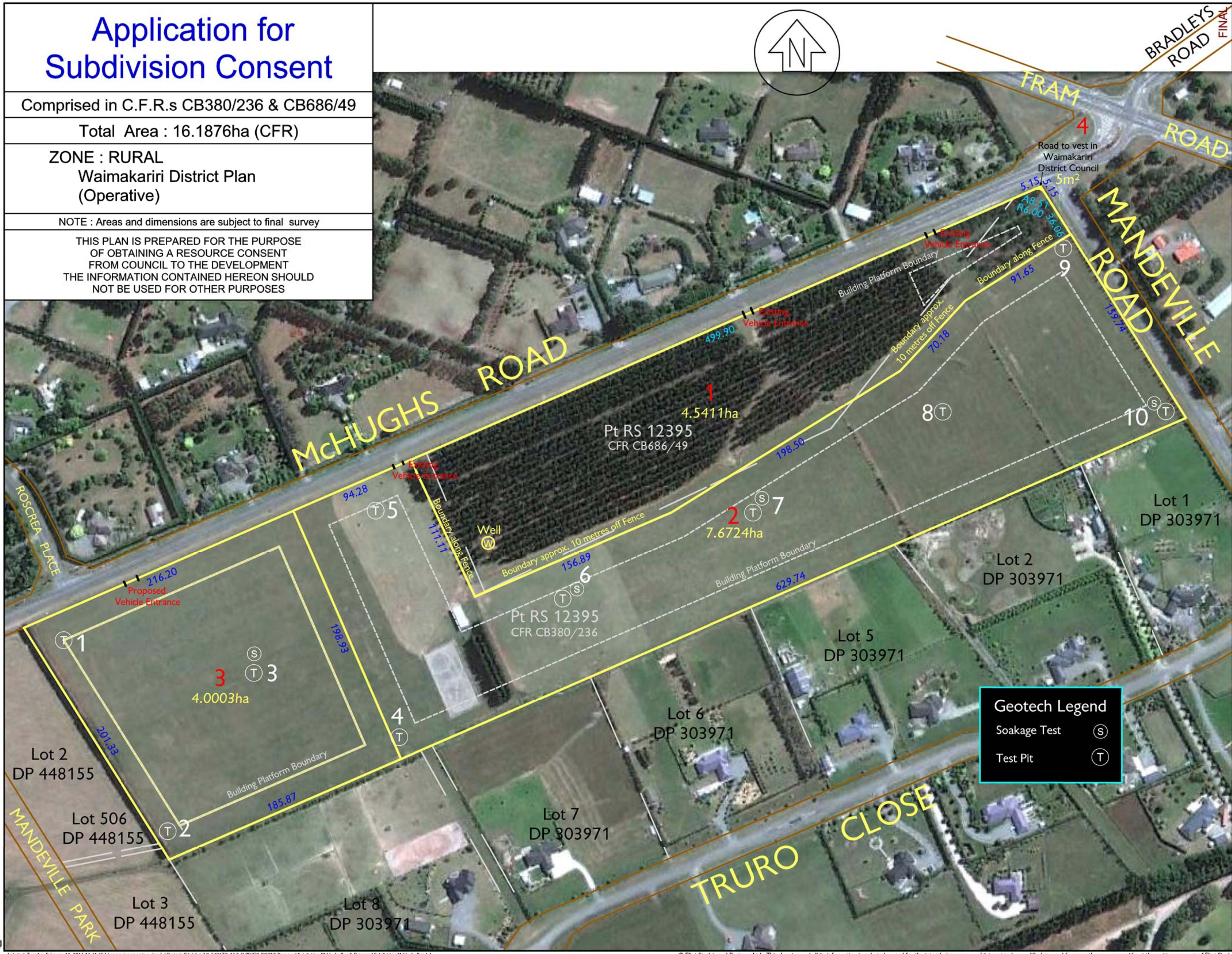
Comprised in C.F.R.s CB380/236 & CB686/49

Total Area : 16.1876ha (CFR)

ZONE : RURAL
Waimakariri District Plan
(Operative)

NOTE : Areas and dimensions are subject to final survey

THIS PLAN IS PREPARED FOR THE PURPOSE OF OBTAINING A RESOURCE CONSENT FROM COUNCIL TO THE DEVELOPMENT THE INFORMATION CONTAINED HEREON SHOULD NOT BE USED FOR OTHER PURPOSES



N
BRADLEYS ROAD
TRAM ROAD
McHUGHS ROAD
MANDEVILLE ROAD
ROSCREA PLACE
MANDEVILLE PARK
TRURO CLOSE
4
Road to vest in Waimakariri District Council 5m²
1
4.5411ha
Pt RS 12395
CFR CB686/49
2
7.6724ha
3
4.0003ha
Pt RS 12395
CFR CB380/236
Existing Vehicle Entrance
Proposed Vehicle Entrance
Building Platform Boundary
Boundary along Fence
Boundary approx. 10 metres off Fence
Well
499.90
216.20
94.28
111.11
198.93
201.33
185.87
156.89
629.74
198.50
70.18
91.65
159.74
36.06
5.15
A8.51
R6.00
Lot 1 DP 303971
Lot 2 DP 303971
Lot 5 DP 303971
Lot 6 DP 303971
Lot 7 DP 303971
Lot 8 DP 303971
Lot 2 DP 448155
Lot 506 DP 448155
Lot 3 DP 448155
Geotech Legend
Soakage Test S
Test Pit T

FINAL

Sheet 1 of 1

Drawing Set 348678 G1

Scale: 1:2500 (A3)

Date: 11/2/2014

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

Projection NZGD 2000
Circuit Mt Pleasant 2000

origin of levels: BM B4AG Cnr Island Road and Tram Road R.L. 17.648m
datum: December 2013 Lyttelton 1937

surveyed: Chris Benns
surv.date: January 2014
designed: Bob Greening
manager: Mark Allan
drawn: Bob Greening
checked:

no. | amendment | initial | date

Geotech Test Location Plan
116 and 148 McHughs Road, Mandeville
being Parts RS 12395
for P.G.Harris

Attachment D: Stormwater Calculations

Typical RoW Soakage Swale Calculation

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Length	50	m
Width	1.6	m
Flow Depth	0.1	m
Volume	4	m3
Infiltration rate	20	mm/hr
or	0.44	l/s
Total Catchment	400.00	m2
RoW	250	m2
C	0.85	
Landscaping	150.00	m2
C	0.2	

Inflow (l/s) (Using Q=CIA, I is HirdsV3 + 10%)

	Duration									
ARI (y)	**10**	**20**	**30**	**60**	**120**	**360**	**720**	**1440**	**2880**	**4320**
1.58	1.6	1.2	1.0	0.7	0.5	0.3	0.2	0.1	0.1	0.1
2	1.8	1.3	1.1	0.8	0.6	0.3	0.2	0.2	0.1	0.1
5	2.4	1.8	1.5	1.1	0.8	0.4	0.3	0.2	0.1	0.1
10	3.0	2.2	1.8	1.3	0.9	0.5	0.4	0.3	0.1	0.1
20	3.7	2.7	2.3	1.7	1.1	0.6	0.4	0.3	0.2	0.1
30	4.1	3.0	2.5	1.9	1.3	0.7	0.5	0.3	0.2	0.1
40	4.5	3.3	2.8	2.0	1.4	0.7	0.5	0.3	0.2	0.2
50	4.8	3.5	2.9	2.2	1.5	0.8	0.5	0.4	0.2	0.2
60	5.1	3.7	3.1	2.3	1.5	0.8	0.6	0.4	0.2	0.2
80	5.5	4.0	3.4	2.5	1.7	0.9	0.6	0.4	0.2	0.2
100	5.8	4.3	3.6	2.6	1.8	0.9	0.6	0.4	0.3	0.2

Overflow (l/s)

	Duration									
ARI (y)	**10**	**20**	**30**	**60**	**120**	**360**	**720**	**1440**	**2880**	**4320**
1.58	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	1.2	0.7	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	1.4	0.8	0.2	0.0	0.0	0.0	0.0
40	0.0	0.0	2.3	1.6	0.9	0.3	0.0	0.0	0.0	0.0
50	0.0	0.0	2.5	1.7	1.0	0.3	0.1	0.0	0.0	0.0
60	0.0	0.0	2.7	1.8	1.1	0.4	0.1	0.0	0.0	0.0
80	0.0	3.6	2.9	2.0	1.2	0.4	0.2	0.0	0.0	0.0
100	0.0	3.8	3.1	2.2	1.3	0.5	0.2	0.0	0.0	0.0

Duration of overflow (mins)

	Duration									
ARI (y)	**10**	**20**	**30**	**60**	**120**	**360**	**720**	**1440**	**2880**	**4320**
1.58	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	4.8	23.5	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	13.0	39.4	92.3	0.0	0.0	0.0	0.0
40	0.0	0.0	1.2	17.8	48.2	140.3	0.0	0.0	0.0	0.0
50	0.0	0.0	3.3	21.0	54.5	166.3	0.4	0.0	0.0	0.0
60	0.0	0.0	4.9	23.5	59.0	186.8	130.2	0.0	0.0	0.0
80	0.0	1.3	7.1	27.1	65.1	210.6	286.6	0.0	0.0	0.0
100	0.0	2.6	8.7	29.5	69.6	225.0	365.1	0.0	0.0	0.0

Typical RoW Soak Pit Calculation

Eliot Sinclair
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Infiltration rate	170	mm/hr
Base width	1.6	m
Base length	4	m
Depth	2	m
Void Ratio	0.38	
Storeage Volume	4.864	m3
Infiltration rate	0.30	l/s

Inflow (l/s) (overflow from Soakage Swale)

	Duration									
ARI (y)	**10**	**20**	**30**	**60**	**120**	**360**	**720**	**1440**	**2880**	**4320**
1.58	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	1.2	0.7	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	1.4	0.8	0.2	0.0	0.0	0.0	0.0
40	0.0	0.0	2.3	1.6	0.9	0.3	0.0	0.0	0.0	0.0
50	0.0	0.0	2.5	1.7	1.0	0.3	0.1	0.0	0.0	0.0
60	0.0	0.0	2.7	1.8	1.1	0.4	0.1	0.0	0.0	0.0
80	0.0	3.6	2.9	2.0	1.2	0.4	0.2	0.0	0.0	0.0
100	0.0	3.8	3.1	2.2	1.3	0.5	0.2	0.0	0.0	0.0

Overflow (l/s)

	Duration									
ARI (y)	**10**	**20**	**30**	**60**	**120**	**360**	**720**	**1440**	**2880**	**4320**
1.58	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Typical Road Soakage Swale Calculation

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Length	50	m
Width	1.6	m
Depth	0.1	m
Volume	4	m3
Infiltration rate	20	mm/hr
or	0.44	l/s
Total Catchment	500.00	m2
Road	275	m2
C	0.85	
Landscaping	225.00	m2
C	0.2	

Inflow (l/s) (Using Q=CIA, I is HirdsV3 + 10%)

	Duration									
ARI (y)	**10**	**20**	**30**	**60**	**120**	**360**	**720**	**1440**	**2880**	**4320**
1.58	1.8	1.3	1.1	0.8	0.6	0.3	0.2	0.2	0.1	0.1
2	2.0	1.4	1.2	0.9	0.6	0.4	0.3	0.2	0.1	0.1
5	2.7	2.0	1.7	1.2	0.9	0.5	0.3	0.2	0.1	0.1
10	3.3	2.5	2.1	1.5	1.0	0.6	0.4	0.3	0.2	0.1
20	4.1	3.0	2.5	1.8	1.3	0.7	0.5	0.3	0.2	0.1
30	4.6	3.4	2.8	2.1	1.4	0.8	0.5	0.4	0.2	0.2
40	5.0	3.7	3.1	2.3	1.5	0.8	0.6	0.4	0.2	0.2
50	5.3	3.9	3.3	2.4	1.6	0.9	0.6	0.4	0.2	0.2
60	5.7	4.1	3.5	2.5	1.7	0.9	0.6	0.4	0.3	0.2
80	6.1	4.5	3.8	2.8	1.9	1.0	0.7	0.4	0.3	0.2
100	6.5	4.8	4.0	2.9	2.0	1.0	0.7	0.5	0.3	0.2

Overflow (l/s)

	Duration									
ARI (y)	**10**	**20**	**30**	**60**	**120**	**360**	**720**	**1440**	**2880**	**4320**
1.58	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	1.4	0.8	0.3	0.0	0.0	0.0	0.0
30	0.0	0.0	2.4	1.6	1.0	0.3	0.0	0.0	0.0	0.0
40	0.0	0.0	2.6	1.8	1.1	0.4	0.1	0.0	0.0	0.0
50	0.0	3.5	2.8	2.0	1.2	0.4	0.2	0.0	0.0	0.0
60	0.0	3.7	3.0	2.1	1.3	0.5	0.2	0.0	0.0	0.0
80	0.0	4.0	3.3	2.3	1.4	0.6	0.2	0.0	0.0	0.0
100	0.0	4.3	3.6	2.5	1.5	0.6	0.3	0.0	0.0	0.0

Duration of overflow (mins)

	Duration									
ARI (y)	**10**	**20**	**30**	**60**	**120**	**360**	**720**	**1440**	**2880**	**4320**
1.58	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	9.7	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	12.5	39.2	98.4	0.0	0.0	0.0	0.0
30	0.0	0.0	2.0	19.3	51.8	158.5	0.0	0.0	0.0	0.0
40	0.0	0.0	4.8	23.4	58.9	189.8	189.2	0.0	0.0	0.0
50	0.0	1.0	6.5	26.1	64.0	207.5	292.7	0.0	0.0	0.0
60	0.0	2.0	7.9	28.2	67.6	221.9	347.2	0.0	0.0	0.0
80	0.0	3.5	9.9	31.2	72.7	239.1	422.9	0.0	0.0	0.0
100	0.0	4.7	11.2	33.3	76.5	249.7	466.0	0.0	0.0	0.0

Typical Road Soak Pit Calculation

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Infiltration rate	170	mm/hr
Base width	1.6	m
Base length	5	m
Depth	2	m
Void Ratio	0.38	
Storeage Volume	6.08	m3
Infiltration rate	0.38	l/s

Inflow (l/s) (overflow from Soakage Swale)

	Duration									
ARI (y)	**10**	**20**	**30**	**60**	**120**	**360**	**720**	**1440**	**2880**	**4320**
1.58	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	1.4	0.8	0.3	0.0	0.0	0.0	0.0
30	0.0	0.0	2.4	1.6	1.0	0.3	0.0	0.0	0.0	0.0
40	0.0	0.0	2.6	1.8	1.1	0.4	0.1	0.0	0.0	0.0
50	0.0	3.5	2.8	2.0	1.2	0.4	0.2	0.0	0.0	0.0
60	0.0	3.7	3.0	2.1	1.3	0.5	0.2	0.0	0.0	0.0
80	0.0	4.0	3.3	2.3	1.4	0.6	0.2	0.0	0.0	0.0
100	0.0	4.3	3.6	2.5	1.5	0.6	0.3	0.0	0.0	0.0

Overflow (l/s)

	Duration									
ARI (y)	**10**	**20**	**30**	**60**	**120**	**360**	**720**	**1440**	**2880**	**4320**
1.58	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Attachment E: Typical Roading Cross-sections

Attachment F: Correspondence from Mainpower

Edward Shaw

From: Brian Heron <brian.heron@mainpower.co.nz>
Sent: Monday, 9 June 2014 4:30 p.m.
To: Edward Shaw
Subject: RE: [#348678] Subdivision at 116 & 148 McHughs Road, Mandeville

Edward

Just checked with the Mainpower NZ Engineer and we would have the capacity in the area to supply the 38 Lots

However we will need to install HV cable, transformers and low voltage cable to reticulate the lots

If you send myself or Paul Oliver a dwg file of the lots he will design the reticulation and give to me to price

Thanks

Brian Heron

From: Edward Shaw [mailto:Edward.Shaw@eliotsinclair.co.nz]
Sent: Tuesday, 3 June 2014 2:48 p.m.
To: Brian Heron
Subject: [#348678] Subdivision at 116 & 148 McHughs Road, Mandeville

Hi Brian,

I've attached your previous correspondence to hopefully aid you with this enquiry.

I'm now writing to let you know that our client is considering a plan change application for the site which would increase the potential yield to 38 residential allotments. Up to 8 of these lots would be accessed from Mandeville Road with the remaining 30 lots accessed from McHughs Road.

In the first instance I would like to know if Mainpower's Infrastructure has the capacity to supply a proposed subdivision of 38 lots in this location?

Thank you for your assistance in this matter so far, and please let me know if you need anything further in order to make your assessment.

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

Attachment G: Correspondence from Chorus

The Subdivision Group
55 Shands Road, Hornby 8042
P O Box 1374, Christchurch 8140
Telephone: (03) 339 3402
Facsimile: (03) 338 0133
Email: tsg@chorus.co.nz

Chorus

7 July 2014

Chorus Ref: OHK17987
Your Ref: 348678

P.G. Harris
c/- Eliot Sinclair and Partners Ltd
Unit 4, 502 Wairakei Road
P O Box 4597
Christchurch 8140

Attention: Edward Shaw

Re: Proposed Subdivision: OHK:116 & 148 McHughs Rd, Mandeville - 38 lot subdivision

(Subdivision Location: 116 & 148 McHughs Road Mandeville)

Dear Sir / Madam

Thank you for letter and scheme plan for the above subdivision.

Chorus requires infrastructure and architecture design work to be completed prior to quoting the price for the provision of their services. At this time, due to other works in the area, the situation regarding spare capacity is unclear and requires further investigation.

Please allow up to six weeks for the Network design work to be completed, (some can occasionally take longer), before we can get back to you with confirmation of the cost to extend Chorus Network in Subdivision Location: 116 & 148 McHughs Road Mandeville.

Please do not hesitate to contact me should you have any queries.

Yours faithfully

Nuncy Maposa

Sub Division Specialist

Attachment H:Correspondence with Waimakariri District Council

Paul Thompson

Subject: FW: [#348678] FOR REVIEW RCP028 PG Harris Plan Change Mandeville RCP028 PG Harris Plan Change Mandeville

From: Tim McLeod
Sent: Monday, 2 May 2016 6:38 p.m.
To: Paul Thompson
Cc: Teresa Garrison; Mark Allan
Subject: FW: [#348678] FOR REVIEW: RCP028 PG Harris Plan Change Mandeville

Hi Paul –

I understand the Council has asked for confirmation that the flood assessment we have undertaken relating to the 1 in 200 year event (0.5% AEP) remains valid following the recent infilling of part of the former gravel pit. Below are our comments in regards to Councils inquiry.

The infilling is generally limited to the existing internal access tracks located within the gravel pit approximately 240m west of the intersection of McHughs Road with Mandeville Road. The depth of the gravel pit in the vicinity of the filling is in the order of 3.0–3.5m. The infilling that has taken place has raised the ground level within the gravel pit by up to 1.5m to form access tracks. The estimated volume of the borrow pit is 38,000 m^3, compared with the estimated volume of infilling to construct the access tracks of 1000 m^3, i.e., approx. 2.6% of the total volume of the gravel pit. The theoretical "displaced volume" of water is smaller than the limits of accuracy on the estimated borrow pit size derived from LiDAR survey or estimated from plan area. This % change would be also be within the accuracy limits of the flood model used and unlikely to be measureable.

Area wide flooding occurring during a 0.5%AEP event is anticipated to occur as sheet flow across McHughs Road towards the development site. The infilling was limited to within the gravel pit, and all areas filled are still lower than the surrounding land and therefore the infilling will not and will not horizontally constrain the flow channels.

Based on historical recorded events (e.g., June 2015) the gravel pit can become inundated with groundwater during extended duration storm events. During periods of high groundwater the pit has limited storage capacity for attenuating storm water. It can be assumed that during the 200 year storm event that the gravel pit is already filled with groundwater and any stormwater would sheet flow through the site. A 2.6% displacement volume of groundwater at this gravel pit is insignificant compared to the overall groundwater surface water interactions that occur on a regional basis.

We confirm that the flood assessment undertaken previously relating to the 1 in 200 year event (0.5% AEP) remains valid, and the impact of the infilling on overland flood flows in this area will be minor.

We trust this responds to the matters raised by the Council.

Regards,

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From: Edward Shaw [mailto:Edward.Shaw@eliotsinclair.co.nz]
Sent: Thursday, 26 November 2015 2:26 p.m.
To: Kalley Simpson
Cc: Paul Thompson; Matthew Bacon; Trevor Ellis
Subject: RE: [#348678] RCP028 PG Harris Plan Change Mandeville

Hi Kalley

Please see my response to your comments in blue below.

Let me know if you need any further information.

Kind regards

Ed.

From: Kalley Simpson [mailto:kalley.simpson@wmk.govt.nz]
Sent: Friday, 20 November 2015 9:19 a.m.
To: Edward Shaw
Cc: Paul Thompson; Matthew Bacon; Trevor Ellis
Subject: RE: [#348678] RCP028 PG Harris Plan Change Mandeville

Hi Ed

I generally agree with you approach but had assumed you would be using topo survey or Lidar data to determine the flow area rather than assuming a rectangular shape. This would also include allowance for post development earthworks associated with the ROW driveways etc.

That said, I infer from the information that you have presented that:

1. You don't expect the flood water to be diverted by the proposed development - ie flood water will continue to enter and exit the site at the sames points as it currently does. In effect this implies there will be no effect in flooding downstream of the site.
We don't expect the anticipated earthworks will form significant barriers or conduits for the 200year flood event and flow across the site would continue to be generally disperse in nature.

2. The potential off site effect may result in a 30mm rise in floodwaters upstream of the site. You conclude that this "is unlikely to impact measurably on the adjoining sites" primarily as this flow will spread out.
The calculation indicates a 30mm rise in the 200year floodwater depths upstream of the proposed development. Given the magnitude of this predicted rise and the potential for it not to be fully realised as described in our email of 23 October 2015 we consider that the impact is unlikely to be measureable on the adjoining sites.

Can you confirm our interpretation of your findings is correct.

Regards
Kalley

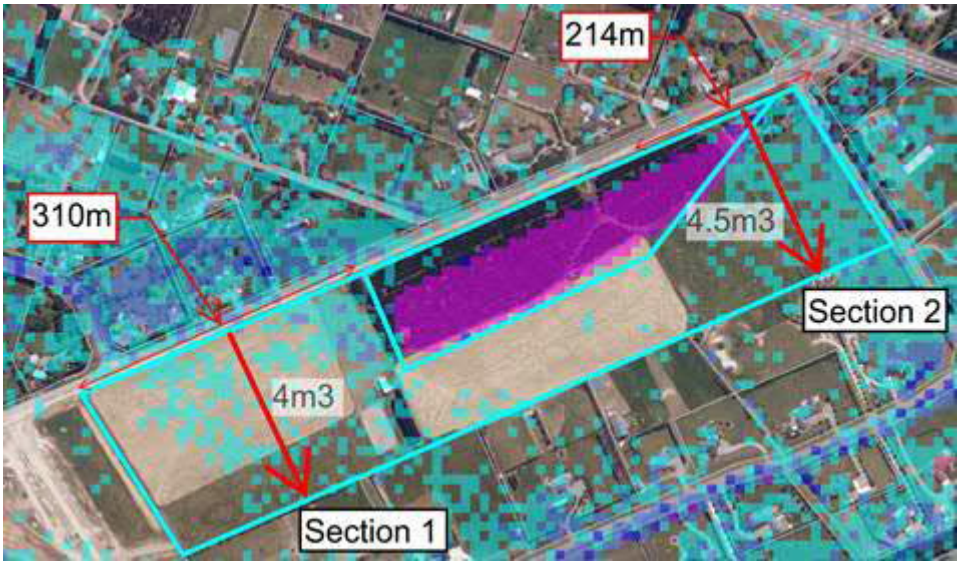
-------- Original message --------
From: Edward Shaw <Edward.Shaw@eliotsinclair.co.nz>
Date: 23/10/2015 4:00 pm (GMT+12:00)
To: Kalley Simpson <kalley.simpson@wmk.govt.nz>
Cc: Paul Thompson <Paul.Thompson@eliotsinclair.co.nz>, Matthew Bacon <matthew.bacon@wmk.govt.nz>
Subject: RE: [#348678] RCP028 PG Harris Plan Change Mandeville

Hi Kalley

We have followed the methodology in your email below as closely as possible however in analysing the site we have found:

- The flows and the topography combine so that in the modelled 200year flood, flows across the site are generally at shallow depth (100-250mm) over relatively wide flow paths. This is demonstrated by the data provided by WDC;
- The anticipated earthworks, RoW and road construction associated with the devlopment will not be on a scale that will channel or fully accommodate the 200year flood flow;
- The flood water over the site is in the form of sheet flow rather than ponding therefore a flow based analysis is more appropriate than a volume based approach.

Based on these observations and the data provided by Chris Bacon we have separated the site into two sections with similar flow regimes as shown in the image below.



The sections were assumed to be rectangular channels with the widths spanning the distance of the section, the width of Section 1 was 310 meters, and the width of Section 2 was 215 meters. Using the Council model for flow rates and depth across each section we determined an associated Manning's roughness coefficient for the existing situation.

To evaluate the effects the housing would have on the flow, we assumed that each house would act as a solid barrier forcing the water around. The total effective width of each section would then be reduced by the number of houses built across that section. We determined the average house width to be 27 m, based on measurements of similar houses in the area. Using the same design parameters as inferred from the WDC modelling but changing the channel width to account for the houses, a new water depth for the post development site was estimated.

The results of this analysis are shown in the tables below.

SUMMARY TABLE

Section 1			
Pre	Flow	4	m3/s
	Depth	0.1	m
	Width	310	m
	Mannings n	0.1	
Post	Flow	4	m3/s
	Number of houses	4	
	Ave House width	27	m
	Width	202	m
	Depth	0.13	m
Change in Water Depth		0.03	m

Section 2			
Pre	Flow	4.5	m3/s
	Depth	0.1	m
	Width	214	m
	Mannings n	0.06	
Post	Flow	4.5	m3/s
	Number of houses	3	
	Ave House width	27	m
	Width	133	m
	Depth	0.13	m
Change in Water Depth		0.03	m

For both sections the analysis indicates that post development conditions could generate a change to the water surface elevation in the order of 30mm.

A rise of this magnitude is unlikely to impact measurably on the adjoining sites and is potentially conservative as:

- The flood flow will not be constrained horizontally and therefore the calculated rise in level would not be fully realised.
- The calculations assume that the houses are constructed in a row perpendicular to the direction of the flood flow. Were the houses staggered (as they are likely to be) the restriction to the flow path would be lessened.
- The effect calculated would be localised to the area where the flood flow was passing between houses. When in open ground the flood depths would decrease back toward the pre-development levels.
- The Mannings values that have been determined from WDC's model data appear high for paddocks and would be more typical of a rural residential development. Given that the surrounding land use is rural-residential it may be that the WDC model already includes for similar development of this site.

I hope that this answers your concerns with regard to the impact of the development on offsite flood levels, but please do not hesitate to contact me if you have any further questions.

Kind regards

Appendix H:

Assessment of most relevant Objectives and Policies: Waimakariri District Plan

Table D: Assessment of most relevant Objectives and Policies: Waimakariri District Plan

Chapter	Objective / Policy	Consideration
2. Maori	**Objective 2.1.1** Effective and appropriate processes and practices that acknowledge the status of tangata whenua as treaty partner and take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi). **Policy 2.1.1.1** In identifying tangata whenua, Te Runanga o Ngai Tahu is recognised as the iwi authority and Te Ngai Tuahuriri as manawhenua. **Policy 2.1.1.2** Provide for the participation of tangata whenua in the management of the District's natural and physical resources. **Objective 2.1.2** Recognition and provision for the manawhenua concept and practice of kaitiakitanga in the management of natural and physical resources. **Objective 2.1.3** Recognition and protection of wahi taonga that is culturally, spiritually and/or physically important to Ngai Tuahuriri. **Objective 2.1.4** Recognition of the importance of mahinga kai to Ngai Tuahuriri and provision for protection of associated resources and access to them.	A list of Wahi Taonga that Ngai Tuahuriri have advised the Council they wish to be consulted on are detailed in Appendix 2.1 of the District Plan. There are no wahi taonga identified in the application site. Archaeological sites identified by the New Zealand Archaeological Association Site Record Scheme are detailed in Appendix 2.2 of the District Plan. There are no identified archaeological sites in the application site. Wahi Tapu/Wahi Taonga Sites as identified in *"Te Whakatau Kaupapa: Ngai Tahu Resource Management Strategy for the Canterbury Region"* (Tau, et al 1990) are detailed in Appendix 2.3 of the District Plan. There are no identified Wahi Tapu/Wahi Taonga sites within the application site.
3. Water	**Objective 3.2.1** The management and enhancement of the natural character and ecosystems of water bodies, and their margins.	The application site contains and abuts a water race for a short distance along its south western boundary.

	Policy 3.2.1.1 Avoid, remedy or mitigate the adverse effects of land use activities on the: a. Water quality; b. Natural character of water bodies and their margins; c. Ecosystems of water bodies and their margins; d. Habitat of trout and salmon; e. Significant amenity and recreational values of rivers and their margins; and f. Mahinga kai resources, wahi taonga of significance to Maori, and the mauri of water **Objective 3.3.1** Maintain and enhance the water quality of confined and unconfined groundwater aquifers. **Policy 3.3.1.1** Avoid or mitigate the adverse effects of the use, development and protection of land on the water quality of confined and unconfined groundwater aquifers.	Future stormwater discharges will be kept separate from this water body and its margin will be protected by the provision of a pedestrian/cyclway connection. Resource consent for the discharge of stormwater on site will be required from Environment Canterbury. The assessment of effects will ensure compliance with the matters listed in Policy 3.2.1.1. The application site overlies semi-confined or unconfined aquifers. The infrastructure servicing assessment has found future rural residential development can be adequately serviced to maintain water quality (surface and groundwaters).
4. Land and Water Margins	**Objective 4.1.1** Maintain and enhance the life-supporting capacity of the land resource in the District. **Policy 4.1.1.4** To ensure that contaminated sites are managed to prevent or mitigate effects and in a manner appropriate for the level of risk associated with the site.	A site investigation has been carried out which confirms the application site is not contaminated, and therefore the land resource will be appropriately maintained by the proposal.
8. Natural	**Objective 8.1.1** The community's understanding of natural hazards and its behaviour	The application site is subject to varying levels of flood

Hazards	prior to, during, and after natural events avoids or mitigates natural hazards to an accepted level. **Objective 8.2.1** The community's desired level of protection from flood events is achieved through an appropriate combination of measures to modify the level of flooding, modify susceptibility to damage and deal with the consequences of floods. **Policy 8.2.1.1** Identify areas of land known to be at risk from flooding or which have a known history of flooding. **Policy 8.2.1.2** In areas identified in the District Plan as having a history of localised flooding, and in areas adjacent to water bodies, give specific consideration to the consequences and probability of flooding at the time of subdivision or land use consent, to avoid or mitigate a flood hazard. **Policy 8.2.1.3** Avoid floodwaters entering residential, commercial and industrial buildings. **Policy 8.2.1.4** Avoid, remedy, or mitigate the adverse effects of activities that impede or redirect the movement of floodwater on a site, and/or exacerbate flood risk. **Policy 8.2.1.5** Include in the District Plan provisions continuing the land use and subdivision controls from the Transitional District Plan until a review of	risk. Methods exist and are proposed to ensure future dwellings are raised to appropriate levels above this risk. An assessment of liquefaction and geotechnical risk has found the land is suitable for rezoning.

	the flooding issue in the District, in conjunction with the Canterbury Regional Council, has been completed. **Objective 8.3.1** Increase Council and community understanding of the earthquake risk and associated natural hazard. **Policy 8.3.1.1** Identify areas which are at risk from liquefaction, associated ground damage effects, and amplified ground shaking.	
11. Utilities and Traffic Management	**Objective 11.1.1** Utilities that maintain or enhance the community's social, economic and cultural wellbeing, and its health and safety. **Policy 11.1.1.1** A utility should: a. contribute to a safe environment; b. maintain or enhance public health; c. promote efficient use of resources and efficient development of the utility, so that resources are conserved and used in a sustainable manner; d. have regard to cross boundary issues where the utility or the service provided by the utility crosses the territorial boundary; e. where it is necessary to service new development, be paid for by the developer, or as a condition of consent for the development; and f. maintains and enhance social wellbeing. **Policy 11.1.1.2** Every new site within a design catchment of an existing or proposed utility should connect to the utility wherever possible.	An Infrastructure servicing assessment of the site has confirmed the site is capable of being adequately serviced for water, wastewater, telecommunications, and electricity. In addition stormwater is able to be adequately managed. This service provision will enhance the social, economic and cultural wellbeing, and health and safety of future residents of the site. The level of service enjoyed by the existing community will be maintained. Service provision will connect to existing or proposed utilities such as the existing public water and wastewater supply as well as electricity and telecommunications. Stormwater management will utilise existing drains adjoining the site as required. Detailed engineering designs, including details of funding, will be addressed as part of the subdivision process. The application site is well serviced by an existing

	Policy 11.1.1.3 Subdivision and development should not proceed with areas that do not have access to appropriate utilities, or where the utilities are operating at full capacity or where these subdivisions or development are likely to adversely affect the planned expansion of those utilities. Subdivision and development can proceed if the existing utilities are upgraded to provide the appropriate capacity for the health and safety of the present and future population, or appropriate alternatives are provided. Appropriate alternative systems should, as a minimum; a. meet the current environmental and engineering design standards prescribed for the present utilities; and b. be capable of integration with existing utilities. **Policy 11.1.1.4** A road hierarchy shall be maintained and protected to enable the District to function with minimal conflict between activities, traffic, and people. **Policy 11.1.1.5** New developments and activities in relation to their traffic generation characteristics should: a. locate on or establish primary access to an appropriate level of road within the road hierarchy; b. not have vehicular access to an inappropriate level of road in the hierarchy; and c. provide cycleways along arterial, strategic and collector roads. **Policy 11.1.1.6** Every site should have access that provides safe entry and exit for vehicles to and from the site to a road without compromising the safety or efficiency of the road or road network.	network of arterial and local roads. Primary access will be obtained from two local roads. Access to the arterial road network via existing intersections. There is available capacity within this network to accommodate the associated additional traffic from the site and support the efficient and effective functioning of the road hierarchy. Cycle and pedestrian access will be provided for in conjunction with the active transport linkages shown on the ODP. A cycleway is not proposed as the site does not adjoin either an arterial, strategic or collector road. Future rural residential allotments will be sufficiently sized to provide on-site parking, turning and loading with safe access. The environmental effects of providing servicing provision are capable of being adequately managed in accordance with the environmental standards of the plan and the amenity and character of the area.

	Policy 11.1.1.7 Sites shall provide on-site parking, loading, turning for vehicles, or have safe and efficient access to those facilities. Any use of off-site facilities should not compromise pedestrian and vehicle safety, or the safe and efficient operation of the road network. **Objective 11.2.1** Adverse effects on the environment caused by the provision, use, maintenance and upgrading of utilities are avoided, remedied or mitigated. **Policy 11.2.1.1** Avoid, remedy or mitigate adverse environmental effects created by the provision, use, maintenance and upgrading of utilities by; a …	
12. Health Safety and Well Being	**Objective 12.1.1** Maintain the amenity values and a quality of environment appropriate for different parts of the District which protects the health, safety and wellbeing of present and future generations, and ensure that any potential adverse environmental effects from buildings and structures, signs, glare, noise and hazardous substances are avoided or mitigated. **Policy 12.1.1.1** Maintain and enhance the positive contribution that buildings and structures, and the spaces between them, make to the character and amenity of urban areas where people reside, the neighbourhood and streetscape. **Policy 12.1.1.3** In the Rural Zones maintain the amenity values and quality of the	Future building and development will take place in accordance with the existing standards of the District Plan to ensure potential adverse effects are avoided or mitigated. An ODP will ensure that future development takes place that supports the health, safety and wellbeing of present and future residents. The application site no longer holds the characteristics of a rural environment. The existing environment has the characteristics and amenity of a rural residential environment. The proposal supports the objectives and policies on the

	environment by ensuring that the land is not dominated by dwelling houses. **Policy 12.1.1.4** Avoid, remedy or mitigate the adverse effects of signs on the amenity values in different zones and avoid detrimentally affecting the safety of the community using road and rail corridors. **Policy 12.1.1.5** Control artificial light at a level that is appropriate to the zone. **Policy 12.1.1.6** Avoid glare from artificial light adversely affecting the amenity values and health and safety of people, on neighbouring properties and roads. **Policy 12.1.1.7** Control noise to a level that is not unreasonable, measured against the character and circumstances of the zone. **Policy 12.1.1.8** Avoid noise adversely affecting the amenity values and health and safety of people on neighbouring sites or zones. **Objective 12.1.2** The establishment and expansion of both farming activities and other activities in the Rural Zones in a way which gives consideration to existing activities while maintaining a quality environment appropriate for the zone. **Objective 12.1.3** Protect people, vegetation, animals, and other natural and physical	rural environment by supporting the Mandeville growth strategy which facilitates rural areas outside of the growth boundary to remain rural in character (by encouraging urban forms of development to be located instead within the growth boundary). The proposal will not compromise the ability for expansion of farming and other rural activities on other rural zoned land. The proposal does not encourage any activities that would result in the need for the discharge of contaminants to air beyond that of the surrounding environment (zones). Any such activities would in any event require resource consent from Environment Canterbury.

	resources, from the adverse effects resulting from the discharge of contaminants to air.	
13. Resource Management Framework	**Objective 13.1.1** Recognise and provide for the community's social and economic relationships within the District and external to the District, particularly those with Christchurch City, so that the District's natural, living and productive environments; e. are managed in an integrated and sustainable way; f. provide for and safeguard the community's wellbeing, health, and safety; g. are managed to ensure the protection and enhancement of natural and physical resources; and h. are not adversely affected by resource use, development and protection. **Policy 13.1.1.1** Management of natural and physical resources based on areas where there are differences in: a. the area's relationships with Christchurch City; b. amenity values and environmental qualities; c. the area's connection to, and dependence on, the national transport corridor; d. the area's form and function; e. the area's relationship with other areas within the District; f. community resource management expectations; and g. actual and potential effects of subdivision, use and development. **Policy 13.1.1.2** Avoid, remedy or mitigate the adverse effects of the development of Residential 4A and 4B Zones by limiting the establishment of new zones	The Waimakariri Rural Residential Development Plan identifies the application site as a preferred area for rural residential development subject to specific site investigations. The proposal is consistent with this strategy which promotes integrated and sustainable rural residential development in the District and through these strategies is in accordance with the community's resource management expectations. As the site is identified as suitable for this form of urban development, the proposal will provide housing choice that provides for the community's wellbeing and, health and safety. The proposal adopts existing zones in the District Plan. This is in keeping with the amenity, wellbeing, and environmental qualities of the surrounding community as provided for through the same or similar zoning. Specifically, in accordance with Policy 13.1.1.2, there are no significant natural and physical resources on the application site. Within the wider area, physical resources such as the sports domain, reticulated infrastructure and the existing road network will all be supported by the proposal. The proposal maintains the existing rural zone in relation to the area of the former gravel pit thereby avoiding any potential to exacerbate damage from natural hazards. The proposal is in

	to locations where the subdivision and development will not: a. adversely affect significant natural and physical resources; b. exacerbate damage from natural hazards (including flood damage); and c. create conflict with neighbouring land uses. **Policy 13.1.1.3** Promote a standard of servicing that recognises; a. the different physical environments and servicing constraints of areas within the District; b. the varying densities of the population in different areas; and c. the different amenity values, environmental quality, and community expectations associated with the different zones. **Policy 13.1.1.4** Encourage patterns and forms of settlement, transport patterns and built environment that: a. reduce the demand for transport; b. provide choice of transport modes which have low adverse environmental impact; c. decrease the production of motor vehicle emissions; d. make efficient use of regional transport network; and e. reduce the rate of use of non-renewable energy sources.	keeping with surrounding neighbouring land uses and anticipated within the relevant planning strategies. The proposal will connect to public (Council) and available reticulated services consistent with the manner in which the surrounding residential areas are serviced. Though rural residential development does not support sustainable transport as well as other land use patterns, the opportunity for public transport to the service the wider community is furthered by the proposal given its central location and the concentration of additional households within the identified growth boundary. The site provides access from local roads and therefore minimises the potential for vehicle and pedestrian conflict associated with access from other roads in the hierarchy. The proposed ODP also encourages active local (recreational) travel by providing key linkages to the existing walking and cycling network within Mandeville. These considerations promote the efficient use of the regional transport network.
14. Rural Zones	**Objective 14.1.1** Maintain and enhance both rural production and the rural character of the Rural Zones, which is characterised by: a. the dominant effect of paddocks, trees, natural features, and	Consistent with Objective 14.5.1 which seeks to facilitate the rebuild and recovery of Greater Christchurch, the proposed rural residential zoning is located within an identified rural residential

	agricultural, pastoral or horticultural activities; b. separation between dwellinghouses to maintain privacy and a sense of openness; c. a dwellinghouse clustered with ancillary buildings and structures on the same site; d. farm buildings and structures close to lot boundaries including roads; e. generally quiet – but with some significant intermittent and/or seasonal noise from farming activities; f. clean air – but with some significant short term and/or seasonal smells associated with farming activities; and g. limited or no roadside advertising. **Policy 14.1.1.1** Avoid subdivision and/or dwellinghouse development that results in any loss of rural character or is likely to constrain lawfully established farming activities. **Policy 14.1.1.2** Maintain the continued domination of the Rural Zones by intensive and extensive agricultural, pastrol and horticultural land use activities. **Policy 14.1.1.3** Maintain and enhance the environmental qualities such as natural features, air, and noise levels and limited signage that contribute to the distinctive character of the Rural Zones, consistent with a rural working environment. **Policy 14.1.1.4**	development areas (as identified in the Council's Rural Residential Development Plan). This objective (recently inserted into the District Plan) by the Land Use Recovery Plan provides a strong signal that development of the application site for rural residential is to be anticipated subject to the outcome of site specific investigations. The proposal will change the existing rural character of the part of the application site from one that is largely free of building and development to one of rural-residential development. Accordingly, the rural character as a setting to adjoining residential areas will also change. Though no longer dominated by paddocks and pastoral activities, the very low density allotments and future built structures on the application site will retain many of the other characteristics of rural character, such as large dwelling house separation and a generally quiet environment. Thus while the rural character of the site and surrounds will change, it will be retained through the standards of the zone. High density urban development that does not support rural character is not being proposed. Rural character as a setting for the existing and proposed rural residential areas will be maintained in the wider context through the effective implementation of the Rural Residential Development Plan and growth management strategy. In addition the proposed retention of the existing rural zone over the area of the former gravel pit will provide a rural backdrop to adjoining areas. The former gravel

	Maintain rural character as the setting for Residential 4A and 4B Zones. **Objective 14.2.1** Protect the life supporting capacity of the water resource from the adverse effects of on-site land based sewage treatment and wastewater disposal systems. **Policy 14.2.1.1** Avoid the deterioration of the quality of the water resource as a result of the operation of on-site land based sewage treatment and wastewater disposal systems in the Rural Zones. **Objective 14.5.1** To facilitate the rebuild and recovery of Greater Christchurch by directing future developments to existing urban areas, priority areas, identified rural residential development areas and MR873 for urban and rural residential activities and development. **Policy 14.5.1.1** To avoid new residential and rural residential activities and development outside of existing urban areas and priority areas as set out in the Land Use Recovery Plan and Chapter 6 of the Canterbury Regional Policy Statement, rural residential development areas identified in the Rural Residential Development Plan and MR873.	pit is fully occupied by trees, being held in forestry, and as such will continue to support a rural amenity. The proposal will not constrain any lawfully established farming activity and is located within an area already extensively developed for rural residential activities rather than any intensive agricultural activities. The environmental qualities of the area will not be adversely affected by the proposal. Existing controls within the District Plan will manage any adverse environmental effects such as noise, signage etc. The proposal provides for connections to the public wastewater system and thus supports minimising on-site land based sewage treatments and disposal systems that will ensure there is no deterioration of water resources.
15. Urban Environment	**Objective 15.1.1** Quality urban environments which maintain and enhance the form and function, the rural setting, character and amenity values of urban areas.	Rural residential environments are considered to provide urban environments as small residential environments in a rural setting with the benefits of some urban services. The proposal adopts an existing rural

	Policy 15.1.1.1 Integrate new development, subdivision, and activities into the urban environments in a way that maintains and enhances the form, function and amenity values of the urban areas. **Policy 15.1.1.2** Within the urban environment subdivision, land use, development and protection should avoid, or mitigate adverse effects on: a. the rural setting of the District's towns and settlements; b. efficient and effective functioning of roads; c. ease and efficiency of access; d. urban water bodies, and downstream effects on rural water bodies; e. low scale, low density housing, with flexibility in some areas to provide for varied housing needs; f. quiet and safe environments; g. cycleways; and h. the individual character of the settlement. **Policy 15.1.1.3** Promote subdivision design and layout that maintains and enhances the different amenity values and qualities of the different urban environments.	residential zone in the District Plan in keeping with adjoining land. This will ensure a quality urban area is provided through the zone rules in the District Plan in keeping with the character, values and qualities of the surrounding urban environment. This supports a variety and choice of low scale and low density housing. The proposal is supported by an ODP which will ensure integration of new development into the existing urban form. The rural setting of the site and adjoining areas will be provided for through the nature of the proposed zoning and the implementation of the growth management strategy. The application site enables acceptable access to be made onto two local roads thereby minimising potential traffic conflicts with other roads in the hierarchy. This will support the efficient and effective functioning of the road network. The stormwater discharges will take place to existing stormwater drains, as required, and will not take place to the existing water race, thereby protecting urban water bodies.
16. Business Zones	**Objective 16.1.3** A business zone within the Mandeville North settlement that: a. fulfils a local community convenience function; b. ensures a scale and form of development that: • is appropriate to serve the Mandeville North	The Mandeville North Business 4 Zone adjoins the Plan Change site to the east across Mandeville Road. The proposed rezoning maintains the ability for safe and efficient road access to Mandeville Road to be provided by the Business 4 Zone.

	settlement; • limits the total floor area of development and sinqle retail tenancies; and • avoids more than minor effects on the function and viability of Key Activity Centres; c. mitigates adverse effects on adjoining properties through • high levels of amenity and urban design; and • comprehensive design of car parking, loading areas, and entranceway design and landscaping d. ensures the safe and effective function of Tram Road. **Policy 16.1.3.1** Provide for retail and business activities in the Mandeville North Business 4 Zone, in a way that: a. ensures that the characteristics of the Residential 4A and 4B Zones are maintained as set out in Policy 17.1.1.1; b. maintains the characteristics of the Mandeville settlement as set out in Objective 18.1.3; c. is limited to the provision of retail and commercial floorspace appropriate to the size of the Mandeville settlement as defined by its extent shown on District Plan Map 167; d. limits access onto and from Tram Road to three locations including a left hand turn exit onto Tram Road from the Business 4 Zone, and two left hand turn entrances from Tram Road that avoid right hand turns to and from Tram Road; e. prevents direct pedestrian access from Tram Road into the Business 4 Zone to maintain the safe use of Tram Road; f. prevents car parking on Tram Road so as to avoid pedestrian access to the Business 4 Zone to maintain the safe use of Tram Road; g. ensures the provision of onsite carparking avoids adverse	

	effects on the amenity of the area; h. limits noise to a level that is consistent with the Residentiai 4A and 4B Zones; i. considers the location size, design and use of buildings to limit the effects of building dominance and amenity; and, j. considers the location of any accessway to Mandeville Road to ensure safe and efficient road access.	
17. Residential Zones	**Objective 17.1.1** Residential Zones that provide for residents' health, safety and wellbeing and that provide a range of living environments with distinctive characteristics. **Policy 17.1.1.1** Maintain and enhance the characteristics of Residential Zones that give them their particular character and quality of environment. **Policy 17.1.1.2** Recognise and provide for differences between Residential Zones reflecting the community's expectations that a range of living environments will be maintained and enhanced.	The proposal adopts an existing residential zone in the District Plan which is the same or similar to adjoining areas. The zone provisions, supported by the proposed ODP, will enable the same characteristics as adjoining residential zones to be provided, including providing a range of living environments. The proposal will enable the characteristics of the Residential 4A/4B zone listed in Table 17.1 to be provided and will meet the community's expectations of low density residential sites in a rural setting.
18. Constraints on Development and Subdivision	**Objective 18.1.1** Sustainable management of natural and physical resources that recognises and provides for; d. changes in the environment of an area as a result of land use development and subdivision; e. changes in the resource management expectations the community holds for the area; f. the actual and potential effects of subdivision, use and development.	The application site is identified as a preferred development location in the Rural Residential Development Plan. Objective 14.5.1 seeks to facilitate the rebuild and recovery of Greater Christchurch, by ensuring rural residential development is restricted to those areas identified in the Rural Residential Development Plan. This objective (recently inserted into the District Plan) by the Land Use Recovery Plan provides a strong signal that development of the application site for rural residential is to be anticipated,

	Policy 18.1.1.1 Growth and development proposals should provide an assessment of how: the use, development, or protection of natural and physical resources affected by the proposal will be managed in a sustainable and integrated way; and the adverse effects on those resources and the existing community will be avoided, remedied, or mitigated. In particular, proposals should not be inconsistent with other objectives and policies in the District Plan, and show how the extent to which they will: a. protect areas of significant indigenous vegetation and habitats of indigenous fauna including vegetation and habitat sites listed in Appendix 25.1; b. protect the outstanding landscape area as defined in the District Plan Maps; c. avoid or mitigate natural hazards including: flooding as defined in the District Plan Maps, flooding from the Waimakariri or Ashley/Rakahuri Rivers, seismic conditions including the potential for liquefaction and amplification effects, damage from the sea, including erosion, storm and tsunami, and land instability; d. protect the life supporting capacity of soils; e. maintain and enhance the environmental characteristics of adjoining zones, and the environment of the zone within which the proposal is located, as set out in Policies 14.1.1.2, 14.1.13, 15.1.1.1, 16.1.1.1 and 17.1.1.2; f. retain the rural environment between Residential 4A and 4B Zones, between the Rangiora, Kaiapoi, Woodend, Pegasus and Oxford urban areas, and other Residential 3 Zones; and between Kaiapoi and the Christchurch City boundary;	subject to site specific investigations, and respects the resource management expectations of the community. Technical investigations have been undertaken that confirm, subject to appropriate mitigation where required, the proposal will meet the criteria listed (a) – (x) and that the site is appropriate for rural residential development. The proposal is compatible with existing activities on adjoining land which are residential and or predominantly residential in nature.

	g. provide access to and along rivers, open spaces and reserves; h. maintain and enhance the form and functions of the District's towns; i. avoid or mitigate significant adverse effects on the form and function of the Business 1 Zones including its role as a dominant community focal point within the four main towns; j. avoid or mitigate the effects of noise within the outer control boundary (55dBA Ldn noise contour) of Christchurch International Airport noise contours as defined in Map 138; k. provide infrastructure for services and roading in a manner consistent with this District Plan; l. ensure the efficient and effective integration of any new infrastructure into the existing network, or ensure the efficient and effective ongoing working of a stand-alone system; m. avoid or mitigate potential adverse effects from sites and facilities using, storing, and/or disposing of hazardous substances; n. protect groundwater quality and quantity; o. protect surface water quality and quantity; p. protect wahi taonga q. avoid adverse effects on heritage sites and protect those sites listed in Appendix 28.1; r. avoid adverse effects on significant plants and protect those notable plants listed in Appendix 29.1; s. avoid adverse effects on the Business 3 Zone; t. provide for efficiency in energy use; u. enable local communities to be more self-sustaining; v. affect the demand for transport; w. provide choice in transport mode, particularly modes with low averse environmental effects; and x. avoid or mitigate for adverse impacts on the habitat of trout and	

	salmon. **Policy 18.1.1.3** Any proposal for extensions to existing zones, or for new zones, should recognise the nature, scale and intensity of effects arising from existing activities adjoining or near to the site of the plan change and show how the proposal will avoid, remedy or mitigate any adverse effects on the environment arising from those existing activities.	
20. Financial Contributions	**Objective 20.1.1** To offset environmental effects resulting from land use or subdivision where they cannot be avoided, remedied or mitigated. **Objective 20.2.1** To ensure that financial contributions are imposed for the purpose of meeting the capital expenditure necessary for the extra demand on infrastructure generated by the proposed subdivision or land use.	At the time of subdivision any environmental offsets (if required) can be put in place and the required financial contributions imposed to meet any capital expenditure necessary to service future development.

Appendix I:

Assessment of most relevant Objectives and Policies: Canterbury Regional Policy Statement

Table E: Assessment of most relevant Objectives and Policies: Canterbury Regional Policy Statement

Chapter	Consideration
Chapter 1 - Introduction	Does not contain any objectives and policies
Chapter 2 - Issues of Resource Management Significance to Ngai Tahu	The proposal recognises that Te Runanga o Ngai Tahu is the iwi authority and mana whenua is exercised through Te Ngai Tuahuriri Runanga. Investigations of relevant documents have not identified that the application site contains wahi tapu and other taonga.
Chapter 3 - Resource Management Processes for Local Authorities	This chapter discusses the working relationship of the Regional Council and the District Council. The proposal does not undermine the ability for these matters to be achieved.
Chapter 4 – Provision for Ngai Tahu and their relationship with resources.	This chapter sets out the tools and processes that the Canterbury Regional Council will use to engage with Ngāi Tahu as tāngata whenua in the management of natural and physical resources. The proposal does not undermine the ability for these matters to be achieved.
Chapter 5 – Landuse and Infrastructure	Objective 5.2.1 and attendant policies 5.3.1, 5.3.2 & 5.3.3 are relevant. The objective and its supporting policies enable rural residential development to occur under appropriate conditions and locations. The plan change will achieve and comply with the objective and policies as it achieves consolidated, well designed and sustainable growth for the District; enables people and communities to provide for their wellbeing, maintains the overall quality of the natural environment; provides housing choice to meet the District's housing needs, is compatible with regionally significant infrastructure and avoids adverse effects on significant natural and physical resources. As the proposal is within Greater Christchurch the matters identified in Chapter 6 takes precedence in giving consideration to this chapter.
Chapter 6 – Recovery and Rebuilding of Greater	This chapter contains the key considerations. Refer to **Table F** below.

Christchurch	
Chapter 7 – Fresh Water	The proposal does not impact upon water flow, groundwater levels or allocation regimes and does not impact on providing sufficient quantities of water in water bodies. The proposal will not have a detrimental effect on water quality and will not result in a release of hazardous substances.
Chapter 8 – The Coastal Environment	N/a. The application site is not located in a coastal environment.
Chapter 9 – Ecosystems and Indigenous Biodiversity	N/a. The application site does not contain any areas of indigenous ecosystems or indigenous biodiversity.
Chapter 10 – Beds of rivers, lakes and their riparian zones	N/a. The application site does not affect the bed of a river or lake.
Chapter 11 – Natural Hazards	Natural hazards associated with the application site have been assessed and where necessary, methods are proposed to adequately mitigate risk to an acceptable level. In particular, methods are proposed to ensure finished floor levels of new dwellings are above a 0.5% AEP flood event in accordance with Policy 11.3.2 *Avoid development in areas subject to inundation.*
Chapter 12 – Landscape	The application site and proposal will not impact on any wetland, outstanding natural features and landscapes or indigenous biodiversity, ecosystem or vegetation and habitat values.
Chapter 13 – Historic Heritage	The proposal will not cause the loss of any historical and heritage sites, buildings, places and areas.
Chapter 14 – Air Quality	The proposal will not cause a deterioration of ambient air quality.
Chapter 15 - Soils	The proposal will not result in soil erosion or sedimentation of water bodies, loss of significant vegetation cover and will not introduce land use activities that have significant adverse effects on soil quality factors. The proposal will maintain and safeguard the quality and life-supporting

	capacity of soil.
Chapter 16 - Energy	N/a. The proposal does not relate to the energy sector.
Chapter 17 – Contaminated Land	The application site has been investigated and found not to be contaminated. The proposal will not introduce activities that will cause contamination of natural resources.
Chapter 18 – Hazardous Substances	N/a.
Chapter 19 – Waste Minimisation and Management	N/a. The proposal does not involve waste management.

Table F: Chapter 6 *Recovery and Rebuilding of Greater Christchurch* of the Canterbury Regional Policy Statement

Objective / Policy	Consideration
Objective 6.2.1 - Recovery framework Recovery, rebuilding and development are enabled within Greater Christchurch through a land use and infrastructure framework that: (1) identifies priority areas for urban development within Greater Christchurch; (2) identifies Key Activity Centres which provide a focus for high quality, and, where appropriate, mixed-use development that incorporates the principles of good urban design; (3) avoids urban development outside of existing urban areas or greenfield priority areas for development, unless expressly provided for in the CRPS; (4) protects outstanding natural features and landscapes including those within the Port Hills from inappropriate subdivision, use and development; (5) protects and enhances indigenous biodiversity and public space; (6) maintains or improves the quantity and quality of water in groundwater aquifers and surface water bodies, and quality of ambient air; (7) maintains the character and amenity of rural areas and settlements; (8) protects people from unacceptable risk from natural hazards and the effects of sea level rise; (9) integrates strategic and other infrastructure and services with land use development; (10) achieves development that does not adversely affect the efficient operation, use, development, appropriate upgrade, and future planning of strategic infrastructure and freight hubs;	Those provisions of Objective 6.2.1 of particular relevance to the proposal include: the application site is identified as a potentially suitable growth location for urban development within the existing Mandeville settlement in the Waimakariri Rural Residential Development Plan. The proposal adopts an existing rural residential zone of the District Plan and carries forward the same character and amenity of the existing settlement. The development will be well integrated including the use of existing infrastructure and services. Appropriate methods are proposed to ensure potential risks from natural hazards are satisfactorily addressed.

(11) optimises use of existing infrastructure; and (12) provides for development opportunities on Māori Reserves in Greater Christchurch.	
Objective 6.2.2 – Urban form and settlement pattern The urban form and settlement pattern in Greater Christchurch is managed to provide sufficient land for rebuilding and recovery needs and set a foundation for future growth, with an urban form that achieves consolidation and intensification of urban areas, and avoids unplanned expansion of urban areas, by: (1) aiming to achieve the following targets for intensification as a proportion of overall growth through the period of recovery: (a) 35% averaged over the period between 2013 and 2016 (b) 45% averaged over the period between 2016 to 2021 (c) 55% averaged over the period between 2022 and 2028; (2) providing higher density living environments including mixed use developments and a greater range of housing types, particularly in and around the Central City, in and around Key Activity Centres, and larger neighbourhood centres, and in greenfield priority areas and brownfield sites; (3) reinforcing the role of the Christchurch central business district within the Greater Christchurch area as identified in the Christchurch Central Recovery Plan; (4) providing for the development of greenfield priority areas on the periphery of Christchurch's urban area, and surrounding towns at a rate and in locations that meet anticipated demand and enables the efficient provision and use of network infrastructure; (5) encouraging sustainable and self-sufficient growth of the towns of Rangiora, Kaiapoi, Woodend, Lincoln, Rolleston and Prebbleton and consolidation of the existing	Those provisions of Objective 6.2.2 of particular relevance to the proposal include: the proposal relates to rural residential development within an existing urban area which will support the creation of an urban form that achieves consolidation of urban areas.

settlement of West Melton; (6) Managing rural residential development outside of existing urban and priority areas; and (7) Providing for development opportunities on Māori Reserves.	
Objective 6.2.3 – Sustainability Recovery and rebuilding is undertaken in Greater Christchurch that: (1) provides for quality living environments incorporating good urban design; (2) retains identified areas of special amenity and historic heritage value; (3) retains values of importance to Tangata Whenua; (4) provides a range of densities and uses; and (5) is healthy, environmentally sustainable, functionally efficient, and prosperous.	The Residential 4A Zone provides for a greater range of allotment densities and housing choice. The existing zone provisions supported by the proposed ODP will maintain the existing values and amenity of the settlement and provide a quality future living environment.
Objective 6.2.4 – Integration of transport infrastructure and land use Prioritise the planning of transport infrastructure so that it maximises integration with the priority areas and new settlement patterns and facilitates the movement of people and goods and provision of services in Greater Christchurch, while: (1) managing network congestion; (2) reducing dependency on private motor vehicles; (3) reducing emission of contaminants to air and energy use; (4) promoting the use of active and public transport modes; (5) optimising use of existing capacity within the network; and (6) enhancing transport safety	The proposal optimises the use of existing capacity within the road network and promotes the use of active transport within Mandeville. There is no public transport available in the local area at present. The proposal would not detrimentally impact on any future decision to provide public transport. Overall the proposal provides for integration of land use with the existing transport infrastructure.

Policy 6.3.1 – Development within the Greater Christchurch area In relation to recovery and rebuilding for Greater Christchurch: (1) give effect to the urban form identified in Map A, which identifies the location and extent of urban development that will support recovery, rebuilding and planning for future growth and infrastructure delivery; (2) give effect to the urban form identified in Map A by identifying the location and extent of the indicated Key Activity Centres; (3) enable development of existing urban areas and greenfield priority areas, including intensification in appropriate locations, where it supports the recovery of Greater Christchurch; (4) ensure new urban activities only occur within existing urban areas or identified greenfield priority areas as shown on Map A, unless they are otherwise expressly provided for in the CRPS; (5) provide for educational facilities in rural areas in limited circumstances where no other practicable options exist within an urban area; and (6) avoid development that adversely affects the function and viability of, or public investment in, the Central City and Key Activity Centres.	As provided for under policy 6.3.1(4) rural residential development is expressly provided for under Policy 6.3.9.
Policy 6.3.2 – Development form and urban design Business development, residential development (including rural residential development) and the establishment of public space is to give effect to the principles of good urban design below, and those of the NZ Urban Design Protocol 2005, to the extent appropriate to the context: (1) Tūrangawaewae – the sense of place and belonging – recognition and incorporation of the identity of the place, the context and the core elements that comprise the place. Through context and site analysis, the following elements should be used to reflect the appropriateness of the development to its location: landmarks and features, historic heritage, the character and quality of the existing built and natural environment,	The proposed rural residential zoning adopts the existing standards of the Residential 4A Zone and the development form and urban design requirements contained in the associated rules package.

historic and cultural markers and local stories. (2) Integration – recognition of the need for well-integrated places, infrastructure, movement routes and networks, spaces, land uses and the natural and built environment. These elements should be overlaid to provide an appropriate form and pattern of use and development. (3) Connectivity – the provision of efficient and safe high quality, barrier free, multimodal connections within a development, to surrounding areas, and to local facilities and services, with emphasis at a local level placed on walking, cycling and public transport as more sustainable forms of transport. (4) Safety – recognition and incorporation of Crime Prevention Through Urban Design (CPTED) principles in the layout and design of developments, networks and spaces to ensure safe, comfortable and attractive places. (5) Choice and diversity – ensuring developments provide choice and diversity in their layout, built form, land use housing type and density, to adapt to the changing needs and circumstances of the population. (6) Environmentally sustainable design – ensuring that the process of design and development minimises water and resource use, restores ecosystems, safeguards mauri and maximises passive solar gain. (7) Creativity and innovation – supporting opportunities for exemplar approaches to infrastructure and urban form to lift the benchmark in the development of new urban areas in the Christchurch region.	
Policy 6.3.3 – Development in accordance with outline development plans Development in greenfield priority areas and rural residential development, is to occur in accordance with the provisions set out in an outline development plan or other rules for the area. Subdivision must not proceed ahead of the incorporation of an outline development plan in a district plan. Outline development plans and associated rules	The proposed rural residential development is supported by an Outline Development Plan (ODP) to be incorporated into the District Plan as a single plan for the whole of the proposed rural residential area. The ODP details all key elements necessary to ensure future development takes place in an integrated manner

will: (1) Be prepared as: (a) a single plan for the whole of the priority area; or (b) where an integrated plan adopted by the territorial authority exists for the whole of the priority area and the outline development plan is consistent with the integrated plan, part of that integrated plan; or (c) a single plan for the whole of a rural residential area; and (2) Be prepared in accordance with the matters set out in Policy 6.3.2; (3) To the extent relevant show proposed land uses including: (a) Principal through roads, connections with surrounding road networks, relevant infrastructure services and areas for possible future development; (b) Land required for community facilities or schools; (c) Parks and other land for recreation; (d) Land to be used for business activities; (e) The distribution of different residential densities, in accordance with Policy 6.3.7; (f) Land required for stormwater treatment, retention and drainage paths; (g) Land reserved or otherwise set aside from development for environmental, historic heritage, or landscape protection or enhancement; (h) Land reserved or otherwise set aside from development for any other reason, and the reasons for its protection from development; (i) Pedestrian walkways, cycleways and public transport routes both within and adjoining the area to be developed;	to support infrastructure, transport and existing natural features.

(4) Demonstrate how Policy 6.3.7 will be achieved for residential areas within the area that is the subject of the outline development plan, including any staging; (5) Identify significant cultural, natural or historic heritage features and values, and show how they are to be protected and/or enhanced; (6) Document the infrastructure required, when it will be required and how it will be funded; (7) Set out the staging and co-ordination of subdivision and development between landowners; (8) Demonstrate how effective provision is made for a range of transport options including public transport options and integration between transport modes, including pedestrian, cycling, public transport, freight, and private motor vehicles; (9) Show how other potential adverse effects on and/or from nearby existing or designated strategic infrastructure (including requirements for designations, or planned infrastructure) will be avoided, remedied or appropriately mitigated; (10) Show how other potential adverse effects on the environment, including the protection and enhancement of surface and groundwater quality, are to be avoided, remedied or mitigated; (11) Show how the adverse effects associated with natural hazards are to be avoided, remedied or mitigated as appropriate and in accordance with Chapter 11 and any relevant guidelines; and (12) Include any other information that is relevant to an understanding of the development and its proposed zoning.	
Policy 6.3.4 – Transport effectiveness Ensure that an efficient and effective transport network that supports business and residential recovery is restored, protected and enhanced so that it maintains and	The proposal optimises the use of existing capacity within the road network and promotes the use of active transport within Mandeville. There is no public transport available in the local area at present. The proposal would not

improves movement of people and goods around Greater Christchurch by: (1) avoiding development that will overload strategic freight routes; (2) providing patterns of development that optimise use of existing network capacity and ensuring that, where possible, new building projects support increased uptake of active and public transport, and provide opportunities for modal choice; (3) providing opportunities for travel demand management; (4) requiring integrated transport assessment for substantial developments; and (5) improving road user safety.	detrimentally impact on any future decision to provide public transport. Road user safety is provided by enabling future access onto local roads which will minimise the potential for vehicle conflicts compared with other roads in the hierarchy. Overall the proposal provides for integration of land use with the existing transport infrastructure.
Policy 6.3.5 – Integration of land use and infrastructure Recovery of Greater Christchurch is to be assisted by the integration of land use development with infrastructure by: (1) Identifying priority areas for development to enable reliable forward planning for infrastructure development and delivery; (2) Ensuring that the nature, timing and sequencing of new development are co-ordinated with the development, funding, implementation and operation of transport and other infrastructure in order to; (a) optimise the efficient and affordable provision of both the development and the infrastructure; (b) maintain or enhance the operational effectiveness, viability and safety of existing and planned infrastructure; (c) protect investment in existing and planned infrastructure; and (d) ensure new development does not occur until provision for appropriate infrastructure is in place; (3) Providing that the efficient and effective functioning of infrastructure, including	Those provisions of Policy 6.3.5 of particular relevance to the proposal include: the proposal can be serviced utilising existing infrastructure. The proposal will therefore optimise the efficient and effective provision of both the development and infrastructure, including the road network.

transport corridors, is maintained, and the ability to maintain and upgrade that infrastructure is retained; (4) Only providing for new development that does not affect the efficient operation, use, development, appropriate upgrading and safety of existing strategic infrastructure, including by avoiding noise sensitive activities within the 50dBA Ldn airport noise contour for Christchurch International Airport, unless the activity is within an existing residentially zoned urban area, residential greenfield area identified for Kaiapoi, or residential greenfield priority area identified in Map A; and (5) Managing the effects of land use activities on infrastructure, including avoiding activities that have the potential to limit the efficient and effective, provision, operation, maintenance or upgrade of strategic infrastructure and freight hubs.	
Policy 6.3.9 – Rural residential development In Greater Christchurch, rural residential development further to areas already zoned in district plans as at 1st January 2013 can only be provided for by territorial authorities in accordance with an adopted rural residential development strategy prepared in accordance with the Local Government Act 2002, subject to the following: (1) In the case of Christchurch City, no further rural residential development is to be provided for within the Christchurch City Plan area; (2) The location must be outside the greenfield priority areas for development and existing urban areas; (3) All subdivision and development must be located so that it can be economically provided with a reticulated sewer and water supply integrated with a publicly owned system, and appropriate stormwater treatment and disposal; (4) Legal and physical access is provided to a sealed road, but not directly to a road defined in the relevant district plan as a Strategic or Arterial Road, or as a State	The application site is identified as a suitable growth location in the Waimakariri Rural Residential Development Plan. The proposal can connect to a public reticulated sewer and water supply and is able to adequately manage stormwater. Legal and physical access is able to be provided by local roads. The application site avoids the Christchurch International Airport and the other specific sites identified under section (5). An outline development plan is proposed which provides for an integrated design for subdivision and land use, and provides for the long-term maintenance of rural residential character in the existing settlement. The proposal does not give rise to reverse sensitivity effects with adjacent rural activities. The proposal will support existing community infrastructure and provide for good access to emergency services.

highway under the Government Roading Powers Act 1989; (5) The location and design of any proposed rural residential development shall: (a) avoid noise sensitive activities occurring within the 50 dBA Ldn air noise contour surrounding Christchurch International Airport so as not to compromise the future efficient operation of Christchurch International Airport or the health, wellbeing and amenity of people; (b) avoid the groundwater protection zone for Christchurch City's drinking water; (c) avoid land between the primary and secondary stop banks south of the Waimakariri River; (d) avoid land required to protect the landscape character of the Port Hills; (e) not compromise the operational capacity of the Burnham Military Camp, West Melton Military Training Area or Rangiora Airfield; (f) support existing or upgraded community infrastructure and provide for good access to emergency services; (g) avoid significant reverse sensitivity effects with adjacent rural activities, including quarrying and agricultural research farms, or strategic infrastructure; (h) avoid significant natural hazard areas including steep or unstable land; (i) avoid significant adverse ecological effects, and support the protection and enhancement of ecological values; (j) support the protection and enhancement of ancestral land, water sites, wāhi tapu and wāhi taonga of Ngāi Tahu; (k) where adjacent to or in close proximity to an existing urban or rural residential	Appropriate methods are proposed to avoid significant natural hazard areas.

area, be able to be integrated into or consolidated with the existing settlement; and (l) avoid adverse effects on existing surface water quality. (6) An outline development plan is prepared which sets out an integrated design for subdivision and land use, and provides for the long-term maintenance of rural residential character. (7) A rural residential development area shall not be regarded as in transition to full urban development.	

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