LAND USE RECOVERY PLAN
ACTION 21

MAORI RESERVE 873 – KAIAPOI

RESPONSE TO ACTION 21
LURP ACTION 21 – Maori Reserve 873 Proposed Plan Change

Amend the Waimakariri District Plan as follows:

Chapter 1: Definitions

Delete the Definition of dwellinghouse and Add a new Definition of dwellinghouse to read as follows:

**Dwellinghouse**

*Dwellinghouse means any habitable structure, occupied or intended to be occupied in part or in whole as a residence and, except in relation to any cluster housing within Maori Reserve 873, includes one additional physically separated dwellinghouse that is no more than 75 square metres in gross floor area and is located within 30 metres of the primary dwellinghouse. For the purposes of this definition there shall be only one kitchen facility under any individual roof structure.*

Add a new Definition of Cluster Housing development (Kainga Nohoanga) to read as follows:

**Cluster Housing (Kainga Nohoanga):**

*Cluster Housing means Kainga Nohoanga dwellinghouse development that has been designed as a group and is contiguous on a site or sites in the Rural Zone of Maori Reserve 873, as identified on District Plan Map 176A.*

Add a new Definition of Maori Reserve 873 to read as follows:

**Maori Reserve 873:**

*Maori Reserve 873 is an area of the District set aside under Kemps Deed (1848) for tangata whenua grantees and their descendants as set out in the Crown Grants Act (No 2) 1862 and the Crown Grants Act 1873. The location of Maori Reserve 873 is identified on District Plan Map 176A. Note: descendancy will be determined by the whakapapa unit of Ngai Tahu.*

Chapter 23: Land and Water Margins - Rules

Delete Rule 23.1 and Add new Rule 23.1 to read as follows:

**23.1 Permitted Activities**

*Any land use is a permitted activity if it:*

i. is not otherwise listed as a controlled, discretionary (restricted), discretionary or non-complying activity under this chapter, or is not a discretionary activity (restricted) under Rule 25.2.4;*
ii. complies with the conditions under Rule 23.1.1; and

iii. complies with all the conditions and provisions for permitted activities in all chapters.

Delete Rule 23.1.1.16 and Add new Rule 23.1.1.16 to read as follows:

23.1.1.16 Within any Residential, Business, Mapleham Rural 4B Zone or cluster housing development within Maori Reserve 873, domestic wastewater generated within any site shall be disposed of by connection to a reticulated sewage disposal utility.

Delete Rule 23.1.1.17 and Add new Rule 23.1.1.17 to read as follows:

23.1.1.17 Within any Residential Zone, Business 1, 2, or 4 Zone, the Rural Zone including cluster housing within Maori Reserve 873 or Mapleham Rural 4B Zone, the supply of water to any site shall be by a reticulated potable water supply.

Delete Rule 23.3.6 and Add new Rule 23.3.6 to read as follows:

23.3.6 Except as provided for by Rule 23.5, any land use that does not comply with Rule 23.1.1.16 (disposal of sewage) is a discretionary activity (restricted).

In considering any application for a resource consent under Rule 23.3.6, the Council shall, in deciding whether to grant or refuse consent, and in deciding whether to impose conditions, restrict the exercise of its discretion, to the following matters:

i. the environmental standards of the proposed and existing sewage disposal systems;

ii. the scale, location, design, construction and standard of any sewage treatment and disposal system and outfall;

iii. contingency provisions and emergency response procedures in the event of a failure in the service, treatment disposal system or outfall;

iv. financial contributions as set out in Chapter 20: Financial Contributions and Chapter 34: Financial Contributions – Rules and development contributions as set out in Waimakariri District Council’s Development Contributions Policy;

v. those matters over which control is exercised for Controlled Activities in Chapter 32: Subdivision – Rules;

vi. effects on wahi taonga and mahinga kai;

vii. effects on effectiveness and efficiency of existing public systems;

viii. the need for ongoing maintenance, service contracts and standards;

ix. the protection of on-site and off-site domestic water supply;
x. buffers between any disposal field(s) and any dwellinghouse;
xii. the design, location, management of any sewerage system(s) in
relation to soil or ground permeability and topography;
xii. buffers between water bodies, excluding aquifers and wetlands
and sewage disposal fields;
xiii. the need to contain disposal fields within allotments; and
xiv. the effect land use will have on the water quantity of any water
body.

Delete Rule 23.3.7 and Add new Rule 23.3.7 to read as follows:

23.3.7 Except as provided for by Rule 23.5, any land use that does not comply
with Rule 23.1.1.17 (supply of water) is a discretionary activity
(restricted).

In considering any application for a resource consent under Rule 23.3.7,
the Council shall, in deciding whether to grant or refuse consent, and in
deciding whether to impose conditions, restrict the exercise of its
discretion to the following matters:

i. the potability and capacity of water supply;

ii. the environmental standards of the proposed and existing
water supply;

iii. the means of supply and location of any water source;

iv. contingency provisions and emergency response procedures
in the event of a failure in the service;

v. financial contributions as set out in Chapter 20: Financial
Contributions and Chapter 34: Financial Contributions –
Rules and development contributions as set out in
Waimakariri District Council’s Development Contributions
Policy;

vi. those matters over which control is exercised for Controlled
Activities in Chapter 32: Subdivision – Rules;

vii. effects on wahi taonga and mahinga kai;

viii. effects on effectiveness and efficiency of existing public
systems;

ix. the need for ongoing maintenance, service contracts and
standards; and

x. the effect land use will have on the water quantity of any water
body.

Add new Rules 23.5 and 23.5.1 to read as follows:

23.5 Non-complying Activity

23.5.1 Any land use that does not comply with one or more of Rules 23.1.1.16,
23.1.1.17 in regard to Maori Reserve 873, is a non-complying activity.
Chapter 27: Natural Hazards – Rules

Add new Rule 27.4.4 to read as follows:

27.4.4. The construction of any new dwellinghouse, or cluster housing within the 0.2% Annual Exceedance Probability flood event hazard area within Maori Reserve 873, is a non-complying activity.

Chapter 30: Utilities and Traffic Management - Rules

Delete Rule 30.6.1.2 and Add new Rule 30.6.1.2 to read as follows:

30.6.1.2 Except where part of a cluster housing development under Rule 31.32.1 access to seven or more sites shall only be provided by way of a road which complies with the design attributes of Table 30.1, or Table 30.2 for the Residential 7 Zone.

Chapter 31: Health, Safety and Wellbeing - Rules

Delete Table 31.1 and Add new Table 31.1 to read as follows:

Table 31.1: Minimum Structure Setback Requirements

<table>
<thead>
<tr>
<th>Location</th>
<th>A setback is required from</th>
<th>Setback depth (minimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Zone)</td>
<td>Any road boundary</td>
<td>20m for any dwellinghouse</td>
</tr>
<tr>
<td></td>
<td>Any internal site boundary</td>
<td>10m for any structure other than a dwellinghouse</td>
</tr>
<tr>
<td></td>
<td>Any existing dwellinghouse on an adjoining site</td>
<td>20m for any dwellinghouse</td>
</tr>
<tr>
<td></td>
<td>Any site boundary</td>
<td>3m for any structure other than a dwellinghouse</td>
</tr>
<tr>
<td>Rural Zone Maori Reserve 873</td>
<td>Any road boundary, any site boundary external to the cluster, and any existing dwellinghouse on an adjoining site</td>
<td>10m for any structure (excluding a dwellinghouse)</td>
</tr>
<tr>
<td>cluster housing</td>
<td></td>
<td>15m</td>
</tr>
</tbody>
</table>

DDS-05-05-21-04 / 150413057939 Page 4 of 14 LURP Action 21 MR873 District Plan Amendments
<table>
<thead>
<tr>
<th>Location</th>
<th>A setback is required from</th>
<th>Setback depth (minimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Residential Zones other than the Residential 4A Zone (Wards Road,</td>
<td>Any road boundary (other than a boundary to a strategic road or arterial road) or any accessway</td>
<td>2m</td>
</tr>
<tr>
<td>Mandeville North and Mill Road, Ohoka), Residential 6A and 7 and the</td>
<td>The Zone boundary within Tuahiwi at the northern, eastern and southern extent as shown on</td>
<td>15m</td>
</tr>
<tr>
<td>Residential 4A Zone (Bradleys Road, Ohoka), NOTE: See Rule 31.1.1.16</td>
<td>District Plan Map 176B</td>
<td></td>
</tr>
<tr>
<td>Residential 4A Zone (Bradleys Road, Ohoka) shown on District Plan Map</td>
<td>Any road boundary</td>
<td>15m</td>
</tr>
<tr>
<td>169</td>
<td>Any internal site boundary</td>
<td>5m</td>
</tr>
<tr>
<td>Residential 4A Zone (Wards Road, Mandeville North) shown on District</td>
<td>Any boundary from a local road</td>
<td>10m</td>
</tr>
<tr>
<td>Plan Map 162, Residential 4A Zone (Mill Road, Ohoka) shown on District</td>
<td>Mill Road boundary</td>
<td>15m</td>
</tr>
<tr>
<td>Plan Map 160 and Woodend Beach Road shown on District Plan Map 171)</td>
<td>Any internal site boundary</td>
<td>5m</td>
</tr>
<tr>
<td>Residential 4A Zone (Mill Road, Ohoka) shown on District Plan Map 160</td>
<td>The road boundary of any strategic or arterial road</td>
<td>6m or 4m for any garage where the vehicle entrance is generally at right angles to the road</td>
</tr>
<tr>
<td>All Residential Zones, other than Residential 6, 6A and 7, where the site</td>
<td>Any site boundary adjoining an accessway for allotments 15, 16, 17, 27, 28 and 29 shown on District Plan Map 140</td>
<td>4m</td>
</tr>
<tr>
<td>fronts onto a strategic or arterial road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential 5 Zone</td>
<td>Any internal site boundary, other than boundaries with accessways</td>
<td>2m</td>
</tr>
<tr>
<td>Residential 6A Zone (other than areas identified on District Plan Map 142</td>
<td>Boundaries with accessways</td>
<td>10m</td>
</tr>
<tr>
<td>as excluded from the setback requirement)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential 6A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Refer to Figure 31.1 and Rule 31.1.1.16
<table>
<thead>
<tr>
<th>Location</th>
<th>A setback is required from</th>
<th>Setback depth (minimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential 7</td>
<td>Any road boundary (other than to a arterial road) or any accessway</td>
<td>2m for any dwellinghouse within Area A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3m for any dwellinghouse within Areas B and C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.5m for any structure other than a dwellinghouse within Areas A, B and C</td>
</tr>
<tr>
<td></td>
<td>The road boundary of any arterial road</td>
<td>6m</td>
</tr>
<tr>
<td></td>
<td>Any internal site boundary</td>
<td>2m</td>
</tr>
<tr>
<td></td>
<td>Any site boundary of 309 Island Road being Lot 1 DP 62400</td>
<td>20m</td>
</tr>
<tr>
<td>Business 2, 3 and 6 Zones, where the site fronts onto a strategic or arterial road</td>
<td>The road boundary of any strategic or arterial road</td>
<td>10m</td>
</tr>
<tr>
<td>All Business Zones, other than:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) the Business 1 Zone at Pegasus.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) any Business 4 Zone, and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) the Business 1 Zones at Rangiora and Kaiapoi, where the site is adjacent to a Residential Zone or a Rural Zone boundary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business 4: Williams/Carew Zone</td>
<td>Any road boundary</td>
<td>6m</td>
</tr>
<tr>
<td>All Zones</td>
<td>Any site boundary</td>
<td>5m</td>
</tr>
<tr>
<td></td>
<td>All overhead high voltage electrical lines as shown on District Plan Maps where the adjacent span length is less than 375 metres</td>
<td>32 metres to the side of the centreline of the conductors</td>
</tr>
<tr>
<td>Location</td>
<td>A setback is required from</td>
<td>Setback depth (minimum)</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td></td>
<td>All overhead high voltage electrical lines as shown on District Plan Maps where the adjacent span length is between 375 and 600 metres</td>
<td>55 metres to the side of the centreline of the conductors</td>
</tr>
<tr>
<td></td>
<td>All overhead high voltage electrical lines as shown on District Plan Maps where the adjacent span length is greater than 600 metres</td>
<td>100 metres to the side of the centreline of the conductors</td>
</tr>
</tbody>
</table>

Delete Rule 31.1.1.22 and Add new Rule 31.1.1.22 to read as follows:

31.1.1.22 Any structure in a Residential 1,2,3,6 or 7 Zone (Areas B and C) shall not exceed a height of 8 m except within the View Protection Area identified in Maori Reserve 873 shown on District Plan Map 176B, where any structure shall not exceed a height of 5 metres.

Add new Rule 31.1.1.55 to read as follows:

Special Requirements for the Residential 3 Zone in Maori Reserve 873

31.1.1.55 Within the Residential 3 Zone in Maori Reserve 873 shown on District Plan Map 176B

a. The landscape strip shown on the Outline Development Plan shall be provided at the time of subdivision and maintained permanently;

b. Landscape planting is to be completed within the first planting season (April – September) after the time of subdivision approval;

c. The landscape strip shall extend for the length of the lot boundary to a depth of 5m and shall include shrubs and trees. The selection of plant species shall include a majority of indigenous species;

d. Trees shall be provided at the rate of one tree for every 10m. All trees shall be a minimum of 1.5m in height at the time of planting and be of a species that is capable of reaching 4m at maturity;

e. All trees shall be maintained so that any dead, dying, damaged or diseased plants are replaced immediately; and

f. These requirements shall be secured by way of a Consent Notice on any new title created within the Residential 3 Zone in Maori Reserve 873 shown on District Plan Map 176B.
Add new Rule 31.1.2.14 to read as follows:

For the purpose of Rule 31.32.1, within Maori Reserve 873 where the land immediately beyond the site boundary functions as an accessway to a rear lot, the boundary of the accessway furthest from the site boundary may be deemed to be the site boundary for the purpose of defining the origin of the setback under Table 31.1, provided this deemed site boundary is no further than 10m from the site boundary.

Add new Rule 31.31 to read as follows:

Maori Reserve 873 - Rural Zone

31.31 Permitted Activities

Any land use is a permitted activity if it:

i. is not otherwise listed as a discretionary or non-complying activity under Rules 31.32 and 31.33;

ii. complies with conditions under Rule 31.31.1; and

iii. complies with all conditions and provisions for permitted activities in this and all other chapters.

Add new Rules 31.31.1 and 31.31.1.1 to read as follows:

31.31.1 Conditions

31.31.1.1 In the Rural Zone, within Maori Reserve 873, any dwellinghouse on a site which has an area of less than 5000m² gross shall:

a. be held on a separate Certificate of Title existing at [insert date that provisions are inserted into the District Plan];

b. not be located within the 0.2% Annual Exceedance Probability flood event area;

c. connect to a reticulated potable water supply and reticulated sewage disposal utility; and

d. be located on a site where it is demonstrated that one or more of the owners is a descendant of an original grantee of land within Maori Reserve 873 as set out in the Crown Grants Act (No 2) 1862 and the Crown Grants Act 1873.

Add new Rule 31.31.2 to read as follows:

31.31.2 Exemptions

31.31.2.1 Any dwellinghouse erected on, or relocated onto a site or an allotment that is within the Maori Reserve 873 under Rule 31.31.1.1 or for the purpose of cluster housing under Rule 31.32.1, is exempt from complying with Rules 31.1.1.1, 31.1.1.3 and 31.1.1.10.

Add new Rules 31.32 and 31.32.1 to read as follows:
31.32  Discretionary Activities

Add new Rule 31.32.1 to read as follows:

31.32.1  Cluster housing within Maori Reserve 873 within the Rural Zone where:

a. the owner or one of the owners of the site or sites is a descendant of an original grantee of land as set out in the Crown Grants Act (No 2) 1862 and the Crown Grants Act 1873;

b. the site or combined area of two or more contiguous sites is 5000m² gross or greater;

c. the total number of dwellinghouses is limited to a minimum of three and a maximum of seven only;

d. the height of any dwellinghouse shall not exceed 8 metres;

e. the structure coverage of the net area of any site shall not exceed 15%;

f. a cluster housing development plan for the site or sites demonstrates:

   i. the design and arrangement of any existing, proposed or consented dwellinghouses and clusters and the interrelationship between them;
   ii. if applicable, the staging of development, including that each sequential dwellinghouse will be the next adjacent and contiguous dwellinghouse in the cluster;
   iii. access, open space links and service areas;
   iv. proposed infrastructure, including that required for firefighting purposes;
   v. areas to be exclusive and common and their dimensions;
   vi. existing topographical features including existing vegetation, streams and overland stormwater flowpaths;
   vii. proposed planting and ecological enhancement of watercourses;
   viii. selected ground heights or contours;

g. dwellinghouses, other private use buildings and any associated curtilages (excluding the accessway):

   i. are designed as a group and are wholly contained within a single location;
   ii. are clustered, such that they are contiguous (except where separated by the accessway), and in a location that does not exceed 20% of the total net area of the site or sites; and
   iii. are not located within the balance of the site or sites.

h. not more than one accessway is provided to the cluster.

is a discretionary activity.
Note: An approved application for any resource consent under Rule 31.32.1 shall have a ten year lapping period.

In considering any resource consent application under Rule 31.32.1 the Council shall, in deciding whether to grant consent, and in deciding whether to impose conditions, have regard to (but not be limited by) the following matters:

i. the proximity of any proposed dwellinghouses or clusters to existing or consented dwellinghouses and clusters on neighbouring sites and in the wider locality;
ii. the extent to which the rural character and amenity in the wider area is adversely affected by the cumulative impact of existing or proposed clusters;
iii. the extent to which any additional ancillary private use buildings proposed are necessary for rural activities or customary use and mahinga kai;
iv. whether landscaping is proposed along boundaries and the extent to which it maintains or enhances rural amenity and outlook;
v. the extent to which the proposed buildings compliment the rural environment;
vi. the extent to which the cluster provides open space and maintains rural amenity when viewed from public roads and accessways;
vii. the extent to which any watercourses are ecologically enhanced; and
viii. advice received from design professionals and Tuahiwi Runanga or Marae Trustees, as well as any relevant design guide.

Add new Rules 31.33 and 31.33.1 to read as follows:

31.33 Non-complying Activities

31.33.1 The erection of any dwellinghouse within Maori Reserve 873 that does not comply with Rule 31.31.1.1 is a non-complying activity.

Add new Rule 31.33.2 to read as follows:

31.33.2 Cluster housing within Maori Reserve 873 that does not comply with Rule 31.32.1 is a non-complying activity.

Chapter 32: Subdivision

Delete Rule 32.1.1.3 and Add new Rule 32.1.1.3 to read as follows:

32.1.1.3 Any allotment in the Rural Zone shall contain one or more building platforms, and, unless otherwise required to be serviced by a reticulated sewage disposal utility by Rule 23.1.1.16, a sewage disposal area for a dwellinghouse shall be provided.

Delete Rule 32.1.1.25 and Add new Rule 32.1.1.25 to read as follows:

32.1.1.25 Subdivision within the following areas shall generally comply with the Outline Development Plan for that area.
a. The Residential 4B Zone of Mandeville identified on District Plan Maps 91 to 93 and the Mandeville Outline Development Plan on District Plan Map 141.

b. The Residential 2 and Residential 4B Zones of North Rangiora on District Plan Maps 110 and 111 and the North Rangiora Outline Development Plan on District Plan Map 146.

c. Southbrook Business 2 Zone identified on District Plan Maps 118 and 119.

d. East Rangiora identified on District Plan Maps 113, 114 and 117.

e. West Rangiora (North of Oxford Rangiora Road) identified on District Plan Maps 110 and 112.

f. West Rangiora (South of Oxford Rangiora Road) identified on District Plan Maps 112 and 116.

g. East Woodend identified on District Plan Maps 128 and 131 and the East Woodend Outline Development Plan on District Plan Map 153.

h. Residential 5 Lees Road identified on District Plan Map 140.

i. Pegasus identified on District Plan Map 142.

j. Mapleham Rural 4B Zone identified on District Plan Map 147.

k. North Kaiapoi identified on District Plan Map 156.

l. The Residential 2 and 4A Zones of North West Rangiora identified on District Plan Map 155.

m. The Residential 2 Zone Ashley Street – Enverton Drive, North Rangiora identified on District Plan Map 165.

n. The Residential 2 Zone Northbrook Road Rangiora identified on District Plan Map 157.

o. The Residential 4A Zone North Eyre Road, Mandeville North on District Plan Map 159.

p. The Residential 4A Zone Waikuku Beach identified on District Plan Map 161.

q. The Residential 4A Zone Wards Road, Mandeville North identified on District Plan Map 162.

r. The Residential 2 Zone Enverton Drive - Ballarat Road North Rangiora identified on District Plan Map 166.

s. The Residential 7 Zone West Kaiapoi, identified on District Plan Map 164.
t. North Woodend identified on District Plan Map 158.

u. The Residential 2 Zone East Kaiapoi identified on District Plan Map 163.

v. The Residential 2 Zone Oxford Road West Rangiora identified on District Plan Map 168.

w. The Residential 4A Zone, Bradleys Road, Ohoka, identified on District Plan Map 169 and more particularly described in Appendix 32.2.

y. The Residential 4A Zone, Woodend Beach Road, Woodend, as identified on District Plan Map 171.

z. The Residential 2 Zone North East Woodend identified on District Plan Map 172.

aa. South West Rangiora identified on District Plan Map 173.

ab. The Residential 4A Zone Mill Road Ohoka identified on District Plan Map 160.

ac. The Residential 4A Zone McHughs Road, Mandeville North identified on District Plan Map 174.

ad. The Todds Road Business 2 Zone identified on District Plan Map 175.

ae. The Business 6 Zone identified on District Plan Map 180.

af. Maori Reserve 873 identified on District Plan Map 176B.

Add new Rule 32.1.1.54 to read as follows:

32.1.1.54 Any new allotment within Maori Reserve 873 identified on District Plan Map 176A shall be connected to a reticulated sewage disposal utility.

Delete Rule 32.1.1.73 and Add new Rule 32.1.1.73 to read as follows:

32.1.1.73 Accidental discovery protocol within Maori Reserve 873, East Woodend, North East Woodend, Waikuku Beach, West Kaiapoi, the North Woodend, South West Rangiora and Todds Road Business 2 Outline Development Plan Areas as shown on District Plan Maps 134, 153, 158, 161, 164, 172, 173, 175 and 176B:

a. within the identified Outline Development Plan areas, a suitably skilled and experienced cultural monitor or monitors nominated by the Runanga and agreed by the landowner shall be appointed to monitor all bulk earthworks on site.
b. where suspected urupa, wahi tapu, wahi taonga or any place associated with Human activity that occurred before 1900 and is, or may be able, through investigation by archeological methods to provide evidence relating to the Māori history of the area is discovered:

- earthworks shall stop immediately;
- all machinery shall be shut down immediately;
- all persons shall leave the area;
- the land owner shall be advised of the discovery;
- the NZ Historic Places Trust shall be advised of the discovery and either the Regional Archaeologist of the NZ Historic Places Trust has confirmed in writing that the archaeologist provisions of the Historic Places Act do not apply; or the requirements of the Historic Places Act have been met and, if required, an archaeological authority (consent) has been granted by the NZ Historic Places Trust;
- Where the place is associated with Māori activity that occurred before 1900 the land owner shall consult Te Ngāi Tūāhuriri Runanga to determine in consultation with the NZ Historic Places Trust, what further actions are appropriate to safeguard the site or its contents, and to avoid, reduce, remedy or mitigate any damage to the site; and
- the Waimakariri District Council shall be notified.

c. where koiwi tangata (human remains) are suspected:

- steps shall be taken immediately to secure the area in a way that ensures the koiwi tangata are untouched;
- Te Ngāi Tūāhuriri Runanga, the Police, the Waimakariri District Council and the New Zealand Historic Places Trust shall be notified;
- the land owner shall arrange for his/her representatives to be available to meet and guide kaumatua, Police, Waimakariri District Council and New Zealand Historic Places Trust staff to the site, assisting with any requests that they may make;
— earthworks in the affected area shall remain halted until the kaumatua, the Police and Historic Places Trust staff have marked off the area around the site and have given approval for earthworks to recommence, including notification that the archeological provisions of the Historic Places Act have been met and, if required, an archaeologica l authority (consent) has been granted by the NZ Historic Places Trust; and

— where the kaumatua are satisfied that the koiwi tangata are of Māori origin the kaumatua will decide in consultation with the NZ Historic Places Trust, what happens to the koiwi tangata and will give their decision to the Police, the New Zealand Historic Places Trust and the land owner.

Add new Rule 32.1.2.14 to read as follows:

32.1.2.14 Unit title subdivision for the purpose of cluster housing within Maori Reserve 873 is exempt from the minimum allotment area requirement for the Rural Zone under Rule 32.1.1.1, Table 32.1.

Add new Rule 32.3.5 to read as follows:

32.3.5 Any subdivision of cluster housing within Maori Reserve 873 shall be by way of unit title subdivision only.

Add new Rule 32.3.6 to read as follows:

32.3.6 Any unit title subdivision for the purposes of cluster housing within Maori Reserve 873 shall be accompanied by a land use consent in accordance with Rule 31.32.1.

Delete Rule 32.4.1 and Add new Rule 32.4.1 to read as follows:

32.4.1 Except where exempted under Rule 32.1.2, any subdivision that does not comply with Rules 32.1.1.1 to 32.1.1.26, 32.1.1.51 to 32.1.1.54 or 32.1.1.61 to 32.1.1.72, or 32.1.1.74 and 32.1.1.76 to 32.1.1.78 or 32.1.1.87 is a non-complying activity.

Add new Rule 32.4.10 to read as follows:

32.4.10 Any subdivision of cluster housing within Maori Reserve 873 other than by unit title subdivision is a non-complying activity.

Delete District Plan Map 47 and 132 and Add new District Plan Maps 47 and 132.

Add new District Plan Maps 132A, 176A and 176B.

Apply any consequential renumbering or amendments throughout the District Plan as necessary.
Refer to Outline Development Plan Map 176B and Associated Rules.

NOTE:
Disclaimer - refer to map legend sheet

Scale 1:7,500 (A4)

Tuahiwi
132A

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LAND USE RECOVERY PLAN
ACTION 21

MAORI RESERVE 873

CONTEXT REPORT
Executive Summary

This document provides a context to the Waimakariri District Council’s response to Action 21 of the Land Use Recovery Plan (LURP).

Action 21 directs the Council to provide methods to give effect to the objectives and policies for Maori Reserve 873 (MR 873) (Tuahwi) as set out in Appendix 3 of the LURP and to change or vary objectives, policies and methods for other Maori reserves in Waimakariri to recognise and provide for the relationship of Ngai Tahu and to enable that land to be used for housing where appropriate.

Development options and the proposed provisions have been consulted on across a number of public consultation rounds, with a range of consultation methods used to seek comment including: multiple newspaper advertisements; website information; a series of drop in sessions at four centres in the District; individual meetings as requested; and direct consultation by letter with a range of relevant groups and organisations (similar to statutory consultation under the Resource Management Act 1991).

The proposed changes introduce new provisions as follows (summarised):

- New definitions of Dwellinghouse, Cluster Housing (Kainga Nohoanga) and Maori Reserve 873;
- Amendments to Rules 23.1, 23.1.1.16, 23.1.1.17, 23.3.6, and 23.3.7 and adding new Rules 23.5 addressing reticulated water and sewage;
- Adding new Rule 27.4.4 to address flood hazard areas;
- An amendment to Rule 30.6.1.2 to exclude access to cluster housing of seven dwellings to be by way of a road;
- Amending Table 31.1 to provide for a reduced setback for cluster housing;
- An amendment to Rule 31.1.1.22 to provide for a structure height restriction within the View Protection Area;
- Adding new Rules 31.1.1.55 and 31.32.1 to provide for landscaping within the Residential 3 zone extension;
- Adding a new rules section (31.31, 31.32 and 31.33) to provide for development opportunities within the Rural zone of MR 873;
- Amending Rules 32.1.1.3, 32.1.1.25, 32.1.1.73, 32.4.1 and adding new Rules 32.1.1.54, 32.1.2.14, 32.3.5, 32.3.6 and 32.4.10 to provide for subdivision of the cluster housing; and
- Amending District Plan Maps 47 and 132 and adding new District Plan Maps 132A, 176A and 176B to reflect the above rule changes.

A number of comments were received on the Council’s response to Action 21. These responses have been summarised and as a result changes to the provisions have been proposed to include amending the definition of Maori Reserve 873 to include reference to the Crown Grants Act (No 2) 1862, adding a new landscape rule applicable to the Residential 3 zone expansion and amending the structure coverage for cluster housing.

This report presents:
- The changes proposed to the Waimakariri District Plan.
- The options considered by the Council.
• The background reporting process that informed the proposed changes to the Waimakariri District Plan.
• The consultation process including a brief summary of the main issues identified through consultation, including any potential risks/issues identified during the consultation phase.
• How the proposed plan change meets the recovery purposes of the CER Act.
• How the proposed plan change gives effect to the LURP Action.
1. **LURP Action**

The Minister for Canterbury Earthquake Recovery directed the Canterbury Regional Council to prepare a Land Use Recovery Plan (LURP). This was done through a collaborative multi-agency partnership with Christchurch City Council, Selwyn District Council, Waimakariri District Council, Te Runanga o Ngai Tahu, New Zealand Transport Agency and the Canterbury Earthquake Recovery Authority.

The LURP was gazetted on the 6th of December 2013 and contains a number of actions for the partner agencies to assist in Earthquake Recovery. Within the Waimakariri District, Action 21 directed the Waimakariri District Council, within 12 months to:

*Amend its district plan to the extent necessary to:*

i. *Provide methods to give effect to the objectives and policies for Maori Reserve 873 (Tuahiwi) as set out in Appendix 3*

ii. *Change or vary objectives, policies and methods to provide for the relationship of Ngai Tahu with other Maori reserves in the area covered by this Recovery Plan, to enable that land to be used for housing where appropriate and in accordance with its intended purpose.*

The Council sought an extension to the 12 month timeframe in order to complete additional consultation. The final report and any proposed plan changes are now due 30th April 2015.

2. **Background Information**

2.1 **Scope**

This report focuses on the Council’s response to Action 21(i), i.e the provision of methods to give effect to the objectives and policies for Maori Reserve 873 (MR 873). In terms of Action 21(ii), after investigation the Council considered that there were no changes required for other Maori Reserves under clause (ii) as none of the other reserves are considered appropriate for housing within Waimakariri District. These other reserves are remote in location to community facilities and have limited or no access to Council services, such as roads, reticulated water and sewage, power and telephone. For example, Maori Reserve 2061 at Oxford is accessed from a paper road, is located considerable distance from reticulated water, sewage, power and telephone, is very steep and is located in the Outstanding Landscape Buffer zone.

2.2 **Site location**

The spatial location of MR 873 is shown on the District Plan Maps 176A contained within the Proposed Response to the Action.

2.3 **Pre-LURP notification**

Prior to the notification of the LURP the Council was already addressing the matter of giving effect to Kemps Deed within MR 873. As part of this, the Council was in dialogue with its key MR 873 project partner Te Mana-Waitaha Charitable Trust. Under the Resource Management Act the Council is
required to work with Ngai Tahu as the Iwi Authority for the District. Ngai Tahu requested that the Council work with Ngai Tuahuriri Runanga directly on this matter as Ngai Tuahuriri is the Runanga with mana whenua over MR 873. The Runanga in turn formally requested that the Council work with Te Mana-Waitaha Charitable Trust.

The Council also commissioned a landscape report which was produced in March 2013.

On the basis of the comments received and technical input the Council commissioned a development options report which identified five potential options that represent different forms of development in MR 873. These comprised: (1) development adjacent to Woodend; (2) Tuahiwi consolidation; (3) Tuahiwi Residential 3 zone extension; (4) support Kainga-Nohoanga Cluster Housing; and (5) provide for individual houses on Rural zoned sites.

A first round of formal consultation was undertaken from 28 March to 17th May 2013 on the identified development options. A hearing was held to consider the comments in May 2013. Staff undertook further work refining the proposed plan provisions and undertook a second consultation period in November and December 2013 when the original development options were further refined.

2.4 Post Land Use Recovery Plan Notification

Following the notification of the LURP the following process has been undertaken:

<table>
<thead>
<tr>
<th>Action</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hearing held on the November - December 2013 Comments</td>
<td>25th March, 2014</td>
</tr>
<tr>
<td>Hearing report to the Resource Management and Regulation Committee of the Council</td>
<td>20th May 2014</td>
</tr>
<tr>
<td>Notification for public comment. A four week comment submission period. In addition, letters to landowners within and adjacent to MR 873.</td>
<td>17 September to 17 October 2014 notification period.</td>
</tr>
<tr>
<td>Community Notice Board</td>
<td></td>
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<tr>
<td>• 20 September 2014</td>
<td></td>
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<tr>
<td>• 27 September 2014</td>
<td></td>
</tr>
<tr>
<td>Newspaper advertisements:</td>
<td></td>
</tr>
<tr>
<td>Northern Outlook</td>
<td></td>
</tr>
<tr>
<td>• 24 September 2014</td>
<td></td>
</tr>
<tr>
<td>The News</td>
<td></td>
</tr>
<tr>
<td>• 25 September 2014</td>
<td></td>
</tr>
<tr>
<td>Public drop-in sessions.</td>
<td></td>
</tr>
<tr>
<td>Tuahiwi – Thursday 25 September and Tuesday 14 October 2014</td>
<td></td>
</tr>
<tr>
<td>Woodend - Monday 6 October</td>
<td></td>
</tr>
</tbody>
</table>
3. Issues and Options

3.1 Issues

Action 21 requires the Council to prepare a Plan change that provides methods to give effect to the objectives and policies for MR 873 as set out in Appendix 3 to the LURP and to change or vary objectives, policies and methods for other Maori reserves in Waimakariri to recognise and provide for the relationship of Ngai Tahu and to enable that land to be used for housing where appropriate.

3.2 Options

The options explored for meeting this Action in relation to MR 873 involved the five development options consulted on and the suite of plan provisions required to best deliver the preferred options in order to meet the objectives and policies contained within the Canterbury Regional Policy Statement and the Waimakariri District Plan. This required both amending existing provisions and adding new provisions, of and to the Waimakariri District Plan.

The initial five development options considered and consulted on are:
<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – Development Adjacent to Woodend</td>
<td>This option involves rezoning to residential 2 approximately 94 hectares of land that bounds the Woodend Township. This was the WW6 area considered within Proposed Change 1 (PC1) to the RPS.</td>
</tr>
<tr>
<td>2 – Tuahiwi Consolidation</td>
<td>This option involves the consolidation of the existing Residential 3 Zone at Tuahiwi Village to enable further residential development. There are 17 empty sections within Tuahiwi Village that could be built on. In addition there are 57 1200m² or larger sections which could be subdivided to the 600m².</td>
</tr>
<tr>
<td>3 – Extend Tuahiwi Residential 3 zone</td>
<td>This option involves providing limited further opportunities for residential subdivision in Tuahiwi Village area by extending the zone boundary outwards.</td>
</tr>
</tbody>
</table>
4 – Kainga-Nohoanga Cluster Housing

This option would support the concept for whānau based housing clusters (Kainga Nohanga) to support Māori community living and cultural values, as a different form of residential development to that currently provided for. This concept would be built around whānau living in both village and rural clusters.

5 – Individual Houses on Rural Sites

This option would allow for a dwelling on existing vacant rural lots and/or enabling rural residential lots below the current 4 hectare minimum site size.

It is similar to the former Rural D zone provisions that were part of the Waimakariri District Scheme from 1980 to 2005.
3.3 Proposal to Meet LURP Action 21

The proposed planning provisions contained in the 'Response to Action 21' provide to differing degrees Options 2, 3, 4 and a variation of Option 5.

3.3.1 Options 2 & 3 – Consolidation and Extension of Tuahiwi Residential 3 Zone

For Options 2 and 3, the Council carefully considered the comments received during the various consultation exercises and the higher order planning framework. The Council noted that consolidation could occur now within the Tuahiwi village given the vacant sites and large Residential 3 zoned sections and that this type of development was appropriate in order to support the village and achieve the compact urban form and rural amenity outcomes sought in the higher order planning framework.

The Council determined that a single extension (Option 3) adjacent to the existing Residential 3 village area to the east was also appropriate in order to provide more opportunities for descendants to live in the village area and thereby give effect to Kemps Deed in accordance with the requirements of LURP Action 21. The extent of the proposed Residential 3 rezoning is shown on District plan Map 176B in the 'Response to Action 21'.

In determining this the Council noted that there were no landowner objections to this rezoning from within the proposed rezone area, and the results of geotechnical, soil contamination, archaeological and Iwi Management Plan assessments confirmed this area as suitable for development. The Council was also mindful of the higher order planning framework set out in the Canterbury Regional Policy Statement (RPS), the LURP and the Waimakariri District Plan objectives and policies.

Objections were received from several adjacent landowners and these principally related to loss of rural amenity and character. Following the hearing of comments received the Council has amended the proposed plan provisions seek to protect rural amenity at the zone interface through requiring a building setback and landscaped buffer strip.

Two other Residential 3 zone extension options were considered and consulted on. These were to the west and the north-west of Tuahiwi Road. The western extension option was discounted principally on the basis of Tuahiwi village landowner comments relating to rural character and amenity, flooding issues and access/roading linkage concerns. The north-west extension option was discounted on the basis of opposition by many landowners within the proposed Residential 3 extension area, concerns relating to rural character and amenity and the policy requirement to protect and enhance views to Maungatere and Nga Tiritiri o te Moana.
3.3.2 Option 4 - Cluster Housing (Kainga-Nohoanga)

For Option 4 the Council carefully considered the comments received during the various consultation exercises and the higher order planning framework. The Council determined that Option 4 is appropriate to give effect to Kemps Deed in accordance with the requirements of LURP Action 21. The cluster housing provisions proposed provide for between 3 and 7 dwellinghouses on Rural zoned lots, within MR 873, over 5000m² subject to certain criteria and assessment matters being met, including the owner demonstrating that they are a descendant of the grantees as set out in the Crown Grants Act (No 2) 1862 and the Crown Grants Act 1873.

In determining the criteria and assessment matters for cluster housing proposals the Council considered that this option:

- Enables Kemp’s Deed and provides for descendants of the original grantees;
- Can provide for a range of housing options including whanau-based living;
- Seeks to maintain rural amenity and outlook;
- Can avoid natural hazards;
- Can require connection to reticulated services;
- Can enhance / protect the Cam River and historic streams;
- Enables subdivision and provides for multiple generations; and
- Can provide a measure of self-governance within the cluster.

Following the hearing of comments received the Council amended the proposed plan provisions to allow for a slightly higher site coverage over the net area of the site to 15%.

3.3.3 Option 5 – Individual Houses on Rural Sites

For Option 5 the Council carefully considered the comments received during the various consultation exercises and the higher order planning framework. The Council determined that it was appropriate to allow descendants to build one dwelling on vacant lots that already exist at the time any response to Action 21 is made operative that are below 5000m² provided that they are not located within a flood hazard areas, can connect to reticulated water and sewage and the owner can demonstrate that they are a descendant of the grantees as set out in the Crown Grants Act (No 2) 1862 and the Crown Grants Act 1873.

The council determined that it was not appropriate to allow rural residential development across MR 873 given the higher order planning framework, particularly RPS Policy 6.3.9 (Rural residential development) which sets out where and how rural residential development is to occur in greater Christchurch. In addition, the council noted that providing for cluster housing (kainga-nohoanga) provided for more development options across the same area than rural residential development.
3.3.4 Discounted Option - Option 1 – Residential Development Adjacent to Woodend

Option 1 was discounted by the Council as this option did not provide opportunities for the majority of descendants who were outside of the defined area. Furthermore, this option involved Greenfield Residential 2 development outside of RPS identified greenfield priority areas and is unconnected to the established Tuahiwi village area. The Council did note that chapter 6 of the RPS does not anticipate that MR 873 will be developed for residential purposes in the same way as the mapped greenfield priority areas but considered that large scale Residential 2 development of the northern extent of MR 873 would not meet the direction of Action 21 or the objectives and policies of the RPS and Waimakariri District Plan.

3.4 Parts of the District Plan Applicable

In addition to the proposed amendments to the District Plan, a range of other provisions currently within the District Plan will still apply, such as on site car parking requirements. Changes to these provisions, listed in Appendix II are not considered necessary.

However the response to Action 21 does propose some changes to the methods included in the Waimakariri District Plan and these include:

Amending of proposing definitions in Chapter 1 defining Dwellinghouse, Cluster Housing and MR 873.

The proposed response to the action also amends and adds a number of rules within Chapter 23 (Land and Water Margins) to address reticulated water and sewage, Chapter 27 (Natural Hazards) to avoid development in Flood Hazard Areas, Chapter 30 (Utilities and Traffic Management) to exclude Cluster Housing from specified road requirements, Chapter 31 (Health, Safety and Wellbeing) to address setbacks, landscaping, height limits and the provision of dwellinghouses in the Rural zone within MR 873 and Chapter 32 (Subdivision) to cover subdivision of cluster housing.

In addition District Plan Maps have either been amended or added to reflect the proposed changes to the District Plan to give effect to development opportunities within MR 873.

4. Consultation undertaken

4.1 Internal

A project control group (PCG) oversees LURP implementation within the Council. It also considers any technical matters and approves consultation processes and overall timeline management. The PCG comprises senior staff from Council planning, strategic policy and engineering units.

This response has also been considered by the Council’s District Development Steering Group (DDSG), which oversees strategic planning within the district. The DDSG also comprises senior staff from Council planning, strategic policy and engineering units.
On the 1st of September, 18th of November 2014 and 14th April 2015 Waimakariri District Councillors were invited to a staff briefing to discuss the proposed responses to Action 21. The briefings focused on the proposed draft amendments necessary to meet LURP Action 21 considering both the legislation requirements and the comments received.

On the 21st April 2015 the proposed response to Action 21 was presented to Waimakariri District Councillors at a Council meeting. Councillors approved the provision of the response to Action 21 to the Minister for Canterbury Earthquake Recovery.

4.2 External

External consultation comprised both informal and formal consultation. The informal consultation principally consisted of face to face meetings with the Te Mana-Waitaha Charitable Trust, update meetings with Ngai Tuahuriri Runanga, and update meetings with Waimakariri District Council’s Recovery Partners (The Canterbury Earthquake Recovery Authority, the Christchurch City Council, the Selwyn District Council, Environment Canterbury, Ngai Tahu and the New Zealand Transport Agency).

Regarding formal consultation, a first round of formal consultation was undertaken from 28 March to 17th May 2013 on the identified development options. The consultation comprised a flyer which was posted to all landowners within MR873 (2,500 households), “Let’s Talk” newspaper advertisements, information posted on the Council’s website and three community information ‘drop in’ sessions (held at Tuahiwi Marae, the Woodend Community Centre and the Tuahiwi School).

This was followed up with a second consultation period in November and December 2013 when the original development options were further refined. The flyer included village expansion options (Areas A and B) and cluster housing provisions. Once again all landowners within the Reserve were posed a flyer (2,500 households), “Let’s Talk” notices were published (on 2nd November in the Northern Outlook and 7th November in The News), information was posted on the Council’s website and three ‘drop-in’ information sessions were held (at the Tuahiwi Marae, the Woodend Community Centre and the Tuahiwi School).

On the 17th of September 2014 the Council initiated a four week consultation period on the proposed district plan amendments under Action 21. Notification of the consultation period was by way of notices in the Northern Outlook, and The News, on the Council’s Community Noticeboard page in the same local newspapers and by direct letters to landowners within, and surrounding, MR 873.

The consultation period ran from the 20th of September 2014 until the 17th of October 2014, with written comments asked for on the proposed Plan provisions. Five public drop-in sessions were held within this period to allow members of the public to ask questions of Council staff. The locations of the drop-in sessions were:

- Kaiapoi – Kaiapoi Community Centre.
• Woodend - Woodend Community Centre.
• Rangiora - Council Chambers.
• Tuahiwi - Tuahiwi Marae (two sessions).

Each drop-in session covered responses to LURP actions 12, 21, 26 and 28.

The Kaiapoi drop in session was not well attended with one attendee in Kaiapoi (discussing matters not directly related to Action 26). The Rangiora and Woodend drop in sessions were well attended with approximately twenty attendees at each session discussing Actions 21, 26(i) 26(ii) and 28. There was no specific discussion with regards to identifying a Key Activity Centre. The focus of the Tuahiwi drop in session was around the proposed response to Action 21.

Further consultation was undertaken which consisted of a letter and further information report being posted to all commenters on 2nd March 2015 who had provided comments on any of the previous consultation rounds. The further information report set out:
• the process to date;
• the legislation and other plans the Council needs to give effect to with the proposed rules;
• the themes of the comments received across the three previous consultation exercises;
• the proposed rule package; and
• background reports which had either been previously circulated or had been commissioned to assist in illustrating the issues.

The Council also considered it important to give the opportunity for anyone one else to also provide written or verbal comment who may wish to either add to their previous comments or provide new comments at this stage. It did this by making a press release on the 4th March, by placing information on the community page of the Northern Outlook (7th March 2015) and placing all the information on its website (2nd March 2015).

4.3 Resource Management Act – First Schedule

On 19th September a letter was sent to the following statutory parties asking for comment on the Action 21 proposed plan changes actions:

• The Ministry for the Environment;
• The Hurunui District Council;
• The Selwyn District Council;
• The Christchurch City Council;
• Te Runanga o Ngai Tahu;
• Environment Canterbury;
• Heritage New Zealand;
• The Canterbury Earthquake Recovery Authority;
• Te Runanga o Ngai Tuahuriri;
• The New Zealand Transport Agency;
• Transpower;
• The Canterbury District Health Board;
• The Maori Trustee;
• The Mana Waitaha Charitable Trust;
• The Rangiora Promotions Association;
• The Kaiapoi Promotions Association;
• Enterprise North Canterbury.

The purpose of the letter was to initiate initial consultation with statutory parties on the proposed response to Action 21 similar to that which the Waimakariri District Council would undertake as part of a Resource Management Act 1991 first schedule plan change process.

4.4 Strategic Partners

In addition to the letters sent on 19th September 2014, a briefing on this LURP Action was provided to the Strategic Partners in April 2015 by Waimakariri District Council staff. This group comprises planning managers and representatives from Waimakariri District Council, Selwyn District Council, Christchurch City Council, Canterbury Regional Council, the New Zealand Transport Agency and the Canterbury Earthquake Recovery Authority (CERA).

The group was briefed on the draft contents of the plan changes by Waimakariri District Council staff. Feedback comprised technical comment on wording and approach.

4.5 Other Partner Consultation

Ngai Tahu is a Recovery Partner. As indicated previously, Ngai Tahu requested that the Council work directly with Ngai Tuahuriri Runanga, who in turn requested that the Council work directly with the Mana-Waitaha Charitable Trust.

The Council has undertaken a number of meetings with the Trust over the course of the project and the Trust has provided informal comment and formal comments through the consultation rounds. The Trust’s written comments for the March 2015 consultation round supported the introduction of a rule framework that gives effect to the higher level policy documents and provides development rights for descendants and the incorporation of ‘cluster development’ to help give effect to traditional methods of land use and development. They sought amendments to the definition of MR 873, the setback provisions and the building coverage rule.

In addition to consultation with the Trust, the Council has also provided regular updates to Ngai Tuahuriri Runanga through the established regular Council / Runanga briefing sessions.

The Council has also provided updates to TRONT staff during the course of the project. A TRONT planning staff member participated in two plan change finalisation workshops prior to the final consultation round.

5. Comments Received

Across the consultation exercises, there have been recurring mixed views on:

• The restriction of development rights to descendants;
• The requirement to connect to reticulated services;
• The protection of rural outlook and amenity;
• The appropriateness of cluster housing in rural areas; and
• The location and extent of any Tuahiwi village extension.

The table below outlines who commented and very briefly covers the comments received on the proposal across the various formal consultation rounds. The full details of written and verbal comments relating to Action 21 that have been received are provided in the Comments Received.
<table>
<thead>
<tr>
<th>Commenter</th>
<th>May 2013 Written Comment</th>
<th>March 2014 Written Comment</th>
<th>Oct 2014 Written Comment</th>
<th>March 2015 Written Comment</th>
<th>March 2015 Hearing Attendance</th>
<th>Key Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kirk Narbey &amp; Louisa Shanks, 132 Tuahiwi Road</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Concerned over loss of rural amenity, adverse effects on their beehives. Concerns over use of paper road, natural springs / flooding issues. Seeks a buffer (landscape and earth mound).</td>
</tr>
<tr>
<td>Arapata Reuben 50 Topito Road</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>Submission refers to a Powerpoint presentation covering specific rules.</td>
</tr>
<tr>
<td>Gabriel Antal &amp; Phil Patira</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Recent comments - supports clusters and unit titling, supports descendancy restrictions. Earlier comments - seeks clear fee simple title, seeks 2,000m² sections, seeks commercial ventures.</td>
</tr>
<tr>
<td>John Ballinger 79 Greens Road</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Seeks protection of rural amenity.</td>
</tr>
<tr>
<td>Carole Church</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Recent comments - unable to comment as did no have enough time to read the Further Information Report. Missed consultation meetings. Earlier comments - supports all options and a combination of them. Wish to put one dwelling on their site and have 1ha titles. Supports specific provisions for MR873. Supports descendants' rights.</td>
</tr>
<tr>
<td>Shirlene Davis, 134 Tuahiwi Road</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Recent comments - Protection of rural amenity, seek a buffer. Earlier comments - Opposes cluster housing. Supports WW6.</td>
</tr>
<tr>
<td>Maic Dartnall, 18 Taunton Place, Rangiora</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Remove restrictions on descendants, make it fee simple subdivisions.</td>
</tr>
<tr>
<td>Andrew Hurley</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Recent comments - supports more extensive development in village and</td>
</tr>
<tr>
<td>Name</td>
<td>Address</td>
<td>Vote 1</td>
<td>Vote 2</td>
<td>Vote 3</td>
<td>Vote 4</td>
<td>Comments</td>
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</tr>
<tr>
<td>Carol Waugh</td>
<td>479 Tuahiwi Road</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Disagrees with descendancy restrictions. Disagrees with reticulation requirements. Disagrees with viewshaft restrictions. Supports houses on vacant lots option. Earlier comments – Option 1 does not address Kemps Deed and is only a small part of the Reserve. Options 2 &amp; 3 workable but don’t apply to all areas of the Reserve and create rural character issues. Option 4 is best for addressing greatest area, needs and maintaining character. Don’t limit Option 5 to descendants.</td>
</tr>
<tr>
<td>Karl Lutterman</td>
<td>257 Tuahiwi Road</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Disagrees with descendancy restriction, protection of rural amenity, flooding issues, comments on village extension area.</td>
</tr>
<tr>
<td>Mana Waitaha Charitable Trust</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>Allan C MacDonald</td>
<td>77 Crinan Street, Invercargill</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>NZ Fire Service Commission</td>
<td></td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>Karen Manson</td>
<td>166 Greens Road</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Seek wording changes to require water supplies for firefighting in non-reticulated areas.</td>
</tr>
<tr>
<td>Peter Manson</td>
<td>55 Turiwhaia Road Woodend</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Supports Option 5 – dwellings on lots smaller than 4 ha, for non-descendants. WW6 option – has stormwater issues. Doesn’t oppose Option 4 – cluster housing.</td>
</tr>
<tr>
<td>Tim Reriti</td>
<td>36 Rossiter Avenue</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>Provided a history of WW6 planning. Supports WW6 Option. Does not support cluster housing bit, notes this may work for others.</td>
</tr>
<tr>
<td>Name</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>Recent comments - against restriction to descendants. Opposes required connections to services. Earlier comments – supports Option 5 for all landowners. Option 1 has merit with 1 dwelling per title – better as rural residential. Seeks Option ‘6’ – a rural commercial zoning for small titles.</td>
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</tr>
<tr>
<td>Dave Uru</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>Supports Option 1 (WW6). Housing clusters may work but there will be issues for multiple landholders.</td>
</tr>
<tr>
<td>89 Rangiorda Woodend Road, Woodend</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Gordon &amp; Elaine Stanley</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Recent comments - supports Proposals, but disagrees with reticulation requirements. Earlier comments - submitted their resource consent for 7 cluster dwellings.</td>
</tr>
<tr>
<td>112 Isaac Road, Eyrewell</td>
<td></td>
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</tr>
<tr>
<td>Andrew &amp; Ngaire Stott</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
<td>Recent comments - loss of rural amenity and village character from village extension. Drainage issues. Seeks a buffer between Residential and Rural. Earlier comments – seeks northwest rezoning area to stop at the Marae. Supports view shaft protection. Supports cluster reticulation requirements. Does not support Residential 3 commercial. Supports options 1, 2, 3 as easily serviced. Can support options 4 and 5 if no adverse environmental effects. Concerned over squatting. Supports cycle / walk ways via Cam River corridor. Supports rules that enhance the environment. Identified collector roads are below standard width.</td>
</tr>
<tr>
<td>61 Topito Road</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>J &amp; C Buckell</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>Larger section sizes in village, keep ability to rebuild if dwelling destroyed.</td>
</tr>
<tr>
<td>37 Topito Road</td>
<td></td>
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<tr>
<td>Bonnie Lintott &amp; Ryan Herdman 155</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Yes</td>
<td>Yes</td>
<td>Protection of rural amenity, traffic speed.</td>
</tr>
<tr>
<td>Tuahiwi Road</td>
<td></td>
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<tr>
<td>Warner &amp; Petra Reid 27 Topito Road</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>Recent comments - support cluster housing. Against the residential re-zoning proposed in the northwest. Earlier comments – does not support any subdivision due to adverse rural</td>
</tr>
<tr>
<td>Name and Address</td>
<td>Yes/No</td>
<td>Notes</td>
<td></td>
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</tr>
<tr>
<td>Matt Columbus 163 Greens Road</td>
<td>-</td>
<td>Supports proposals. Comment on road. Maintenance of rural amenity. Seeks that parties are consulted through developments. Allow clusters on neighbouring properties too.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manson, Kim 158 Greens Road</td>
<td>Yes</td>
<td>Supports Option 5 for non-descendants. Has a 2.88 ha site. Wants a house on it. Wants alternative drainage before Option 1 proceeds.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Paul and Rosie Oliver 95 Turiwhaia Road</td>
<td>Yes</td>
<td>Supports Options 1 and 2 as good land and easy to build on and service. Does not support 3, 4 and 5 as difficult to service and create adverse character and landscape effects.</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Pekka Mustonen 273 Tuahiwi Road</td>
<td>- Yes</td>
<td>Strongly opposes the residential zoning changes in the northwest. Will destroy lifestyle properties. There are flooding issues.</td>
<td></td>
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</tr>
<tr>
<td>Mary &amp; Mike Newton, 109 Te Pouapatuki Road</td>
<td>- Yes</td>
<td>Concerned re storm water and sewage issues</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>John Phillips 82 Rangiora Woodend Rd</td>
<td>Yes</td>
<td>Does not support WW6 option. Village consolidation and expansion could be popular. Position clusters close to township or along the ridge. Supports descendancy restrictions but notes this could still result in significant development. Undeveloped areas contribute to the Reserve’s character.</td>
<td></td>
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</tr>
<tr>
<td>Paul O'Donnell 229 Tuahiwi Road</td>
<td>- Yes</td>
<td>Challenges the view shaft height restriction in village. Disagrees with descendancy restrictions</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Henk &amp; Johanna Lettink 50 Te Pouapatuki Road, Kaiapoi</td>
<td>Yes</td>
<td>Option 1 = an extension to Woodend – not part of Tuahiwi. Options 2 and 3 are the most supported as less rural amenity impact. Option 4 is a nice plan but too expensive. Plus isn’t recreation space needed for each dwelling? Option 5 is probably too expensive. Concerned with buses, cabins and sheds under this option.</td>
<td></td>
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</tr>
<tr>
<td>William Pitama 42 Orrick Crescent Avondale</td>
<td>- Yes</td>
<td>Rezone Section 221 from rural to residential.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Andrew &amp; Gina Kidney</td>
<td>Yes</td>
<td>Wishes Option 5 to be reviewed so they can build on their sub 4 ha site without reticulated services.</td>
<td></td>
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</tr>
<tr>
<td>Name &amp; Address</td>
<td>Support</td>
<td>Consultation</td>
<td>Notes</td>
<td></td>
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</tr>
<tr>
<td>D &amp; B Rahurahu 283 Tuahiwi Road</td>
<td>-</td>
<td>-</td>
<td>Poor consultation, many got none and others got notification after the meetings. Concerned over forced sales and loss rural rights. Stormwater and height against boundary issues identified.</td>
<td></td>
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</tr>
<tr>
<td>Ryman R &amp; M Harris, 44 Topito Road</td>
<td>Yes</td>
<td>-</td>
<td>Objects to pathway between their titles. Concerned about squatters. Wish to be able to subdivide.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Tim &amp; Jenny Hurley 300 Tuahiwi Road</td>
<td>-</td>
<td>-</td>
<td>Good consultation.</td>
<td></td>
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</tr>
<tr>
<td>Frances Ryman, 399 Tuahiwi Road</td>
<td>-</td>
<td>-</td>
<td>Seeks protection of rural amenity.</td>
<td></td>
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</tr>
<tr>
<td>Environment Canterbury</td>
<td>-</td>
<td>Yes</td>
<td>Supports avoidance of floodable areas, servicing requirements, protection of Cam and scale of development.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Andy Johnston</td>
<td>Yes</td>
<td>-</td>
<td>Supports Options 1 and 5. Servicing is available. His land is in WW6 area.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D Evans 52 Topito Road</td>
<td>-</td>
<td>Yes</td>
<td>Seeks protection of rural amenity. Notes lack of consultation and flooding issues.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Julie Jones</td>
<td>Yes</td>
<td>-</td>
<td>Supports Option 5. Does not support Option 1 as too many subdivisions leading to traffic issues on SH1.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>AP Moody 803 Main North Road</td>
<td>-</td>
<td>Yes</td>
<td>Severe flooding issues on his property. This will worsen with proposals.</td>
<td></td>
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</tr>
<tr>
<td>Katherine &amp; Roy Jacob, 370 Tuahiwi Road</td>
<td>-</td>
<td>-</td>
<td>Seeks protection of rural amenity.</td>
<td></td>
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</tr>
<tr>
<td>David &amp; Lynda Sale 175 Rangiora Woodend Road</td>
<td>-</td>
<td>Yes</td>
<td>Notes amenity impacts from development and disagrees with descendancy restrictions.</td>
<td></td>
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</tr>
<tr>
<td>Ivan Ryan, 337</td>
<td>-</td>
<td>Yes</td>
<td>Seeks his land behind the Marae to be rezoned to Residential 3 so can sell it</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Location</td>
<td>Yes/No</td>
<td>Comments</td>
<td></td>
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<td>-----------------------------------------------</td>
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<tr>
<td>Lehmans Road, Rangiora</td>
<td></td>
<td>with development rights.</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Edmund Fjeldham</td>
<td></td>
<td>Supports village expansion options. Does not support cluster housing. Lots of vacant land already for descendants to return to.</td>
<td></td>
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<tr>
<td>T Cromwell</td>
<td></td>
<td>Seeks maintenance of rural amenity. Does not support clusters. Considers there is severe flooding in village area.</td>
<td></td>
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<tr>
<td>261 Tuahiwi Road</td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Henare Rikihi Tau</td>
<td></td>
<td>WDC needs to recognise Kemps Deed and descendants' rights. Supports servicing requirements, but septic tanks for remote developments and private wells. Disagrees with all costs to developers. Disagrees with restriction to descendants for clusters – needs to be available to all to make it happen &amp; at residential density or 2 houses per 4000m². Supports enabling subdivision of existing village lots as too large to maintain for many.</td>
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</tr>
<tr>
<td>John &amp; Jan Eastwick</td>
<td>Yes</td>
<td>Supports Option 2 (Village consolidation) and 3 (Village expansion). Ok with option 1 (WW6) but notes character issue. Doesn’t like Options 4 (Cluster) and 5 (individual houses) as lead to urban sprawl and rural amenity impacts. Need high standard of infrastructure and landscaping. Concerned over substandard building.</td>
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<tr>
<td>Te Pouapatuki Road</td>
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<tr>
<td>Michael &amp; Maria Wise</td>
<td></td>
<td>Stated that was not given all the documents to comment on. Too short timeframes. Land is flood prone. Disagrees with descendancy restrictions. Land is better to remain in productive land uses.</td>
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<tr>
<td>440 Tuahiwi Road</td>
<td></td>
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</tr>
<tr>
<td>Denise Hamilton, 195a Tuahiwi Road, Kaiapoi</td>
<td></td>
<td>Seeks to protect rural character / amenity and view protection. Does not support western village expansion (Area B). Supports eastern expansion area (Area A). Does not support buffer along Woodend, or co-governance. Agrees with cluster self-governance and happy to develop a cluster.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sean Adamson</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 Topito Road</td>
<td></td>
<td>Supports Village extension and services upgrading.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arapata Tregerhen</td>
<td>Yes</td>
<td>Supports Option 1. Land is multiple owned. Wants to be part of Woodend.</td>
<td></td>
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</tr>
</tbody>
</table>
5.2 Changes Resulting from Comments Received

On the basis of comments received the Council has made a number of changes to the proposed provisions. The main ones are set out in the table below.

Comments and resulting changes:

<table>
<thead>
<tr>
<th>Comment</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Village Provisions</strong></td>
<td></td>
</tr>
<tr>
<td>Village Residential 3 extension areas to the west and northwest – some</td>
<td>Village Residential 3 extension areas to the west and northwest deleted.</td>
</tr>
<tr>
<td>support but majority strongly oppose. Village Residential 3 extension</td>
<td>Village Residential 3 extension to the east retained</td>
</tr>
<tr>
<td>to the east – some opposition and some support</td>
<td></td>
</tr>
<tr>
<td>Potential for flooding on neighbouring land from village Residential 3</td>
<td>Village Residential 3 extension area to the northwest deleted</td>
</tr>
<tr>
<td>extension area to the northwest</td>
<td></td>
</tr>
<tr>
<td>Loss of rural amenity at the boundary with the rural zone</td>
<td>15m setback introduced with a 5m minimum landscape strip around the</td>
</tr>
<tr>
<td></td>
<td>village Residential 3 extension to the east</td>
</tr>
<tr>
<td>Potential for flooding on neighbouring land from village Residential 3</td>
<td>Stormwater detention basin proposed as shown on proposed Outline</td>
</tr>
<tr>
<td>extension to the east</td>
<td>Development Plan</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td><strong>Cluster Housing Provisions</strong></td>
<td></td>
</tr>
<tr>
<td>Concern over loss of rural amenity and outlook</td>
<td>New structure coverage rule of 13% introduced. Subsequently increased</td>
</tr>
<tr>
<td></td>
<td>to 15% on the basis of comments</td>
</tr>
<tr>
<td>Many sites are narrow, the boundary setback requirement will limit</td>
<td>Setback reduced from 20m to 15m and can include up to 10m in an</td>
</tr>
<tr>
<td>development</td>
<td>access leg on a neighbouring property</td>
</tr>
<tr>
<td>A desire to combine two adjacent sites</td>
<td>Provisions changed to allow one cluster across two adjoining sites</td>
</tr>
<tr>
<td>Definition of ‘Maori Reserve 873’ needs amending</td>
<td>Definition changed accordingly</td>
</tr>
<tr>
<td>Require water supply for firefighting purposes</td>
<td>Cluster Housing provisions changed to require demonstration of adequate</td>
</tr>
<tr>
<td></td>
<td>supply</td>
</tr>
<tr>
<td>Provide for structures for customary use and mahanga kai</td>
<td>Provisions changed to allow for these subject to site coverage</td>
</tr>
<tr>
<td></td>
<td>requirements</td>
</tr>
<tr>
<td>Exclude the main accessway from the 20% developable area</td>
<td>Accessway now excluded</td>
</tr>
<tr>
<td>Provide assessment matters to guide council staff</td>
<td>Assessment matters now included</td>
</tr>
<tr>
<td>Concern over co-governance requirement</td>
<td>Provisions amended such that the Council now may seek advice from</td>
</tr>
<tr>
<td></td>
<td>Tuahiwai Runanga or Marae Trustees</td>
</tr>
</tbody>
</table>
5.3 Potential Risks Arising from Comments

5.3.1 Descendancy

The proposed restriction of additional development rights within MR 873 to descendants of the original grantees has received a number of comments across the consultation rounds. Commenters have both supported and opposed this proposed restriction. Opposition has been principally from non-descendants who are seeking equity and fairness. The Council believes that this restriction is appropriate because the rationale for the change under Action 21 is to give effect to Kemps Deed, and the Crown Grants Act (No 2) 1862 and the Crown Grants Act 1873, which set aside a reserve in 1848 for Ngāi Tahu grantees and their descendants to live upon as a 'kainga nohoanga' or 'settlement'.

The Council also notes that the higher order planning framework that the proposed plan change seeks to give effect to as required under LURP Action 21 consistently refer to the purpose of Kemps Deed and the Crown Grants Act (No 2) 1862 and the need to provide for the original grantees and their descendants. For example, Waimakariri District Plan Policy 2.1.3.4 states:

"Recognise the relationship of Ngai Tuahuriri with the land and associated resources in Maori Reserve 873 so as to enable the land to be used as intended by Kemps Deed of 1848 and the Crown Grants Act (No. 2) of 1862, for places of residence and living activities for the original grantees and their descendants."

Finally the Council notes that granting rights to non-descendants within MR 873 would itself create inequity with Rural zoned landowners outside of MR 873. Overall, the Council considers it appropriate to restrict these extraordinary development rights to descendants of the original grantees.

5.3.2 Lack of Consultation

Some commenters, particularly for the September / October 2014 consultation round considered that there had been insufficient consultation on the proposal. As indicated in Section 4 of this report, because of these consultation concerns the Council sought a delay of provision of the response to the action, to the Minister for Canterbury Earthquake Recovery. This was to enable the Council to prepare a detailed Further Information Report to address the issues and concerns raised through the comments and drop-in sessions.

The Further Information Report included deleting the proposed Residential 3 expansion of the village to the northwest and the provision of technical reports on flooding and servicing. This report was then made available, two weeks prior to the hearing of comments in March 2015, to all those who had provided written comments to date. The Council also considered it important to give the opportunity for anyone else to also provide written or verbal comment who may wish to either add to their previous comments or provide new
comments at this late stage. It did this by issuing a press release, placing information on the community page of the Northern Outlook and placing all the information on its website, again two weeks prior to the hearing of comments in March 2015.

The Council considers that sufficient opportunity was provided for the community to provide comments throughout the process. In addition the Council also notes that other commenters have stated that they have been well informed throughout the process and have commended the Council for the quality and thoroughness of the consultation undertaken.

6. Legislation and Policy

6.1 Canterbury Earthquake Recovery Act 2011 (CER Act)

The CER Act 2011 provides for the recovery of greater Christchurch as set out in Part 1, section 3, clauses (a) to (i) – the purposes of the Act. Land Use Recovery Plan Action 21 specifically links to clauses:

“(a) to provide appropriate measures to ensure that greater Christchurch and the councils and their communities respond to, and recover from, the impacts of the Canterbury earthquakes:

(b) to enable community participation in the planning of the recovery of affected communities without impeding a focused, timely, and expedited recovery:

(d) to enable a focused, timely, and expedited recovery:

(f) to facilitate, co-ordinate, and direct the planning, rebuilding, and recovery of affected communities, including the repair and rebuilding of land, infrastructure, and other property:”

(g) to restore the social, economic, cultural, and environmental well-being of greater Christchurch communities:”

Section 10 of the CER Act 2011 requires that the exercise of powers under the Act is in accordance with the purposes of the Act.

The Minister has a range of mechanisms under the CER Act to make the changes recommended should he consider them appropriate, including:

- Amending the Land Use Recovery Plan
- Implementing an Order in Council
- Preparing additional plans
- Using the powers under section 27 of the CER Act.

Before making any changes the Minister for Canterbury Earthquake Recovery will determine, in accordance with the CER Act, the level of community consultation required, and consider whether the exercise of any power is in accordance with the purposes of the CER Act and if the Minister reasonably considers it necessary to exercise this power.
6.2 Recovery Strategy – Vision and Goals

The vision of the Recovery Strategy is:

"Greater Christchurch recovers and progresses as a place to be proud of – an attractive and vibrant place to live, work, visit and invest, mō tātou, ā, mō kā uri ā muri ake nei – for us and our children after us."

Land Use Recovery Plan Action 21 links to goal 5.5 under built recovery. This clause is as follows:

"Built environment recovery

5. Develop resilient, cost effective, accessible and integrated infrastructure, buildings, housing and transport networks - by:

5.5 zoning sufficient land for recovery needs within settlement patterns consistent with an urban form that provides for the future development of greater Christchurch."

The proposal involves rezoning from Rural to Residential 3 an area of land adjacent to the existing eastern edge of the Tuahiwi Village. The location of the extension is consistent with the urban form proposed through the LURP and the RPS Chapter 6 and for development within the village area.

The proposed cluster housing provisions are intended to give effect to Kemps Deed (1848) for tangata whenua grantees and their descendants as set out in the Crown Grants Act (No 2) 1862 and the Crown Grants Act 1873 as required in the higher order documents and not undermine the carefully determined residential greenfield priority areas rezoned through the LURP to provide for recovery needs.

Together the proposed Tuahiwi Village extension and cluster housing is considered to give effect to Kemps Deed and the associated Crown Grants Acts and is considered to provide housing opportunities sufficient to meet earthquake recovery needs.

6.3 Land Use Recovery Plan Outcomes

The LURP is a Plan that provides direction for residential and business land use development to support recovery and rebuilding across metropolitan greater Christchurch in the next 10-15 years. The Plan identifies critical actions required in the short and medium term to coordinate and advance decision making about land use.

Clause 4.2.3 (page 26) refers to new housing on Maori reserves. This clause states that:

"Enabling Ngai Tahu whanau impacted by the earthquakes to build new homes on Maori reserves in metropolitan greater Christchurch addresses a specific recovery need. It also helps realise the original intent of the Maori reserves to protect and provide for enduring tūrangawaewae.
Chapter 5 of the Canterbury Regional Policy Statement already provides for tangata whenua with mana whenua to undertake papakainga, marae and ancillary activities on ancestral land. In addition, it requires city and district councils to set out objectives and policies in their district plans to implement this policy.

The Land Use Recovery Plan requires Christchurch City and Waimakariri District Councils to give effect to this policy within the metropolitan greater Christchurch area to enable appropriate subdivision and use of whenua land and provide affordable housing options for Ngai Tahu whanau. These actions will assist social, cultural and economic recovery and will enable the expression of mana whenua and tino rangatiratanga."

Action 21 specifically addresses the above statement. It also relates to LURP Outcomes 1, 3, 4 and 6:

"Direction and coordination

1. A clear planning framework directs where and how new development should occur so that it integrates efficiently and effectively with infrastructure programmes and avoids key hazards and constraints.

3. Land use recovery integrates with and supports wider recovery activity, particularly within the central city.

4. RMA plans and regulatory processes enable rebuilding and development to go ahead without unnecessary impediments.

Communities and housing

6. The range, quality and price of new housing meets the diverse and changing needs of those seeking to buy or rent, including the needs of a growing temporary rebuild workforce"

6.3.1 Addressing Action 21 and Earthquake Recovery

The proposed changes directly address the requirements in Action 21. They include methods (rules, including planning maps) to give effect to the objectives and policies for MR 873 as set out in Appendix 3 of the LURP. In doing so, these changes will assist social, cultural and economic recovery and will enable the expression of mana whenua and tino rangatiratanga.

6.4 Regional Policy Statement

Land Use Recovery Plan Action 21 specifically links to Chapters 5 and 6 of the Canterbury Regional Policy Statement (RPS). The relevant objectives and policies that have been taken into account are as follows:

6.4.1 Chapter 5 Land-use and infrastructure

Chapter 5 of the RPS sets out planning provisions for land-use and infrastructure. Objective 5.2.1 (h) states that development is to be
located and designed so that it functions in a way that facilitates the establishment of papakainga and marae. Policy 5.3.4 – Papakainga housing\(^1\) and marae is significant and is therefore reproduced in full below.

"Policy 5.3.4 – Papakainga housing and marae (Entire Region)
To recognise that the following activities, when undertaken by tangata whenua with mana whenu, are appropriate when they occur on their ancestral land in a manner that enhances their ongoing relationship and culture and traditions with that land:
(1) papakainga housing;
(2) marae; and
(3) ancillary activities associated with the above
And provide for these activities if:
(4) adverse effects on the health and safety of people are avoided or mitigated; and
(5) as a result of the location, design, landscaping and management of the papakainga housing and marae:
   (a) adverse effects on the following are avoided, and if not practicable, mitigated:
      (i) the important natural character values of coastal environment, wetlands lakes, rivers and their margins
      (ii) the values of the outstanding natural features and landscapes
      (iii) the value of the historic heritage, and
      (iv) the values of areas of significant indigenous vegetation and habitats of indigenous fauna and
   (b) regard has been given to amenity values of the surrounding environment."

These provisions clearly anticipate that district plans shall provide for papakainga housing and marae on ancestral land where identified adverse effects are appropriately managed.

6.4.2 Chapter 6 Recovery and Rebuilding of Greater Christchurch

Chapter 6 of the RPS sets out the planning framework for the recovery and rebuilding of Greater Christchurch. Any plan change to the Waimakariri District Plan must give effect to or implement these provisions. The relevant provisions are analysed in turn below.

Objective 6.2.1 Recovery framework, carefully manages greenfield development through the recovery period by, among other things, setting out mapped greenfield priority areas where future residential

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\(^1\) Papakainga is defined in the RPS as: "a form of housing development which occurs on multiply-owned Maori or ancestral land. Traditionally, the literal meaning of papakainga housing is, 'a nurturing place to return to'".
development can occur. MR 873 is not mapped as a greenfield priority area and as such, the RPS does not anticipate that this area will be developed for residential purposes in the same way as the mapped priority areas. However, Clause 12 of Objective 6.2.1 requires that the land use and infrastructure framework for recovery rebuilding and development "provides for development opportunities on Maori Reserves in Greater Christchurch".

Other clauses of relevance to MR 873 in Objective 12 include: Clause 5 which seeks the protection and enhancement of indigenous biodiversity and public spaces; Clause 6 which seeks the maintenance or improvement of surface and groundwater quality; Clause 7 which seeks the maintenance of the character and amenity of rural areas and settlements; and Clause 8 which seeks the protection of people from an unacceptable natural hazard risk.

Clearly therefore, while MR 873 is not a greenfield priority area, the RPS does anticipate that development opportunities will exist in MR 873, subject to meeting other relevant specified outcomes.

In addition to setting out greenfield priority areas, the RPS also provides for consolidation and intensification in Objective 6.2.2 (Urban form and settlement pattern) to meet the anticipated growth needs of Greater Christchurch through the recovery period.

Importantly this objective contains listed intensification targets to achieve and identifies locations where intensification should be directed. It also seeks to manage rural residential development outside of existing urban and priority areas.

Notably, Clause 7 specifically seeks to provide "for development opportunities on Maori Reserves". The principal reasons and explanation states that:

"Following the earthquakes and the subsequent damage and red zoning of properties, a number of Maori have sought to return to and live on the Maori Reserves set aside by the Crown in the 19th century for the then present and future needs of local Ngai Tahu. Providing for development opportunities on those reserves will enable the descendants of the original grantees to return and realise the original intent of those reserves."

Clearly this objective, like Objective 6.1.1, anticipates that development opportunities will exist in MR 873. However, this objective and its supporting explanation suggest these opportunities will be limited in number and will be limited to descendants of the original grantees.
Objective 6.2.3 Sustainability, seeks recovery and rebuilding in Greater Christchurch that, among other things, provides a range of densities and uses, is healthy and environmentally sustainable and retains values of importance to Tangata Whenua.

Objective 6.2.4 Integration of transport infrastructure and land use, seeks to maximise the integration of the priority areas and new settlement patterns with transport infrastructure. It seeks, among other things, to: reduce dependency on private motor vehicles; promote the use of active and public transport and optimise the use of the existing capacity within the network.

This objective does not specifically reference Maori Reserves, however, it is clear that ad hoc high density residential development that is outside of identified growth areas and which relies on private vehicles is not anticipated by this objective. Rather, development in MR 873 should be carefully considered, with lower densities provided for and/or further residential development located within or adjacent to the existing Tuahiwi village area. Unplanned growth without corresponding infrastructure upgrades is not supported.

With regard to the policies of particular relevance to the managed purposeful approach to growth in Chapter 6 during the recovery period is Policy 6.3.5 – Integration of land use and infrastructure. This policy reinforces and implements Objective 6.2.4 by seeking to ensure that new development (e.g residential) is coordinated with the development of infrastructure in order to: optimise the efficient and affordable provision of both the development and infrastructure, ensure new development does not occur until the provision for infrastructure is in place, and maintain or enhance the operational effectiveness of existing and planned infrastructure. This policy works in tandem with Policy 6.3.7 residential location, yield and intensification which sets out where residential development is to occur and sets density targets. Through Policy 6.3.7 infrastructure location, capacity, and timing can be planned.

It is considered that ad hoc wide scale high density development within MR 873 that is divorced from planned infrastructure development would not be consistent with these policies.

Policy 6.3.9 - Rural residential development, sets out where and how rural residential development is to occur in greater Christchurch. Notably, in the Waimakariri district rural residential development can only be provided for by the Council in accordance with an adopted rural residential development strategy prepared in accordance with the Local Government Act 2002 (LGA).
Rural residential development is defined in the RPS as: "residential units outside the identified Greenfield Priority Areas at an average density of between 1 and 2 households per hectare."

Given the policy and the definition of rural residential it is clear that development at this density, i.e. one dwelling per 5000m² to 10,000m² is not provided for in MR 873 unless set out in a rural residential development strategy adopted under the LGA. The LURP did not anticipate this process for Action 21 and this has not been proposed by the Council.

It is noted that a Rural Residential Development Plan was completed in June 2010 for the Waimakariri District. The community views canvassed by the Council in 2009 and 2010 on this matter indicated that rural residential development was not a preferred option for MR 873.

Of direct relevance to MR 873 is Policy 6.3.10 (Maori Reserves). This policy is reproduced in full below.

"Policy 6.3.10 – Maori Reserves
Recognise and provide for the relationship of local Ngai Tahu with their ancestral lands, waters, wahi tapu and taonga by enabling Maori Reserves within the Greater Christchurch area to be developed and used for their intended purposes for which they were originally reserved, taking into account the following matters where relevant:
(a) flooding, inundation and other natural hazards;
(b) rural amenity and outlook;
(c) compact urban form;
(d) range of housing options
(e) provision of appropriately sized local / commercial centres;
(f) any outline development plans; and
(g) a range of lot sizes and densities."

The principal explanation and reason to this policy is reproduced in full below.

"Principal reasons and explanation
The earthquakes and the subsequent damage and red zoning of properties in Waimakariri District and Christchurch City has led to a number of Maori seeking opportunities to return to ancestral lands, including land at Maori Reserve 873 (Tuahiwi) and Maori Reserve 875 (Rapaki). This policy recognises the original intent of the land purchase deeds of the 19th century to provide for the present and future needs of local Ngai Tahu landowners and their descendants.

It is important that any development of Maori Reserves is enabled in a way that meets the needs of Maori and other residents, whilst
protecting natural and physical resources through maintaining and enhancing the environmental qualities and rural amenity of the area.

Maori Reserves in Greater Christchurch have not been identified as priority areas, nor as rural residential as development of this land is seen as something that will likely take a more dense form in certain areas and this could result in a more closely settled development pattern. However, it is considered important that any development is of a size and scale appropriate for the surroundings and that rural amenity and outlook is maintained. For these reasons it is considered important that an Outline Development Plan is prepared in consultation with the landowners within those reserves to guide and manage development."

This policy clearly provides for development in MR 873 consistent with the purpose for which it was reserved. Matters to expressly consider in any plan change and subsequent development are set out in (a) to (g). This policy anticipates a different pattern of development than provided for in the residential priority areas and under the rural residential provisions.

6.4.3 Overall RPS conclusions

Clearly the RPS anticipates that development opportunities for descendants of the original grantees will exist in MR 873. However, what is less clear is the scale and character of the development anticipated by RPS. Given the RPS's tightly managed approach to greenfield and intensification development and the statements in Policy 6.3.10 and its principal reasons and explanation, it is clear that normal density residential development is not anticipated for this area, and neither is rural residential. At the same time, natural hazards, rural amenity and outlook, a compact urban form and a range of housing and lot size options must be taken into account.

6.4.4 Assessment against the Mahaanui Iwi Management Plan

An assessment of the proposed plan changes against the Mahaanui Iwi Management Plan (IMP) was undertaken by the Council. The Council report states that the proposed plan change to enable development within MR 873 is consistent with the IMP. Key aspects of the IMP that align with the proposed plan change are the improvement of water quality and quantity, the enhancement of waterways and provision for Mahinga Kai, recognition of mana whenua and undertaking meaningful collaboration with the Runanga and communities. It is considered that the plan change gives recognition to Ngāi Tahu cultural heritage values, including wāhi tapu and other sites of significance and cultural landscapes.
7. **Risks of Acting or Not Acting**

7.1 **Achieving Recovery**

The LURP signals that achievement of Action 21 is important for recovery purposes. Specifically it states that "enabling Ngai Tahu whanau impacted by the earthquakes to build new homes on Maori reserves in metropolitan greater Christchurch addresses a specific recovery need." It also states that appropriate subdivision and use of whanau land will "assist social, cultural and economic recovery and will enable the expression of mana whenua and tino rangatiratanga."

The LURP also states that enabling Ngai Tahu whanau impacted by the earthquakes to build new homes on Maori reserves "helps realise the original intent of the Maori reserves to protect and provide for enduring tūrangawaewae."

As such, Action 21 is clearly required for recovery purposes. It is also required in order to realise the original intent of Maori Reserves and give effect to Kemps Deed. If Action 21 is not progressed then this specific recovery need will not be addressed at this time.

7.2 **Consultation Risks**

The risks identified through consultation are covered in Section 5 of this report. One of the risks identified related to concerns over the quantity and quality of consultation.

Some commenters, particularly for the September/October 2014 consultation round considered that there had been insufficient consultation on the proposal. As indicated in Section 4 of this report, because of these consultation concerns the Council sought a delay of provision of the response to the action, to the Minister for Canterbury Earthquake Recovery. This was to enable the Council to prepare a detailed Further Information Report to address the issues and concerns raised through the comments and drop-in sessions. The Council then circulated this report two weeks prior to the hearing of comments to allow for further comments to be provided to the Council’s Hearing panel in March 2015.

As noted in Section 5 the Council considers that the consultation processes to date have provide sufficient opportunity for the community to provide comments on these proposals. The Council also notes that other commenters have stated that they have been well informed throughout the process and have commended the Council for the quality and thoroughness of the consultation undertaken.

In addition, the Council notes that the Mana Waitaha Charitable Trust has undertaken significant consultation with local descendants and the Runanga on development options within MR 873.
7.3 Risk Associated with the Plan Change

The key risk associated with the plan change is that it may lead to significant development in MR 873 which results in a loss of rural character and amenity and creates pressure on infrastructure. These risks are managed by:

- Providing development opportunities within and adjacent to the existing Tuahiwi Village;
- Introducing planning limitations on cluster developments (e.g. site coverage; maximum number of dwellings; setbacks);
- Introducing a requirement to connect to Council reticulated sewage and potable water services; and
- Limiting cluster development and single house developments on vacant sites to descendants.

8. Further Plan Changes

The Council considers that a further plan change is necessary to provide policy support for unit title subdivision of the cluster developments. This was unable to be included within the response to Action 21 as the Council was only directed to provide methods to give effect to objectives and policies for MR 873 as set out in Appendix 3 of the LURP. The Council has commenced scoping this further plan change requirement and should the proposed response to the Action be included within the Waimakariri District Plan then Council would progress the necessary plan change to provide the required unit title subdivision policy support for cluster developments.

9. Final Recommendation

After considering the comments made during the notification period the Council considers that the proposed changes meet the relevant legislative requirements and are considered necessary for recovery purposes. The Council considers that the proposed changes give effect to Action 21.

After considering the comments made during the comment period, and the risk level associated with both the comments and the consultation process, the following changes are proposed by the Waimakariri District Council and provided to the Minister for Canterbury Earthquake Recovery for assessing whether any public consultation or process is required:

- New definitions of Dwellinghouse, Cluster Housing (Kainga Nohoanga) and Maori Reserve 873;
- Amendments to Rules 23.1, 23.1.1.16, 23.1.1.17, 23.3.6, and 23.3.7 and adding new Rules 23.5 addressing reticulated water and sewage;
- Adding new Rule 27.4.4 to address flood hazard areas;
- An amendment to Rule 30.6.1.2 to exclude access to cluster housing of seven dwellinghouses to be by way of a road;
- Amending Table 31.1 to provide for a reduced setback for cluster housing;
- An amendment to Rule 31.1.1.22 to provide for a structure height restriction within the View Protection Area;
- Adding new Rules 31.1.1.55 and 31.32.1 to provide for landscaping within the Residential 3 zone extension;
• Adding a new rules section (31.31, 31.32 and 31.33) to provide for development opportunities within the Rural zone of MR 873;
• Amending Rules 32.1.1.3, 32.1.1.25, 32.1.1.73, 32.4.1 and adding new Rules 32.1.1.54, 32.1.2.14, 32.3.5, 32.3.6 and 32.4.10 to provide for subdivision of the cluster housing; and
• Amending District Plan Maps 47 and 132 and adding new District Plan Maps 132A, 176A and 176B to reflect the above rule changes.
Appendix i

Development Options Assessment
KAIAPQI MĀORI RESERVE 873
DEVELOPMENT OPTIONS ASSESSMENT
CONTRIBUTORS:
Earthwork Landscape Architects
Lucas Associates Landscape Architects
Planz Consultants

Cover Image:
within MR 873 Rural Zone

Right Image:
The opening of the new hall at Tuahiwi,
Maahunui Marae 1922

source: Christchurch City Libraries Image Collection
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MR 873 & TUAHIWI
LOCATION

Legend
- MR 873 Boundary
- Waterway
- Road

to CHRISTCHURCH & KAIAPOI

↑ NORTH

0 200m 400m 800m 1km

map base sourced from LINZ & WDC 2013 & aerial imagery from Google Earth 2012
Māori Reserve 873 is an area of 1068 hectares, with Woodend along its northeast boundary and the Cam (Ruatanihia) River as its western boundary. It comprises varied farmland with the Tuahiwi village at its centre.

The reserve is significant to Te Ngāi Tūāhuriri Rūnanga and many whānau and hapū throughout Ngāi Tahu as ancestral lands and waters. The reserve was granted to local Māori during the 1840’s as part of the Kemp’s Deed purchase of the South Island. The purpose of the reserve was for the tangata whenua to have kainga nohoanga (a place of residence) and mahinga kai (cultivation and gathering of food) with emphasis on fresh flowing water.

Since this time, these rights have changed. The Waimakariri District Council has recently reconfirmed its responsibility to address this issue and resolved to look at ways settlement for descendants of the original Deed’s grantee’s could be enabled.

They have commissioned various technical reports to assess the issues, including this one which draws the information together and assesses five possible options for development.
On 20th November 2012 the Waimakariri District Council’s Resource Management and Regulation Committee agreed to “undertake consultation on issues and options for development, and related District Plan Changes, to enable the land in the Kaiapoi Maori Reserve 873 to be used as intended by Kemps Deed of 1848 and the Crown Grants Act (No 2) of 1862”.

The Committee also noted:

“that the purposes intended under Kemps Deed and the Crown Grants Act is for the land to be used for places of residence and living activities for the original grantees and their descendants; and that

all developments for residential and living purposes will need to meet high standards for servicing and environmental protection.”
The Committee agreed to the following process:

- Prepare an Issues and Development Options Report;
- Consultation with the Tuahiwi community and the opportunity for any interested parties to submit on the options;
- Meetings with affected parties and briefing of Woodend-Ashley and Kaiapoi Community Boards;
- Opportunities for submitters to be heard;
- Depending on the feedback from the community, further consultation on the preferred option or combination of options with a view to Council developing a change to the District Plan;
- Draft District Plan changes recommended to Council;
- Formal notification of proposed Plan Changes, submissions, hearings and decisions in accordance with the statutory processes set out in the Resource Management Act.

**REPORT ASSUMPTIONS**

In preparing this report the following assumptions have been made:

1. For the purpose of the report it is assumed that all new development will need to be serviced with reticulated services (water and sewer). However alternative servicing is discussed in various parts of this report and the Technical Information Reports.

2. No housing is contemplated within the identified flood hazard area under any of the options.

3. All waterways within MR873 will need to be managed appropriately.

4. All land within MR873 is to be assessed regardless of tenure, although it is recognised that the development options relate to descendants of the original grantees.

5. The cultural and social components of possible developments are not addressed as that is better left to specific proposals.
DEVELOPMENT OPTIONS LOCATION

Legend
- MR 873 Boundary
- Waterway
- Road
- Residential 4B Zone (WDC)

Options Key
- **Option 1**: Development Adjacent to Woodend (WW6)
- **Option 2**: Tuahiwi Consolidation
- **Option 3**: Tuahiwi Expansion
- **Option 4**: Housing Clusters (Including kainga-nohoanga & papakainga housing)
- **Option 5**: Individual Houses on Rural Sites

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DEVELOPMENT OPTIONS

As a starting point for consultation with the Tuahiwi community, the Council has identified the following five broad options representing different forms of development (see map on page 8).

Option 1 – Development Adjacent to Woodend (WW6)
This involves development within a rectangular block of land known as WW6 which is included in Plan Change 1 to the Regional Policy Statement for urban growth purposes. This block is located to the southwest of Rangiopa Woodend Road and is located approximately opposite Woodend Primary School.

Option 2 – Tuahiwi Consolidation
This involves consolidation of the existing Residential 3 zone at Tuahiwi through the development of vacant sites and a reduction in the minimum site area subdivision standards.

Option 3 – Tuahiwi Expansion
This involves expanding the existing Residential 3 zone at Tuahiwi to enable further residential style development. The boundaries of such an extension are not specified at this stage, however would be based on an assessment of the ease of servicing, landscape character, and environmental constraints.

Option 4 – Housing Clusters (including Kainga-Nohoanga and Papakainga housing)
This option involves the enabling of housing clusters to support Māori community living and cultural values, as a different form of residential development to that currently provided for.

Option 5 – Individual Houses on Rural Sites
This option would allow a dwelling on existing rural lots and/or enabling rural residential lots below the current 4 hectare minimum site size.
OPTION ASSESSMENT METHODOLOGY

One purpose of this report is to assess the advantages and disadvantages of the five options listed on page 9. It assesses a broad range of information and is complemented by a range of technical reports (see Supporting Technical Information pages 10-11).

From these a number of constraints and issues have been identified. They are presented as a series of mapped constraints supplemented with written explanation and the technical reports.

Secondly the issue of the landscape character is addressed. An analysis of the existing landscape character and then a set of possible positive landscape development factors is discussed.

The purpose of this is to present possible methods and specific issues for managing and providing for development. This information is supplemented by The Landscape of Tuahiwi and Kaiapoi Maori Reserve 873 report.

The assessments are summarised in the form of a simple Constraints & Issues Summary map (see page 37) and a section entitled The Way Forward (see page 36) looking at the combinations of the options and methods that best enable development.

SUPPORTING TECHNICAL INFORMATION

The assessments undertaken use information gathered from the following reports:

- Tuahiwi Water Supply Extension & Sewer Reticulation Upgrade 4th December 2012 (WDC #121128084783)
- Tuahiwi Servicing – Servicing Issues Report, 8th September 2006 (WDC #DDS-02-04/060908101261
- Dr Henry Hudson – Drainage Rehabilitation and Low impact Development: Issues and Options for Māori Reserve 873 (June 2012)
**Supporting Technical Information continued**

- Localised Flood Hazard Assessment MR 873 (WDC, 2013)
- Lucas Associates - The Landscape of Tuahiwi and Kaiapoi Māori Reserve 873 (March 2013)
- Geotech Consulting Ltd on Geotechnical Issues, (August 2012);
- Pattle Delamore Partners Ltd on Ground Contamination, (December 2012);
- Reports prepared for the Tuahiwi Marae Trustee, 2005 – 2009, including:
  - Dr Te Maire Tau “History of the Kaiapoi Maori Reserve”
  - H R Tau and W M Karaitiana “Turangawaewae”
  - W M Karaitiana “Kaiapoi MR 873 Case Studies”
- Mana-Waitaha Trust, October 2011, “Kaiapoi Maori Reserve Kainga-Nohoanga Pre-consultation Concept and Scoping Report” WDC Trim No 111012047032

**Context**

MR873 has been subject to various central and local government laws and regulations which have tended to either contribute to the alienation of the land from Māori or restrict the use of the land by Māori owners.

Since November 2011 Council staff have been meeting with landowners and various groups and organisations representing land owners, to develop options for, and to enable, development within the MR 873 land and enable it to be used as intended by Kems Deed 1848 and the Crown Grants Act 1862 which is as a place of residence and living by grantees and their descendants. Council has also been involved in preliminary discussions with many landowners, including some of the owners of the WW6 block (Option 1), and with the Mana Waitaha Charitable Trust regarding the future form of development in Tuahiwi.
PLANNING CONTEXT

Earlier District Planning schemes zoned much of the area as Rural D which provided the ability to construct dwellings on existing titles down to 1 ha in size (with dwellings on smaller lots being subject to Council approval). These rights only applied to applicants who could demonstrate direct descendancy from original MR873 grantees.

The Rural D zone was removed when the current District Plan was developed in the 1990s, with the area now having a standard Rural zone which permits subdivision and dwellings down to 4 ha in size. Tuahiwip Village is zoned Residential 3, with subdivision and dwellings permitted on lots down to 600m² in size.

Since 2007, the Council, in association with the Canterbury Regional Council, Christchurch City Council, and Selwyn District Council, has been working on an integrated approach to managing urban growth in Greater Christchurch. This work programme culminated in the Greater Christchurch Urban Development Strategy and proposed change to the Canterbury Regional Policy Statement (CRPS). This made provision for growth in the greater Christchurch area, and required development to be integrated with the provision of infrastructure and undertaken in a comprehensive manner. The operative CRPS and Change 1 provide high level policy support for Papakainga housing, whether or not such housing is within an urban limit. Policy 6 allocates housing for greenfield areas, which includes a portion of MR 873 adjacent to Woodend. Policy 6 also provides for up to a further 1,000 households at Tuahiwip, as well as opportunities for rural-residential development. The Council reserved up to 300 lots from its rural-residential allocation as a contingency for MR 873.

There is therefore considerable scope at a strategic level for further residential development within the study area, albeit that this support is conditional on any option being serviced with reticulated infrastructure and subject to an Outline Development Plan to ensure detailed development occurs in an integrated manner.

Concurrent with this process, the Council is also involved with the preparation of a Land Use Recovery Plan (LURP) that is being drafted under the Canterbury Earthquake Recovery Act. The LURP covers all of Greater Christchurch and as such is not specific to Tuahiwip, although it will set out the location of future growth areas in the District and their integration with infrastructure, and therefore is directly relevant to the consideration of future levels of urban and residential development at Tuahiwip. The LURP makes provision for additional housing and related activities to be planned and developed within MR 873. The LURP will be consulted on separately, by Environment Canterbury and the Minister of Earthquake Recovery. Submissions on the LURP may be sent to Environment Canterbury up until 12 noon on Monday 22 April 2013.

LEGAL OPINION

In May 2011 the Council received a report and legal opinion from Mr J D Hall dealing with Kemps Deed and the Crown Grant of 1862 to the Council’s administration of the Resource Management Act and other legislation. Mr Hall is a specialist lawyer with extensive experience in dealing with Maori customary rights and land issues. His advice is that the promises made in the Deed were given effect to through the Crown Grants Act (No 2) of 1862, which created a special status for Maori Reserve 873, and that this is a compelling factor in the Council applying sections 6, 7 and 8 of the Resource Management Act.

The Council considered Mr Hall’s advice at its meeting on 1 November 2011, and resolved:

“(f) Requests the Manager: Planning and Regulation to identify appropriate District Plan Changes to better recognise the rights and duties arising from Kemps Deed 1848, and the Crown Grant that established Kaiapoi Maori reserve 873.”

A meeting of the Council’s Resource Management and Regulation Committee on 20 November 2012 resolved:

“(b) Agrees to undertake consultation on issues and options for development, and related District Plan Changes, to enable the land in Kaiapoi Maori Reserve 873 to be used as intended by Kemps Deed of 1848 and the Crown Grants Act (No 2) of 1862”

“(c) Notes that the purposes intended under Kemps Deed and the Crown Grants Act is for the land to be used for places of residence and living activities for the original grantees and their descendants.”

This report and the consultation process follows from those decisions.
SOCIAL & COMMUNITY CONTEXT

Within MR873 there are approximately 214 rural households and 58 residential. Recent demographic information has been limited by the lack of a census in 2011.

The community has a preschool next to the primary school. Tuahiwi Primary School is a Decile 7, year 1-8 school with a role of some 122 pupils and 2 mainstream and 4 bilingual classes (see page 15). Secondary school pupils mainly attend Rangiora High School, although others travel to Kaiapoi High School and various Christchurch schools.

The community also has the following facilities:

- St Stephens Church (a listed heritage building)
- Maahunui Il Marae (recently re-built to replace the previous building and the meeting place of Ngai Tuahuriri)
- Tuahiwi Sport & Recreation Centre
- Cemetery (Urupa)
- The northeastern edge of MR873 adjoins Woodend with its associated shops, services, and primary school.
- Tuahiwi Village is approximately a five minute drive to either the Rangiora or Kaiapoi town centres, with secondary schools and full commercial and social facilities located in both of these larger townships.
- There is no public bus service through Tuahiwi village at present.
POTENTIAL DEVELOPMENT

CONSTRAINTS & ISSUES

The following issues are relevant as part of the assessment of any plans and proposals for future development within the reserve.
Heritage and Cultural Designations

St Stephen’s Church (Anglican) (Pt Lot 1 DP 12780) is a listed heritage building within the Plan. The church is recognised in the Plan for its historical and social significance, cultural and spiritual significance, architectural significance and landmark status. It is also a Category I building with the New Zealand Historic Places Trust. At 431 Tuahiwi Road a group of three white poplars and a single white poplar are listed as notable plants. There are no other listed buildings or trees within the study area. Heritage buildings and notable trees do not therefore preclude any of the growth options, albeit that the detailed design of any development option should take into account the ability to incorporate existing mature trees or non-listed character buildings into the final development to retain a ‘sense of place’ and local identity.

The Tuahiwi Marae (Lots 32 and 33 MR 873) is indicated as a Wahi Tapu/Wahi Taonga Site, while there are identified archaeological sites A116, on Tuahiwi Road and A012, A010 and A015 adjoining the eastern side of State Highway 1. Silent Files SF011, SF012 and SF016 are shown to cover parts of the study area (see map on right). Any substantial earthworks are likely to require an Archaeological Authority from the New Zealand Historic Places Trust. The whole of MR 873 has cultural and heritage significance through its history as a Māori Reserve and through the strong ongoing role of local Runanga in the Tuahiwi community and school. All of the whenua (land) and awa (rivers) in the area are also highly significant for tangata whenua due to unbroken historical and ancestral connections over many generations.

KAIAPOI MĀORI RESERVE 873 Development Options Assessment 17
**Flood Risk**

The area north of the Cam River between Bramleys Road and the State Highway is identified in the District Plan as a localised flooding area. Recent flood hazard analysis has resulted in the adjacent map (see Supporting Technical Information pages 10-11). It is anticipated that no dwellings will be located within the high or medium flood hazard areas under any of the Options.

There are examples of raised pole and/or building platform designs in the district. However these can have significant landscape effects in addition to altering flood flows and displacing water onto other properties and should be avoided if possible.

There are other areas further to the north which show a lower degree of flood hazard restriction and these follow the eastern banks of the Cam River and the eastern swale between Tuahiwai and Rangiora Woodend Roads.

The Cam River which runs along the western boundary of the study area is also subject to esplanade provisions in the District Plan, although these provisions relate more to securing recreational access to the waterway margins than in preventing the construction of buildings within a flood hazard area.
LIQUEFACTION RISK

The geotechnical qualities of the study area have been examined by Aurecon in a report dated 15th March 2013.

Geotechnical Class 1 – These areas typically take the form of topographic highs and are underlain by deposits dominated by granular material, such as sand and/or gravel. Groundwater is likely to be encountered at a depth that is unlikely to adversely affect appropriate foundation solutions.

Geotechnical Class 2 – These areas have been identified as being underlain by fine grained materials that may be vulnerable to liquefaction, particularly if predominantly silty in nature.

Geotechnical Class 3 – These areas have been identified as having ground conditions that are likely to require non-standard ground engineering solutions and may be considered inappropriate for development without ground treatment. Ground materials may comprise organic deposits such as peat or sediments potentially vulnerable to liquefaction. Groundwater may be encountered at levels likely to contribute to liquefaction or adversely affect foundations.

As a generalisation, the ‘better’ land is located immediately adjacent to Woodend township, and along the ridge that follows Tuahiwi Road and the existing village, reflecting the likelihood that the original village location was due to this ridge providing a slightly elevated and less flood prone position. This pattern coincides with the most productive and utilitarian soils of the reserve.

Whilst much of the site is exposed to some liquefaction risk, the areas mentioned above do seem to offer better opportunity. Over much of the remainder of MR873, the risk does not appear to be sufficiently great so as to preclude any of the growth options, albeit that specific geotechnical testing will be required for each specific site.
**Potential Land Contamination Risk**

Council has a legal responsibility to give effect to the provisions of the National Environmental Standard for Assessing and Managing Contamination in Soil to Protect Human Health. This NES requires that potentially contaminated sites are identified and if need be remediated prior to sites being subdivided or their use changed e.g. from rural to residential. Pattle Delamore Partners Ltd have undertaken a desktop assessment of the potential for land contamination within MR 873. The potential sources of contamination primarily relate to the area’s historic use for agricultural and horticultural production (and associated chemical spraying and storage), along with smaller areas of localised rubbish dumping. Individual lots across the study have been identified according to their potential for contamination rather than any known instances of contamination (see Supporting Technical Information pages 10-11).

The report does not mean that sites with higher potential for contamination cannot be urbanised or used for housing but rather that more detailed site-specific assessment is required before some form of urban or residential development on these sites is confirmed.

The sites with high contamination potential are widely distributed across the study area, such that potentially contaminated sites requiring further site-specific investigation will be included in all of the growth options. The smaller, more intensely developed options would offer more chance to offset contamination remediation costs. Less physical dense options offer the opportunity to avoid possible contaminated areas although food production and water quality are strong considerations where contamination is a potential risk.

Due to the preliminary nature of the existing information and the widespread possible occurrence, potential contamination issues should not preclude any of the options at this stage. Further investigation on any potential development site will be necessary.

**Roading**

The study area is located in easy proximity to Christchurch via State Highway 1 at the south and to State Highway 73 to the north. The area is also bordered by local collector roads that connect the major townships of Rangiora, Woodend, and Kaiapoi. Within the study area the road network is largely serving the local community, with roads typically rural in character with no formed footpaths or kerbs. A number of the local roads are either unformed or are formed and metalled.

There are no known road network capacity constraints that would limit any of the development options, although development adjacent to Woodend (WW6) would need to be planned to manage potential traffic/pedestrian conflict across Rangiora Woodend Road. The more intensive development options are likely to necessitate localised intersection upgrades in order to safely and efficiently accommodate increased local traffic volumes.

There are no footpaths outside the village area. Pedestrian safety would need to be addressed if further development was to be undertaken outside the village area. Opportunities to create a wider network of open space, paths and cycleways should be part of any development plans.
STORMWATER, GROUND WATER & WATERWAYS

Stormwater disposal is currently via a network of open drains flowing into Māori Drain and the Cam River, with localised surface ponding occurring in low lying parts of the study area following heavy rain.

There are a number of waterways through MR873, including those above, generally moving from north to south. These are in various states of development, being channelised or lacking natural buffer and edge planting, although the Cam is mostly well shaded. Overall there is significant opportunity to naturalise the streams themselves as well as the catchments that feed them.

Groundwater is relatively shallow (generally 1 – 3 m in depth from the surface). This means that there are limited options for disposing of stormwater into the ground and that the quality of groundwater is easily affected by land management practices.

The solution to improving the treatment of the stormwater, groundwater and waterways is creating a more natural water catchment and stream environment. This involves treating stormwater and runoff as naturally as possible by allowing water to filter into the ground where practical, be stored on site during storm events to avoid fast flood peaks and creating filters for stormwater to purify it before it reaches natural stream systems or groundwater.

For the treatment method above, recreating natural environments around and within the waterways is essential. Removing sediment and contamination, creating natural stream bank shapes and flow patterns and significant ecological plantings on the banks, margins and in the water all contribute, and may include provision of public access linkages.

Complementing the naturalisation approach are conservation and water reuse strategies. These involve domestic use of rainwater, reuse of greywater, using well water for non-potable supply such as irrigation as well as other methods.

These issues and methods are more fully explained in the Dr Henry Hudson and Mahaanui Kurataiao Ltd reports (see Supporting Technical Information pages 10-11).
MR873 SERVICING

NOTE:
Any area within MR 873 can be serviced with reticulated water & wastewater services, but the affordability of extending the services to a development outside the Tuahiwī township is dependant on a number of factors including:
- The distance of the proposed development from the trunk mains
- The required size of the main to service the proposed development
- The number of properties that would be available to fund the extension

Legend
- MR873 Boundary
- Residential Zone (WDC)
- Land Title

Existing Utilities*
(*based on WDC Utilities Map for MR873, WDC 2012 & ECAN GIS database for private wells 2012)
- Water Main
- Drain Main
- Sewer Main
- Open Drain (WDC)
- Open Drain (Private)

Ease of Water & Wastewater Servicing
(*based on the Tuahiwī Water Supply Diagram, WDC, 2013)
- Proposed Water Extension
- Easy to service
- Moderate to service
WATER & SEWER NETWORK

Currently within MR873 there is a variety of servicing provisions for water supply and wastewater disposal. Water supply to all properties is via private wells. Many of these are shallow with varying water quality. Wastewater is disposed of via septic tanks in the rural areas and a Septic Tank Effluent Pump (STEP) system in the village. This takes waste from septic tanks and pumps into the Council’s effluent disposal system.

The Council has a requirement that any future development be connected to a piped, public reticulation system for both water and wastewater. The reasons for this are that the current issues with water supply quality and quantity, and ground water contamination from wastewater and septic tanks are avoided. These issues are particularly relevant as further development is contemplated.

There are alternatives to publicly reticulated services. For water supply deeper private wells can be dug, water can be stored on site from rain water and potable water can be recycled for non-potable uses. There are systems for treating wastewater, mainly based on plant based filtering and exposure to ultraviolet rays from the sun. It is the experience of the Council that these and other private treatment plants do not offer security of supply and quality. This does not rule these options out but puts the onus on a potential developer to prove the efficacy of such a system.

To remedy the existing situation the Council has approved an increase in capacity for the wastewater system and a 200mm water pipe to service the village. This will follow the line of the existing sewer main along Turiwhaia Rd and on through the village along Tuahiwi Rd. Construction work has started, and is expected to be completed before December 2013.

These improvements allow for future development. The wastewater proposal allows for approximately 160 additional connections, depending on where in the system the connections are. This is only one of the variables that affect the viability and cost of future connections. The greater the distance of a proposed development from the existing supply, the more costly the connections will be. In very approximate terms this cost may vary from $60 - $120/metre depending on a number of factors for each of the water and wastewater. This is countered by the number of connections there will be in a development, so the larger the development, the greater economy of scale for the connections. Also a logical and planned sequence for development means that services can be installed in the most efficient way. These issues are further complicated by issues such as pumping and the capacity of the wider reticulation system.

In terms of where that future development may be the following summary can be made. The easiest places to service are along Turiwhaia Rd, and Tuahiwi Rd within the village, and along Rangiora Woodend Rd where there are existing reticulated services. There are also some extensions of the proposed system that would be straightforward and cost effective to make. These extend out from the existing or planned service lines approximately 1.0 kilometre. This would allow economical connections from parts of Greens, Topito, and Bramleys Roads as well as further north and south on Greens Rd (see map on page 22).

This information starts to form a pattern of areas that are easy and moderate to service and this distinction has been shown on the page 22. This does not rule out other areas for development but does mean that there are significant issues and/or costs to resolve for reticulated servicing.
TITLE SIZE AND DEVELOPMENT POSSIBILITY

RURAL TITLES

At present there are 96 Rural titles within MR873 above 4 hectares in size. Of these 51 contain buildings and 45 do not.

There are 373 Rural titles below 4 hectares of which 163 contain buildings and 210 do not. The current Rural titles below 4 hectares are spread across MR873 but are also nearly all grouped together in collections of well over 4 hectares. There do not appear to be a significant number of titles over 8 hectares, which could be subdivided under existing rules (see page 24).

The conclusions from this are:

- There is the possibility of significant change to MR 873 with Rural titles able to be built on now. This change would be even more significant if the rules were changed regarding rural title size.
- There also appears to be significant opportunity to amalgamate titles in the Rural Zone.
- There are 45 titles that can be built on within the existing Rural Zone.

RESIDENTIAL TITLES

In the Residential 3 Zone there are 75 titles: 17 are between 600 and 1200 m², with only one not built on; 57 are 1200 m² plus, 42 being built on and 15 unbuilt; however many of these titles are part rural and part residential zoned. There are several unbuilt titles that are very large in size (see table adjacent).

These few large unbuilt titles offer significant building opportunity within the existing Residential 3 Zone.
The following information is based on the *Landscape of Tuahaiwi & Kaiapoi Maori Reserve 873 Report* (see Supporting Technical Information pages 10-11). The rural and village areas are discussed separately, followed by a discussion of general issues and a summary.

**Rural Landscape Character**

MR 873 has a character and density typical of a long established rural/horticultural zone on the productive parts of the lower Canterbury plains.

The mature plantings create a variety of spatial experiences from broad and open to more intimate, enclosed and small scale.

The natural landscape systems of outwash ridges and broad swales, can still be seen and are reflected in the settlement pattern of the reserve. The ridges are more intensely developed with both housing and planting. The broad swales are less populated with less plantings.

The rural housing is generally clustered in small groups, close to the roads, although there are a small number of separated and less planted, recently developed lifestyle properties.

This landscape pattern is visible from within MR873 and from the surrounding lands, including from highways. Overall this is a positive, recogniseable landscape and is valuable from within and from outside MR873.

Although there is little of ecological value left within MR873, as highlighted by the poor state of the waterways, there are many opportunities to improve these aspects within the future pattern of development, and this is a priority for the protection and restoration of cultural values associated with waterways and mahinga kai.
**Urban Landscape Character**

The urban area has a dense but low key and typically pleasant village character.

The structure of well-established and consistent planting is one of the main contributing factors to this character. This varies from very tall shelter belts and mature trees to garden planting and screening.

Complementing this is the lack of hard infrastructure such as fencing and gates, formal streetscape such as kerbing and car parking.

Connection to the rural landscape from within the village is important. This is gained through the planted framework and the amount of open, rural space within and surrounding the village.

The character of the houses themselves contribute also. Colours are generally subtle and the houses relatively modest in size. However considering the large sections sizes, the housing pattern is quite dense and close to the road. In most parts of the village, housing is only one or two properties deep. The area of the village that does not fit this character is the recently subdivided area in the centre. Although sections are relatively generous, the lack of planting, the fencing, the size of houses and the deeper, more uniform pattern of development is an obvious difference.

**Summary**

Overall MR873 has a recogniseable, varied, positive landscape character.

Some of the important aspects of this are:

- Well settled groups of houses combined with open space;
- Consistent planted framework that while varied is always a strong part of the experience;
- Low key, pleasant village character again characterized by planting.

However the lack of ecological value, especially regarding waterways is a concern. So is the different character of the more recent developments.

It does seem from this that planted character and clustering are more important than title size.

It also seems evident that options other than the existing planning framework need to be explored to retain the positive existing attributes as well as facilitate positive development.
POSITIVE LANDSCAPE DEVELOPMENT

SUMMARY

The basis of this report is the WDC’s decision to enable living development within MR873 for descendants of the reserve’s original grantees.

Also accepted is the need for that development to “meet high standards for servicing and environmental protection”.

To enable this development, the existing positive landscape characteristics need to be retained as well as methods and specific issues to assure appropriate and positive outcomes from further development.

THE EXISTING LANDSCAPE

Some of the significant positive attributes of the existing landscape that may be used in future development are:

- Well settled groups of houses combined with open space;
- Consistent planted framework that while varied is always a strong part of the experience
- Low key, pleasant village character again strongly influenced by planting

source: landezine.com, New Dutch Waterline by OKRA Landscape Architecture
Positive Landscape Development Criteria

Comprehensive Development Approach
Much of the development of MR873 to date has been small scale and piecemeal. This is typical of the district and the country as a whole. A Comprehensive Development Approach looks at the issues of a much wider area with particular requirements (such as MR873) and provides a logical solution to those requirements for that entire area. This may be in the form of a set of development guidelines or rules, and/or an Outline Development Plan to control the layout of development.

Low Impact Design
Low impact design focusses on minimising the inputs, outputs and impacts of development on the people and landscape. This may range from using local materials to solar energy, rain water harvesting and cycle and pedestrian connections.

Natural Landscape Processes
Related to Low Impact Design is the use of natural landscape processes. There are many examples of retaining and where possible, recreating natural landscapes. These create a more resilient, adaptable landscape as well creating a unique character. Examples of these processes are: natural stormwater detention and soakage; naturalisation, including planting and “de-channelising” of waterways; and creating significant ecological plantings for natural habitats.

A Structured Planting Framework
MR 873 benefits from an established planting framework. To ensure that the MR873 landscape benefits from future development, a design guideline approach is recommended. This could address the general planting framework (rural areas and the village) as well as ecological planting with emphasis on waterways.

A Development Density/Layout Framework
The existing positive landscape has centered on the grouped layout of rural houses. In order to retain this approach, build on it and retain the stated assets of the village, a framework for development would be a great benefit. This follows the Comprehensive Development Approach above and might control size and separation of groups of houses, off sets from each other and issues such as separation from roads and boundaries.

Designing for Minimal Visible Infrastructure
Modern development has high standards for things such as parking and drainage, which can sacrifice landscape character. One of the challenges of development in MR873 will be satisfying practical requirements while continuing the low key, informal feel of the existing landscape.

Maintaining and Developing the Village Character
The village character is recognised by its Residential 3 status. Creatively developing this as the village develops will be a challenge and will need to be complemented by social and cultural outcomes that suit MR873 residents.

Waterway Naturalisation
This issue is discussed here and in Dr Hudson’s report but is a key issue that needs to be recognised separately and given attention regardless of the development scenario being contemplated.
DEVELOPMENT OPTIONS ASSESSMENT

The following information assesses the five development options as described on page 9.
OPTION 1

DEVELOPMENT ADJACENT TO WOODEND (WW6)

This block of land of approximately 94 ha has been identified for possible development as part of ongoing land allocation and urban planning processes and the Canterbury Regional Policy Statement. The final outcome of these processes is unclear and hence so is the future planning status. However the land is an interesting option for development within MR873 because it bounds Woodend township and has a degree of separation from Tuahiwi Village.

In terms of constraints there are a number of factors which make the area conducive to development.

Geotechnical information shows it is likely the land along Rangiora Woodend Road is more straightforward to develop than the western area and there is little significant flood hazard present in the area. The land is also relatively easy to service from Rangiora Woodend Rd. Existing information shows the land does not contain significant ecology or specific heritage/cultural sites.

However there are issues of urban form and character to consider. Rangiora Woodend Rd is the current delineation between the urban and rural landscape and the start of MR873. To retain this delineation, development in this area should respect the MR873 landscape character and should create an asset for MR873 as well as the long term urban form and facilities of Woodend.

A developed form that would respond to the factors above could be a pattern of grouped development along Woodend Rangiora Rd with significant views and connections through to the rural land beyond and to Tuahiwi Village. This would need to balance a rural separation from the Woodend township with the logical preference for staying on the geotechnically better eastern land. This would allow the remaining area to be in rural or productive use.

If the above pattern of development were adopted and up to 25% of the area was developed in a grouped but conventional urban density of 10 households per hectare, this would yield up to about 200 households from the 94 hectare total. If a more comprehensive or intense approach was taken to the development groups this figure could be significantly higher while still retaining a positive character and community form.
**Option 2 | Tuahwi Consolidation**

The village has a pleasant landscape character. Boundary and garden planting, modest dwellings and a consistent visual backdrop of the rural hinterland all contribute. Section sizes are deceptively large within the village as many are long and narrow with the road end having been developed. As with many long established settlements the physical infrastructure does not dominate the village.

Servicing is a current constraint to development although this being addressed by the WDC. The current improvements to sewer and water supply would cater for over 50 new houses in the village. There are minor flood hazard areas within the village, mainly around the dry stream in the northwest and there appear to be areas in the northwest and southeast that will require further geotechnical investigation.

In terms of creating a more dense village within the existing Residential 3 boundary, there are few straightforward opportunities along the west side of Tuahwi Rd due to the section width and placement of existing houses. There are maybe six sites that offer easy subdivision. There are several larger titles on the eastern side of the road whose Residential 3 zoned parts offer simple subdivision opportunity.

The current Residential 3 zoning allows subdivision down to 600m2. There is the option of further reducing the minimum lot size (typical minimums being 450 or 300m2). However this would greatly increase the visual impact of physical infrastructure and dwellings, which would change the existing positive landscape character. To mitigate these affects, design controls on issues such as plot ratios, building setbacks, infrastructure and landscape treatment would need to be considered.

At present there is the existing opportunity for "family flat" type development which allows auxiliary buildings on existing sites without the infrastructure of subdivision. These buildings are allowed up to a size of 70 m2 and need to be located within 30 metres of the main dwelling.

The development approach of continued 600m2 subdivision within the Residential 3 Zone and continued family flat development on existing titles would have a manageable impact on the existing landscape character. However to create the most positive outcome, having design guidelines regarding the existing planted character of the village (planting guidelines) and liaising with developers on layout to retain the connection to the rural landscape would be a benefit to the village.

Any further reduction of minimum lot size below 600 metres would require careful control to retain the existing positive character attributes.

If the village were to continue to be developed with 600 metre minimum sections then anywhere between 6 and 50 new sections could be formed, excluding any family flats added onto existing sites.
**Option 3 | Tuahiwi Expansion**

The Development Constraints Maps and the Landscape Character Study would both accommodate a much larger village development area. This would also create the opportunity for further social and community facilities for the village, positive urban form and connections.

There is a logical area for “infill” as defined by the intersections of: Tuahiwi Rd and Greens Rd; Tuahiwi Rd and Topito Rd, and; Greens Rd and Te Pouapatuki Rd. This could also easily spread further to the north towards Waikoruru Road and Okahau Road, and to the west of Tuahiwi Rd bounded by the Flood Hazard Area of the Cam River (see Flood Risk map on page 18).

The area identified above is defined by existing flood hazard areas to the west and southeast and by servicing ease via the existing WDC provision. There are areas requiring further geotechnical investigation west and east of Tuahiwi Rd. There are also a number of heritage sites and silent files within the possible village area.

The landscape character of the existing village is described elsewhere. If the village were expanded, in order to retain a positive and distinctive character for the village and the surrounding area, there are a number of factors that would need to be addressed. Connection to the rural landscape from within the village and the continued dominance of the planted framework are important. The non-intrusive character of the physical infrastructure would ideally be retained through any expansion of the village.

These character factors as well as the optimum servicing outcome could be addressed by a Comprehensive Development strategy in the form of an Outline Development Plan (ODP) for the expanded village area. Ad hoc development would not address these issues or retain the character attributes described.

A layout that retains open space within the village, creates denser groups of houses to maximize resource and service efficiency, as well as other positive community outcomes, would continue the positive existing character as well as providing best practice urban design outcomes.

In addition having specific and detailed regard for the Positive Landscape Development Criteria would help create an appropriate outcome.

The area of possible expanded village outlined above is approximately 70 hectares, excluding the Residential 3 and urupa land. If this land 25% of this land was developed in housing groups of varying density (10 – 20 dwellings per hectare), this would yield 150 to 350 houses and still retain the important character attributes described above. Obviously this level of development is hypothetical but would certainly require a rethink of current servicing provisions.
Option 4
Housing Clusters

(including kainga nohoanga & papakainga housing)
The existing rural landscape pattern is of varied planting and housing groups along the roads with open areas on the broad swales between.

Cluster housing would likely be larger than the current 3 – 6 house groups and potentially out of scale and intrusive to the landscape pattern. However the planted structure of the rural road areas of MR873 is such that well designed groups of houses could be absorbed into the landscape.

In terms of constraints, servicing is important. Grouping houses brings down the cost of servicing from public supplies. It also increases the viability of alternative servicing solutions. There may well be degrees by which this can be implemented, for example: water recycling; well water use for non-potable purposes; on site stormwater and rainwater use; through to on site wastewater and disposal.

The ridge along Tuahiwi Rd is the most geotechnically suitable for development in the rural areas, and also away from the flood hazard areas. There are minimal specific heritage and culture designations in this area. As stated above, these areas also possess the existing planted framework to best absorb change. This does not rule out kainga nohoanga development in other parts of MR 873 but it does seem like a logical place to start.

In order to address the issues of appropriate placement, scale, design and treatment of kainga nohoanga a Comprehensive Development approach is recommended. This both for the development clusters themselves but also for the likely placement of the clusters within the landscape. Placement of these clusters would benefit from significant separation to retain the rural landscape framework. Offsetting the clusters so that they have a varied relationship to each other, to the roads and a good degree of separation from the village would help retain the existing character.

In addition to this having specific and detailed regard for the Positive Landscape Criteria would help create an appropriate outcome.

If this pattern of development was adopted and the area of geotechnical low risk land along Tuahiwi Rd was seen as a good starting point, this would provide, very approximately, 95 ha of land. If, for example, 10% of this was developed into kainga nohoanga clusters at 10 to 20 houses per hectare, this would yield up to 200 dwellings and still retain a significant rural and productive landscape framework.
OPTION 5
INDIVIDUAL HOUSES ON RURAL SITES

The existing rural landscape pattern is of varied planting and housing groups along the roads with open areas on the broad swales between.

This option contemplates further dwellings on conforming rural titles or dwellings on titles smaller than 4 hectares. In terms of servicing, the pattern of small scale, geographically separated dwellings is very inefficient and expensive. Other constraints need to be looked at on a case by case basis due to the spread out nature of the land in question.

Given the number of rural titles on which there are no current buildings or are over 4 hectares and offer the opportunity for further residential development, this is option has the potential to create the most widespread change across MR873 of any of the options. However despite these serious issues, in terms of enabling development, there are a number of solutions that may help create appropriate development.

Having regard to planting and design guidelines would help reduce or manage the impact of this type of development.

The amalgamation of adjoining small rural titles would help to create a further resource of conforming titles. Again having regard for planting and design guidelines would certainly reduce the impact of this option and provide the opportunity to create positive outcomes.

Taking the amalgamation of titles further, creating further comprehensive development or kainga nohoanga opportunities would create a better servicing and landscape outcome then individual isolated houses.

In principle, the best solution is to seek opportunities for further development grouping, following the pattern of kainga nohoanga development.
THE WAY FORWARD

This report is written recognising the WDC decision to find ways to enable residential development in MR873 for descendants of the reserve’s original grantees.

It also recognises the need for high standards for servicing and environmental protection for development within the reserve.

In terms of assessing the options, none have been discounted by the assessment. However the options, or aspects of them are appropriate to different degrees, according to the issues and constraints identified, the attributes of the existing landscape and the application of the Positive Landscape Development Criteria (see page 29).

It is recommended that development proposals adopt a Comprehensive Development Approach to development with low impact design principles and natural landscape processes. The specific issues these methods should address are: creating a well structured planting framework; retaining a balance of open space and development; improving the ecology of the site, especially the waterways; maintaining a minimal visible infrastructure approach; and; respecting and developing the character of the village. These criteria would be complemented by the appropriate social and cultural measures which are not a specific part of this report.
CONSTRAINTS & ISSUES SUMMARY

By combining the main issues and constraints, flood hazard, waterways management, geotechnical risk and servicing, a simple, indicative map can be drawn to show the likely relative ease of development for different areas of MR873.

This is not intended to determine development areas but to start discussion on which areas are relatively easy, moderate or possibly difficult to develop. These are shown on the plan as green (easy) and red (difficult).

As can be seen from the map the ridge along Tuahiwi Road and Rangiora Woodend Road offer less geotechnical and flood risk and generally better access to public reticulated services.

Please note there are variables and/or more information required to confirm development suitability of any particular site. The intention in presenting this information is to inform discussion on broad patterns of landscape development.

Legend
- - - MR873 Boundary
Waterway
- - - Land Title
- - - Residential Zone (WDC)

Flood Hazard
(based on Localised Flood Hazard Assessment MR873 mapping, WDC 2013)
- - - - High
- - - - Low

Ease of Servicing
(based on ease of water & wastewater servicing of Tuahiwi MR 873 mapping, WDC)

- - - Easy to service
- - - Moderate to service

Geotechnical Classes
(based on Aurecon’s Kaiapoi Māori Reserve 873 - Tuahiwi, Geotechnical Classes Map 2013)
- - - Class 1
- - - Class 3

NORTH
map base sourced from LINZ & WDC 2013
KAIPOI MĀORI RESERVE 873 Development Options Assessment 37
As stated above none of the options are ruled out according to this assessment. In accepting which options are best to enable development it is appropriate to group them into three according to type.

**Development Adjacent to Woodend (WW6)**
The option to develop WW6 offers many benefits. To capitalise on these benefits and retain a positive landscape, groups of development allowing rural space and views, concentrated on the most geotechnically stable land and with strong connections to the rest of MR873 seems most appropriate.

**Tuahiwi Village**
Developing the existing residential land under existing rules, allows for a near doubling of the number of village households. This has benefits and a manageable impact on the landscape character, but would benefit from some design guideline control.

The preferable approach would be to initiate a Comprehensive Development Approach to achieve the best long term structure, creating the best community outcomes and retaining and building on the existing attributes. This also corresponds to the easiest areas in which to extend public reticulated services.

**Rural Zone**
Increasing the number of rural residences whether above or below the 4 hectare threshold has disadvantages in terms of servicing and landscape character. Limiting rural development to a 4 hectare minimum and providing design guideline control would help the landscape issues but not the servicing.

A more efficient and appropriate form of development would be create groups or clusters of development following a Comprehensive Development Approach with a character and layout that recognise the existing attributes and specific issues of MR873.

The logical area for this would be along the Tuahiwi Road ridge north of the village, where there are more stable geotechnical conditions, easy access to public reticulated services and in a landscape more able to absorb further development.
Appendix ii

Consultation Flyers
Development Within
Kaiapoi Maori Reserve 873

Your Views on the Options

The Waimakariri District Council wants to address the rights and duties arising from the Canterbury Purchase (Kemp’s Deed - 1848) and the Crown Grant that established Kaiapoi Maori Reserve 873.

The Council has also resolved to change its District Plan and to undertake public consultation on issues and options for development.

Five possible forms of development have been identified which would provide additional housing within the reserve. Any one or any combination of these could be a possibility.

We want your feedback on the options

Option 1 – Development Adjacent to Woodend (WW6)

- Area identified for possible residential development in Canterbury Regional Policy Statement.
- Adjacent to Woodend water and sewer systems, relatively low flood and geotechnical risk.
- Separated from Tuahiwi.
- Design challenge for housing to be seen as part of Tuahiwi/MR873 and not just an urban extension of Woodend.
- Groups of houses with comprehensive design, setback from Rangiora Woodend Road, co-ordinated landscaping and planting may be possible from development.

Option 2 and 3 – Tuahiwi Consolidation and Expansion

- Limited opportunity for more houses in the existing village (Res 3 zone) unless minimum lot size is reduced.
- Tuahiwi is located on a gentle stony ridge through the centre of MR873. Physical constraints (flooding, geotechnical) and landscape character would accommodate a much larger village area.
- Improvements to sewer and water supply are currently underway with capacity to supply up to 150 additional houses.
- Design controls may be needed to avoid loss of ‘village’ landscape character and maintain connections to the rural area.
- Further development will include opportunities to improve pedestrian and cycleway links, open space and public amenities within an expanded village, with a comprehensive design and integrated development rather than each site being developed separately.
Option 4 – Housing Clusters
(including Kainga-Nohoanga and Papakainga Housing)

- Groups of houses with common features within a rural or semi-rural environment.
- Connection to public water supply and sewerage will be important.
- Will need to be designed to be compatible with the MR873 landscaper pattern.
- Protection of the environment, landscape character and the protection and enhancement of surface waterways will require comprehensive design.
- The ridge line along Tuahiwi Road is likely to be the most favourable, with few constraints and reasonable access to services.
- Will involve a District Plan Change or resource consent under the RM Act.
- Could occur on Maori Land or land in general title.

Option 5 – Individual Houses on Rural Sites

- Limited to descendants of the original owners under the Crown Grant of 1862.
- Would involve high standards of servicing to protect the environment.
- If there is a significant number of individual houses on rural lots this could affect the landscape character of MR873 which is based on individual or groups of houses near rural road frontages and separated by open paddocks.

Where to from here?

Once you have read the information in this pamphlet we would like you to take the opportunity to send your views to the Council. Your comments will help the Council to decide how to manage development of MR873.

We are happy to receive your comments up until Friday 17 May 2013.

We’ve prepared a background report which provides some of the details and discussion issues. We’ve also brought together other material which could provide further useful information. A summary report and other supporting material are available from all Council Service Centres and libraries (Rangiora, Kaiapoi and Oxford), the Runanga office at Tuahiwi and you can also download them from the Council website waimakariri.govt.nz.

The feedback we get from you will help to determine proposed District Plan changes. Those changes will then be put out for public consultation before any changes to the District Plan are confirmed.

Workshop / Information Session

There will be opportunities for further discussion and input.

We will be holding information drop-in sessions as follows:

- Tuesday 16th April from 2.30pm – 7.30pm Tuahiwi Marae
- Wednesday 24th April from 2.30pm – 7.30pm Woodend Community Centre
- Tuesday 30th April from 2.30pm – 7.30pm Tuahiwi School

Council staff are happy to discuss the options with individuals and community groups. Please join us.
Development Within Kaiapoi Maori Reserve 873

The Waimakariri District Council is initiating a change to the District Plan to facilitate residential development within Kaiapoi Maori Reserve 873 for descendants of the original grantees from the Canterbury Purchase (Kemps Deed – 1848) and the Crown Grant Act.

The Council carried out public consultation in April this year on five development options for the Kaiapoi Maori Reserve 873.

The Council will undertake further public consultation in November this year on development proposals that fit the requirements of the draft Land Use Recovery Plan.

**Development proposals**
- Extension of Tuahiwi Village Residential 3 Zone
- Kainga Nohoanga (rural zone housing cluster development)

**Your feedback needed on**
- The Draft Outline Development Plan for MR873
- The proposed areas identified for the extension of the Tuahiwi Village Residential 3 Zone
- The draft provisions to manage Kainga Nohoanga

**Proposed extension of the Tuahiwi Village Residential 3 zone**
- Proposed village extension areas as shown on draft Outline Development Plan
- Village area not restricted to descendants of original grantees
- Flexibility to allow for convenience retail within the existing village area.

**The draft provisions to enable rural zone cluster housing development**
- Development can only be undertaken by people who can demonstrate bona fide descendency of an original grantee
- Minimum site size 5000m²
- Between 3 and 7 houses in a Kainga Nohoanga development
- 20% of a site to be taken up with houses and associated buildings such as garages, the 80% balance to be held in common for the residents for rural activities
- A Kainga Nohoanga development plan is required to be submitted for approval
- Kainga Nohoanga developments to have access to public reticulated wastewater and water scheme at the expense of those undertaking the cluster development.

Not to scale – for a detailed map see waimakariri.govt.nz

**Sample layout Kainga Nohoanga**
(rural zone housing cluster development)
Draft outline development plan for Kaiapoi Maori Reserve 873

Key features of the Outline Development Plan:

- Protection of the views from the Tuahiwi Marae to Maungatere/Mt Grey and Nga Tiritiri o te Moana/Southern Alps
- Identification of high risk flood hazard areas to safeguard future development
- Continued separation between the reserve and the Woodend township.

Where to from here?

We'd like to hear your views. More detailed information and submission forms are available from all Council Service Centres and libraries (Rangiata, Kaiapoi and Oxford), the Runanga office at Tuahiwi and the Council website waimakariri.govt.nz.

Your feedback will inform the Council’s Plan Change proposal, which will then be put out for formal public consultation before any changes to the District Plan are made.

The existing provisions under the District Plan still apply to non-descendants who live in the Kaiapoi Maori Reserve 873.

There will be opportunities for further discussion and input.

Hui:

Tuahiwi Marae, 11 November 2013, 7pm start, with presentation at 7.30pm

Drop-in sessions:

Tuahiwi Marae, 19 November 2013, 3.30-5pm and 6-7.30pm

Woodend Community Centre, 21 November 2013, 3.30-5pm and 6-7.30pm

Tuahiwi School, 27 November 2013, 3.30-5pm and 6-7.30pm

Please send your submission to:

Waimakariri District Council, Private Bag 1005, Rangiata, or email records@wmk.govt.nz

Submissions close: 5.00pm, Fri 6 December, 2013

Questions?

Please contact Tammy McMahon, on (03) 311 8900, email tammy.mcmahon@wmk.govt.nz
The Land Use Recovery Plan (LURP) directs the Waimakariri District Council to make changes to its District Plan. Some of these changes have already occurred – others are to be developed where necessary by Council.

**Action 12:** Enable a range of community facilities within key activity centres. Changes to the District Plan are not required to achieve this action.

**Action 21:** Provide methods to give effect to the objectives and policies for Māori Reserve 873 and changes to recognise and provide for the relationship of Ngāti Tahua whānui with other Māori reserves. Extend the Tukutahi Village Residential 3 Zone to the north and east and protect views to Maungatape (Mount Grey) and Rā Te Huna (Te Moana, Southern Alps) from the Marine.

Enable development for owners of land in the Rural Zone of Māori Reserve 873 who are descendants of an original grantee of land within the reserve, provided the land can be connected to reticulated water and sewer and is outside a high risk flood area.

Changes are not proposed for other Māori reserves.

**Action 26/28 Key Activity centres and Comprehensive Redevelopment Plans:** Key Activity Centres for Rangiora and Kaiapoi have been defined. A Key Activity Centre has not been defined for Woodend / Pegsau. A comprehensive precinct-based redevelopment plan has been prepared for land north of High Street within the Rangiora town centre.

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Please insert:

Northern Outlook – WDC Community Noticeboard – Saturday 20 September 2014

Page 2 Priority

Order No: 44249

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WRITE/EMAIL YOUR COMMENTS BY 17 OCTOBER 2014 TO:

- 'Action 12 Comment', 'Action 21 Comment'
- Or 'Action 26/28 Comment'
- Waimakariri District Council
- Private Bag 1005, Rangiora 7440
- Email: planning@wmk.govt.nz

For further information call the Council Planning Unit on 03 311 8900
Appendix iii

Further Information Report and Associated Appendices
Maori Reserve 873

Further Information Report

February 2015
1.0 Executive summary

Maori Reserve 873 (MR 873) is a reserve set aside in 1848 under Kemp’s Deed for Ngāi Tahu grantees and their descendants to live upon as a ‘kainga nohoanga’ or ‘settlement’. MR 873 is 1068 hectares, with Woodend along its northeast boundary and the Cam (Ruataniwha) River as its western boundary. It comprises varied rural farmland with the small Tuahiwi Village at its centre.

Since its establishment MR 873 has been subject to various laws and regulations. Since the 1960’s these regulations have largely restricted the ability of descendants of the original grantees to build dwellings on land originally set aside for them under Kemp’s Deed. The Waimakariri District Council has recognised that the current planning provisions do not provide for the descendants of the original grantees to use the land for the purpose it was intended and have therefore sought to review the provisions to better enable this. This review is also required under Action 21 of the Land Use Recovery Plan.

The Council has undertaken three public rounds of consultation on proposed planning provisions for the Rural-zoned areas and Tuahiwi Village. The number of comments received at each of the three formal consultation exercises is considered to be relatively low. There have been recurring mixed views on:

- The restriction of rights to descendants;
- The requirement to connect to reticulated services;
- The protection of rural outlook and amenity;
- The appropriateness of cluster housing in rural areas; and
- The location and extent of any village extension.

There have been a number of supporting reports prepared to guide decision making and inform the local community. These reports cover such things as servicing, cluster housing developments, landscape matters, archaeological and geotechnical matters, site contamination, an assessment of the proposal against the relevant Iwi Management Plan, tenure options and unit title information.

The planning provisions proposed as part of the proposed Plan change must variously give effect to and not be inconsistent with higher order planning documents and provisions. These comprise the Canterbury Regional Policy Statement, the Land Use Recovery Plan and the existing relevant objectives and policies within the Waimakariri District Plan. As such, the scope and outcomes of what the provisions must cover and deliver is already largely established and comprises the following:

- Enable Kemps Deed and provide for the descendants of original grantees
- Provide a range of housing options, densities and allotment sizes
- Ensure a compact contained village defined by natural / built features and landscape and implementing an Outline Development Plan
- Enable a mixed-use centre
- Connect to reticulated services
• Avoid natural hazards
• Maintain rural outlook and setting in the Village, and in the Rural-zoned area, maintain the rural environment and amenity, recognising different rural character
• Enhance / protect The Cam River and historic streams
• Protect the views to Maungatere and Ngā Tiritiri o te Moana
• In the rural areas, require a comprehensive design for the whole site
• Enable cluster housing with a rural outlook, at densities greater or less than 1 dwelling per 5000m² – 10,000m²

The Plan provisions proposed by the Waimakariri District Council generally cover and achieve the above outcomes.

Guidance on the application of the rural zone cluster rules through a resource consent is provided. Information required to be submitted with an application must include a development plan, proof of descendancy and a statement on how the proposal will address the Plan’s reticulated servicing requirements. The Council will assess the application, including considering a number of matters as set out in the relevant rule. Approved developments have ten years to complete the development. Further resource consents can be sought to extend the timeframe. If subdivision is being proposed, the required unit tile documentation must be prepared.

2.0 Introduction

This report seeks to outline: the background to the Maori Reserve 873 (MR 873) plan review project; the existing planning framework; the supporting documentation; the consultation undertaken and responses; and proposed plan provisions for the proposed Plan Change to the Waimakariri District Plan. The intention is that this report will support engagement with and inform the community and Waimakariri District Council decision making.

3.0 Maori Reserve 873 - Background

3.1 Maori Reserve 873 and Kemps Deed

In 1848 Governor Grey sent land commissioner Henry Kemp to the South Island to buy land for the new settlement. Sixteen Ngāi Tahu chiefs signed the Deed of Purchase between Ngai Tahu and the Crown in Akaroa on 12 June 1848. This purchase is known as ‘The Canterbury Purchase’ or more commonly ‘Kemp’s Deed’.

A common feature of this Deed was for the Crown to set aside lands for Ngai Tahu to reside upon. In the Canterbury Deed of Purchase it was stated:

Ko o matou kainga nohoanga ko a matou mahinga kai,
me waiho marie mo matou, mo a matou tamariki, mo muri iho i a matou;
Our places of residence and our cultivations are to be reserved for us and our children after us.

As a consequence MR 873 was set aside in 1848 for Ngāi Tahu to live upon as a ‘kainga nohoanga’ or ‘settlement’. MR 873 measures 1068 hectares, with Woodend along its northeast boundary and the Cam (Ruataniwha) River as its western boundary. It comprises varied farmland with Tuahiwi Village at its centre. The extent of MR 873 is shown in Figure 1.

Figure 1 – MR 873 site location

By 1860 the Ngai Tū-āhu-rihi Runanga petitioned Governor Gore-Browne for the right of the people to subdivide and individualise title:
"The voice of all the people is that our land Reserves be subdivided, so that each may have their own portion. We ask you to give to each man a title in writing to his own allotment"

The expectation from the Kaiapoi Ngai Tahu was that land upon the Reserve was to be alienable only to Maori. From 1848 to the 1960s, tribal members of the local hapu, Ngāi Tū-āhu-riki were free to sub-divide and build upon their land. From 1968 through to the present MR 873 has been subjected to various zoning regulations from the local councils. Further detail on the plan provisions is contained in Section 3 of this report.

The significance of Kemp’s Deed has been formally recognised by the Waimakariri District Council. The Council accepted the advice provided in a legal opinion from Ian Hall in a Council meeting held 1 November, 2012:

“...that the rights of the owners of Kaiapoi Māori Reserve 873 as stemming from Kemps Deed 1848 and recognised by the Crown Grants Act (No 2) 1862 as a “ceding in good faith” still exists and should have been affirmed by the Council, and that the ongoing rights should have been recognised and accepted by the Council in the zoning of Kaiapoi Māori Reserve 873, and in its administration of other legislation.” (Accent added)

It has been established¹ that any development rights within MR 873 to give effect to Kemps Deed are held by the descendants of the original grantees of Kemps Deed. As such, they are not available to non-descendants.

3.2 Giving Effect to Kemps Deed: The Need for a Plan Change

Since its establishment MR 873 has been subject to various laws and regulations. Since the 1960’s these regulations have restricted the ability of descendants of the original grantees to build dwellings on land originally set aside for them under Kemp’s Deed. It has been argued that these restrictions have forced tribal members to relocate to urban areas, contributed to the alienation of the land and resulted in the breakdown of the Tuahiwi community in both its social and cultural makeup.

Of note, under the Rangiora District Scheme, the precursor to the current operative District Plan, the reserve was zoned “Rural D” (from 1980 to 2005). The Rural D Zone enabled people who could demonstrate that they were descendants of original grantees to build houses and/or subdivide land in circumstances not available to other applicant. This was however subject to limiting conditions around the provision and disposal of water, flooding and access. Importantly, the Rural D provisions only allowed one permit to be issued to any person and any proposed partition (by the Maori land Court) was not be less than 1.0 ha.

¹ Established by legal advice and set out in the LURP and Waimakariri District Plan. This was also affirmed at the Waimakariri District Council meeting held 1 November 2011 and the Hearings Panel decisions in July 2013.
The Rural D provisions were not carried through into the operative District Plan. The Plan recognises the historical significance of the reserve in its Objectives and Policies, but does not make provision for the special circumstances of the descendants. In particular, the area zoned Rural in MR 873 within the District Plan requires a minimum size lot to be four hectares before a dwelling can be established. This rule applies to both descendants and non-descendants.

As such, it is arguable that the current relevant planning provisions (and to a lesser extent the previous planning provisions) do not provide for the use of MR 873 as originally intended by Kemps Deed. Various consultation exercises on the topic have demonstrated that these restrictions have been a significant frustration for Māori land owners within the reserve.

The District Council recognised that the current planning provisions do not provide for the descendants of the original grantees to use the land for the purpose it was intended and have therefore sought to review the provisions to better enable this. This is set out in the decision by the Waimakariri District Council Resource Management and Regulation Committee (on 20th November 2012), where the Committee agreed:

"to undertake consultation on issues and options for development, and related District Plan Changes, to enable the land in the Kaiapoi Maori Reserve 873 to be used as intended by Kemps Deed of 1848 and the Crown Grants Act (No 2) of 1862."

In late 2013 the Land Use Recovery Plan changed the Waimakariri District Plan to include objectives and policies for MR 873, as set out in Appendix 3 (Amendment 2) of the LURP (see Section 4 of this report). The Plan also directed, under Action 21, that the Waimakariri District Council amend its district plan to the extent necessary to: (i) provide methods to give effect to objectives and policies for MR 873 as set out in Appendix 3 (of the LURP).

3.3 Project Partners

Under the Resource Management Act the Council is required to work with Ngai Tahu as the Iwi Authority for the District. Ngai Tahu has requested that the Council work with Ngai Tuahuriri Runanga directly on this matter as Ngai Tuahuriri is the Runanga with mana whenua over MR 873. The Runanga has in turn formally requested that the Council work with Te Mana-Waitaha Charitable Trust.

The Mana-Waitaha Charitable Trust is a Māori organisation that is committed to advancing whānau in the Waitaha/Canterbury region. The Trust utilises the networks and skills of its Trustees and willing helpers to promote, empower and advance Māori whānau. It follows the mission of its ancestor and tōhunga Waruwarutu based on aroha ki te tangata - love towards others.

As this is a recovery project under the LURP, the Council has also been working with its recovery partners to progress this proposed plan change. The recovery partners are: the Canterbury Earthquake Recovery Authority; the Christchurch City Council; the Selwyn District Council; Environment Canterbury; the New Zealand Transport Authority; and Ngai Tahu.
3.4 Overview of the Project to Date

A significant amount of background work and consultation has been undertaken on this matter to date by the Council, in consultation with its project partners. These are set out below.

3.4.1 Consultation

The Council has undertaken a significant amount of consultation on this matter. This has been both informal, such as through meetings and discussions with its project partners, and formal, such as through receiving public comments on development issues and options and proposed plan provisions. The formal consultation undertaken is set out in more detail below and in the Consultation section (Section 5), where the consultation responses are assessed.

- Issues and Options Consultation - 28 March to 17 May 2013
  From 28 March to 17 May 2013 formal consultation was undertaken on a Development Options Assessment report (see the reports cover in figure 2) which identified five potential options that represent different forms of development. These comprised: (1) development adjacent to Woodend; (2) Tuahiwi consolidation; (3) Extend Tuahiwi Residential 3 zone; (4) support Kainga-Nohoanga Cluster Housing; and (5) provide for individual houses on Rural zoned sites.

The consultation included three information sessions held at Tuahiwi Marae, Woodend Community Centre and Tuahiwi School.

*Figure 2: The issues and options assessment report cover*
• Draft Outline Development Plan and Rule Framework Consultation - November and December 2013

On the basis of the comments received from the Issues and Options consultation Council staff drafted an Outline Development Plan (ODP) and rule framework and sought further comment from stakeholders. Consultation was undertaken in November and December 2013.

**Figure 3: Draft ODP and rule framework consultation flyer**

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• Notification of Amended Proposals - 27th September to 17th October 2014

On the basis of comments received, Council staff made a number of amendments including: amending the proposed village expansion area; amending the view shaft provisions; removing the proposed setback buffer along Rangiora Woodend Road; and commissioned reports to support the proposal (e.g. a desktop archaeological assessment, an assessment of the proposed plan change against the Iwi Management Plan; a landscape assessment). The consultation occurred from September to October 2014.

• Ongoing consultation with stakeholders – October 2014 to February 2015

Since the amended proposal consultation closed the Council has undertaken informal discussions with its recovery partners, Te Mana Waikato Trust and Tuahinui Village landowners. These discussions have further informed the proposed plan change provisions, the location of the proposed Village extension and the ODP.
2.4.2 Supporting reports

The Council has commissioned and prepared a number of reports to inform the topic and guide their decision making. Where appropriate these are included in the Appendices to this report. Where they are large or specialist in nature they are identified in Appendix 5 and are available on the Council’s website and can be requested from the Council. The reports cover such topics as: servicing; flooding; village and cluster development options; geotechnical matters, archaeological matters; cultural matters; tenure options and unit title background information.

3.5 Characteristics of MR 873

The supporting reports describe various characteristics of MR 873. Key general points of note from these reports are reproduced below.

3.5.1 Landscape

MR 873 is on the lower edge of the outwash fan to the Ashley River, involving a pair of gentle stony ridges formed by the Ashley flood paths, with broad boggy swales from the silts shed either side. MR 873 is predominantly rural in character, encircling a small core of village development zoned Residential 3 (Tuahiwi Village).

Elsewhere houses are scattered and grouped in the Rural-zoned land, particularly alongside roads on the higher well drained ridges such as the central Tuahiwi Road. This grouping along ridge roads means much of MR 873 is open, pastoral land. The open areas have particular character and amenity that is enjoyed in over-view from roads and surrounding houses. The pasture, crop and horticultural activity evident on the more open rural lands contribute importantly to rural character and amenity. Views out north beyond to Maungatere (Mt Grey) are variously visible from throughout MR 873.

Whilst MR 873 has been closely sub-divided for more than 130 years, with further subsequent subdivision many lots have not been built on and the fine-grained cadastral pattern is only partially evident in the landscape.

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2 Lucas Associates Landscape Architects (March 2013): The Landscape of Tuahiwi and Kaiapoi Maori Reserve 873.
3 Ibid
4 Ibid
5 Ibid
3.5.2 Water supply

A new water supply was installed in Tuahiwi in 2013 (extended from Woodend) and now provides an on-demand supply to the Residential 3 village and a restricted supply (2,000 litres per day) to parts of the surrounding rural area where there was sufficient interest from the community to fund the extension. Approximately 50% of the properties in the Residential 3 zoned area have physically connected to the supply.

The water supply was principally funded by the existing Tuahiwi community, with the Council carrying approximately 50% of the cost to be recovered by way of Development Contributions from future property owners. Further approximate costings are set out in the servicing issues report contained in Appendix 3.

In terms of capacity to cater for growth, a large diameter trunk main has been installed through the village from Tuahiwi and has ample capacity for future growth to service both development within the village and expansion into the rural area. However, the exact capacity to accommodate a specific development in the rural area cannot be determined until the nature and location of that development is known. This is largely because the capacity of the rural pipelines is at its greatest when close to the main trunk pipeline in the Tuahiwi village.
The Council's current policy on service extensions requires that extensions to the water and wastewater services are extended at the developer's expense. In the case of MR 873, this would mean that when cluster housing is developed, water and sewer reticulated services will be extended to each cluster at the expense of the cluster developer. There are occasions where the Council would contribute a portion of the cost of extending services and recover those costs through Development Contributions. This would require that there was a clear benefit to the wider ratepayer and that a clear and realistic opportunity existed to recover those costs typically within a one to five year timeframe. It is possible but unlikely that this would occur with cluster housing in the rural area of MR 873.

3.5.3 Wastewater

Reticulated wastewater is currently provided to the Residential 3 zoned properties within the Tuahiwi village by way of a Septic Tank Effluent Pump (STEP) system. This type of system comprises a privately owned on-site septic tank and pump system that collects wastewater and provides primary treatment on-site. The treated effluent is then pumped into a Council owned pressure pipe system. A conventional gravity sewer system was not feasible for Tuahiwi due to the sparsely populated area and the high cost of installing the gravity mains.

The pressurised reticulated system in Tuahiwi extends along Tuahiwi Road from the corner of Bramleys Road to Turiwhaia Road. A pump station at the corner of Turiwhaia Road and Tuahiwi Road then pumps the effluent along Turiwhaia Road to the reticulation in Woodend. A plan of the area currently serviced by the wastewater system is shown in the servicing issues report contained in Appendix 3.

Many of the privately owned septic tanks within Tuahiwi are not adequately sealed and as a result of this groundwater enters the sewer system during periods of high rainfall and high groundwater table. This has resulted in the wastewater system becoming overloaded at times of very high rainfall, resulting in some properties being unable to pump into the wastewater systems. Some comments from the submitters make reference to concerns over the capacity of the wastewater system to cater for growth.

In terms of capacity to cater for growth, upgrades to the sewer reticulation were undertaken at the same time as the water supply was installed for Tuahiwi. This upgrade was intended to increase the capacity of the Tuahiwi sewer system and make provision for an additional 160 lots between Bramleys Road and Turiwhaia Road.

However, it is important to note that the true additional capacity will be dependent on the location of the development. While the wastewater reticulation has been upgraded to cater for an additional 160 lots, the capacity would be less if all lots were located closer to Bramleys Road and would be more if all lots were located closer to Turiwhaia Road.

It is expected that an upgrade to the Turiwhaia Road pump station will be required at some time in the future, but this will be undertaken as required and need not represent a significant impediment to growth in the Tuahiwi area.

The Council's current policy on service extensions, as described for potable water supply, also applies to wastewater.
3.5.4 Stormwater drainage

The existing stormwater drainage system in Tuahiwi is largely based on a network of open drains, which are managed and maintained by the Council or the riparian landowner. The principal drain in the area is Maori Drain, which discharges to the Cam River. There is evidence of some springs within MR 873 and soakage to ground is poor and limited by silty loam soils, which prevents discharge to ground as an effective stormwater disposal method.

In terms of managing stormwater in any new Residential 3 zoned areas, stormwater will be treated and attenuated in stormwater management areas prior to discharge to the downstream receiving environment. It is expected that stormwater from most development areas would be serviced by way of grassed swales to provide treatment and attenuation ponds prior to discharging into the existing drainage system. In terms of managing stormwater in any new rural cluster development, each development will need to manage stormwater onsite to achieve stormwater neutrality.

Further stormwater detail is contained in the Servicing Report in Appendix 3.

3.5.5 Flood hazards

Much of MR 873 is subject to various levels of flooding. This is both from breakout flooding from the Ashley River and also from localised flooding from the upstream catchment. The work undertaken by Environment Canterbury in 2008 shows that the southern and western part of MR 873 is prone to high hazard flooding in the 1 in 200 year event (see the Servicing Report in Appendix 3), which is not suitable for habitable dwellings. The village area is not prone to breakout flooding from the Ashley River.

3.5.6 Historic and anticipated development demand within Tuahiwi village

A Council report indicates that existing development and development pressure within Tuahiwi Village is low. The report notes that there are currently 14 vacant sites and that the majority of sites are over 1600m² in area. As such, very few have taken the opportunity provided by the relevant Plan provisions to subdivide into two lots. This could be attributed to:

a) preference to have a larger lot, with no desire to develop;
b) expense of subdividing, and lack of sewer and water reticulation to date;
c) some lots are in multiple ownership which makes it difficult get agreement; or
d) lack of demand generally.

While development demand appears to be low, with the availability of sewer and water reticulation, and the desire for Maori to return to MR 873 following the earthquakes this demand may change. It is noted that it is prudent to provide for some expansion opportunities as part of any plan changes for MR 873. This is anticipated in the planning policy framework (see Section 4.0 of this report) and was the subject of consultation with the community (see Section 5.0 of this report).

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5 Council Report (8th October 2013): Public consultation of draft Outline Development Plan and provisions to enable Maori Reserve 873 development
4.0 The Planning Framework for the Proposed MR 873 Plan Change

The Resource Management Act establishes a hierarchy of planning instruments and how these are to be considered by the Council when it prepares plan changes such as MR 873 and makes decisions on resource consents in the reserve. Notably, any plan change must:

- Not be inconsistent with any relevant Earthquake Recovery Plan
- Give effect to the Canterbury Regional Policy Statement 2013 (RPS)

In addition, the Act sets out an internal ‘hierarchy’ within plans. As such, any proposed rules within the Waimakariri District Plan must give effect to the Plan’s objectives and policies. The relevant policy statements and plans are considered below, along with a brief assessment of how Maori Reserves are provided for within other district plans.

4.1 Land Use Recovery Plan

The Land Use Recovery Plan (LURP) is a Plan that provides direction for residential and business land use development to support recovery and rebuilding across metropolitan greater Christchurch in the next 10-15 years. The Plan identifies critical actions required in the short and medium term to coordinate and advance decision making about land use.

Clause 4.2.3 (page 26) refers to new housing on Maori reserves. This clause states that:

“Enabling Ngai Tahu whanau impacted by the earthquakes to build new homes on Maori reserves in metropolitan greater Christchurch addresses a specific recovery need. It also helps realise the original intent of the Maori reserves to protect and provide for enduring tūrangawaewae.

Chapter 5 of the Canterbury Regional Policy Statement already provides for tangata whenua with mana whenua to undertake papakainga, marae and ancillary activities on ancestral land. In addition, it requires city and district councils to set out objectives and policies in their district plans to implement this policy.

The Land Use Recovery Plan requires Christchurch City and Waimakariri District Councils to give effect to this policy within the metropolitan greater Christchurch area to enable appropriate subdivision and use of whanau land and provide affordable housing options for Ngai Tahu whanau. These actions will assist social, cultural and economic recovery and will enable the expression of mana whenua and tino rangatiratanga.”

The LURP also contains changes directed to be made within a fortnight of gazettal of the LURP to the RPS (a new Chapter 6 for Greater Christchurch) and the Waimakariri District Plan (provisions for Maori Reserves). These changes were contained in Appendices 1 and 3 of the LURP and directed in Actions 44 and 20 respectively. Chapter 5 and the changes made to the RPS by the LURP are considered at section 4.2 of this report. The changes made to the Waimakariri District Plan by the LURP are considered at section 4.3 of this report.
In addition to the above, and of critical significance to this project is LURP Action 21. Under this Action the Council is directed to amend its district plan to the extent necessary to provide methods to give effect to objectives and policies for MR 873, as set out in Appendix 3 (of the LURP). This proposed plan change for MR 873 is the Council’s response to this Action.

4.2 Canterbury Regional Policy Statement 2013

Chapter 5 and Chapter 6 contain provisions that directly reference development on Maori reserves. These are considered in turn below.

4.2.1 Chapter 5 Land-use and infrastructure

Chapter 5 of the RPS sets out planning provisions for land-use and infrastructure. Objective 5.2.1 (h) states that development is to be located and designed so that it functions in a way that facilitates the establishment of papakainga and marae. Policy 5.3.4 – Papakainga housing and marae is significant and is therefore reproduced in full below.

“Policy 5.3.4 – Papakainga housing and marae (Entire Region)
To recognise that the following activities, when undertaken by tangata whenua with mana whenu, are appropriate when they occur on their ancestral land in a manner that enhances their ongoing relationship and culture and traditions with that land:
(1) papakainga housing;
(2) marae; and
(3) ancillary activities associated with the above
And provide for these activities if:
(4) adverse effects on the health and safety of people are avoided or mitigated; and
(5) as a result of the location, design, landscaping and management of the papakainga housing and marae:
(a) adverse effects on the following are avoided, and if not practicable, mitigated:
(i) the important natural character values of coastal environment, wetlands lakes, rivers and their margins
(ii) the values of the outstanding natural features and landscapes
(iii) the value of the historic heritage, and
(iv) the values of areas of significant indigenous vegetation and habitats of indigenous fauna and
(b) regard has been given to amenity values of the surrounding environment.”

These provisions clearly anticipate that district plans shall provide for papakainga housing and marae on ancestral land where identified adverse effects are appropriately managed.

4.2.2 Chapter 6 Recovery and Rebuilding of Greater Christchurch

Papakainga is defined in the RPS as: “a form of housing development which occurs on multiply-owned Maori or ancestral land. Traditionally, the literal meaning of papakainga housing is, ‘a nurturing place to return to’.
Chapter 6 of the RPS sets out the planning framework for the recovery and rebuilding of Greater Christchurch. Any plan change to the Waimakariri District Plan must give effect to or implement these provisions. The relevant provisions are analysed in turn below.

4.2.2.1 Objective 6.2.1 Recovery framework

This objective carefully manages greenfield development through the recovery period by, among other things, setting out mapped greenfield priority areas where future residential development can occur. MR 873 is not mapped as a greenfield priority area and as such, the RPS does not anticipate that this area will be developed for residential purposes in the same way as the mapped priority areas. However, Clause 12 of Objective 6.2.1 requires that the land use and infrastructure framework for recovery rebuilding and development “provides for development opportunities on Maori Reserves in Greater Christchurch”.

Other clauses of relevance to MR 873 in Objective 12 include: Clause 5 which seeks the protection and enhancement of indigenous biodiversity and public spaces; Clause 6 which seeks the maintenance or improvement of surface and groundwater quality; Clause 7 which seeks the maintenance of the character and amenity of rural areas and settlements; and Clause 8 which seeks the protection of people from an unacceptable natural hazard risk.

Clearly therefore, while MR 873 is not a greenfield priority area, the RPS does anticipate that development opportunities will exist in MR 873, subject to meeting other relevant specified outcomes.

4.2.2.2 Objective 6.2.2 Urban form and settlement pattern

In addition to setting out greenfield priority areas, the RPS also provides for consolidation and intensification in Objective 6.2.2 to meet the anticipated growth needs of Greater Christchurch through the recovery period. Importantly this objective contains listed intensification targets to achieve and identifies locations where intensification should be directed. It also seeks to manage rural residential development outside of existing urban and priority areas.

Notably, Clause 7 specifically seeks to provide “for development opportunities on Maori Reserves”. The principal reasons and explanation states that:

“Following the earthquakes and the subsequent damage and red zoning of properties, a number of Maori have sought to return to and live on the Maori Reserves set aside by the Crown in the 19th century for the then present and future needs of local Ngai Tahu. Providing for development opportunities on those reserves will enable the descendants of the original grantees to return and realise the original intent of those reserves.”

Clearly this objective, like Objective 6.1.1, anticipates that development opportunities will exist in MR 873. However, this objective and its supporting explanation suggests these opportunities will be limited in number and will be limited to descendants of the original grantees.
4.2.2.3 **Objective 6.2.3 Sustainability**

This objective seeks recovery and rebuilding in Greater Christchurch that, among other things, provides a range of densities and uses, is healthy and environmentally sustainable and retains values of importance to Tangata Whenua.

4.2.2.4 **Objective 6.2.4 Integration of transport infrastructure and land use**

This objective seeks to maximise the integration of the priority areas and new settlement patterns with transport infrastructure. It seeks, among other things, to: reduce dependency on private motor vehicles; promote the use of active and public transport and optimise the use of the existing capacity within the network.

This objective does not specifically reference Maori Reserves, however, it is clear that ad hoc high density residential development that is outside of identified growth areas and which relies on private vehicles is not anticipated by this objective. Rather, development in MR 873 should be carefully considered, with lower densities provided for and / or further residential development located within or adjacent to the existing Tuahiwi village area. Unplanned growth without corresponding infrastructure upgrades is not supported.

4.2.2.5 **Policy 6.3.5 Infrastructure and Policy 6.3.7 Residential**

Of particular relevance to the managed purposeful approach to growth in Chapter 6 during the recovery period is Policy 6.3.5 – Integration of land use and infrastructure. This policy reinforces and implements Objective 6.2.4 by seeking to ensure that new development (e.g residential) is coordinated with the development of infrastructure in order to: optimise the efficient and affordable provision of both the development and infrastructure, ensure new development does not occur until the provision for infrastructure is in place, and maintain or enhance the operational effectiveness of existing and planned infrastructure. This policy works in tandem with Policy 6.3.7 residential location, yield and intensification which sets out where residential development is to occur and sets density targets. Through Policy 6.3.7 infrastructure location, capacity, and timing can be planned.

It is considered that ad hoc wide scale high density development within MR 873 that is divorced from planned infrastructure development would not be consistent with these policies.

4.2.2.6 **Policy 6.3.9 - Rural residential development**

This policy sets out where and how rural residential development is to occur in greater Christchurch. Notably, in the Waimakariri district rural residential development can only be provided for by the Council in accordance with an adopted rural residential development strategy prepared in accordance with the Local Government Act 2002 (LGA).

Rural residential development is defined in the RPS as: "residential units outside the identified Greenfield Priority Areas at an average density of between 1 and 2 households per hectare."
Given the policy and the definition of rural residential it is clear that development at this density, i.e. one dwelling per 5000m\(^2\) to 10,000m\(^2\) is not provided for in MR 873 unless set out in a rural residential development strategy adopted under the LGA. The LURP did not anticipate this process for Action 21 and this has not been proposed by the Council.

It is noted that a Rural Residential Development Plan was completed in June 2010 for the Waimakariri District. It is understood that community views canvassed in 2009 and 2010 on this matter indicated that rural residential development was not a preferred option for MR 873.

4.2.2.7 Policy 6.3.10 – Maori reserves

Of direct relevance to MR 873 is Policy 6.3.10. This policy is reproduced in full below.

```
Policy 6.3.10 – Maori Reserves
Recognise and provide for the relationship of local Ngai Tahu with their ancestral lands, waters, wahi tapu and taonga by enabling Maori Reserves within the Greater Christchurch area to be developed and used for their intended purposes for which they were originally reserved, taking into account the following matters where relevant:
(a) flooding, inundation and other natural hazards;
(b) rural amenity and outlook;
(c) compact urban form;
(d) range of housing options
(e) provision of appropriately sized local / commercial centres;
(f) any outline development plans; and
(g) a range of lot sizes and densities.”
```

The principal explanation and reason to this policy is reproduced in full below.

```
Principal reasons and explanation
The earthquakes and the subsequent damage and red zoning of properties in Waimakariri District and Christchurch City has led to a number of Maori seeking opportunities to return to ancestral lands, including land at Maori Reserve 873 (Tuahiwai) and Maori Reserve 875 (Rapaki). This policy recognises the original intent of the land purchase deeds of the 19th century to provide for the present and future needs of local Ngai Tahu landowners and their descendants.

It is important that any development of Maori Reserves is enabled in a way that meets the needs of Maori and other residents, whilst protecting natural and physical resources through maintaining and enhancing the environmental qualities and rural amenity of the area.

Maori Reserves in Greater Christchurch have not been identified as priority areas, nor as rural residential as development of this land is seen as something that will likely take a more dense form in certain areas and this could result in a more closely settled development pattern. However, it is considered important that any development is of a size and scale appropriate for the surroundings and that rural amenity and outlook is maintained. For these reasons it is considered important that
an Outline Development Plan is prepared in consultation with the landowners within those reserves to guide and manage development.”

This policy clearly provides for development in MR 873 consistent with the purpose for which it was reserved. Matters to expressly consider in any plan change and subsequent development are set out in (a) to (g). This policy anticipates a different pattern of development than provided for in the residential priority areas and under the rural residential provisions.

4.2.3 Overall RPS conclusions

Clearly the RPS anticipates that development opportunities for descendants of the original grantees will exist in MR 873. However, what is less clear is the scale and character of the development anticipated by RPS. Given the RPS’s tightly managed approach to greenfield and intensification development and the statements in Policy 6.3.10 and its principal reasons and explanation, it is clear that normal density residential development is not anticipated for this area, and neither is rural residential. At the same time, natural hazards, rural amenity and outlook, a compact urban form and a range of housing and lot size options must be taken into account.

4.3 Waimakariri District Plan

The provisions of key relevance to MR 873 are those provisions inserted into the District Plan by the LURP under Action 20. As they are contained within a Recovery Plan, decisions by the Council must not be inconsistent with these provisions. In addition, rules and other methods in the District Plan must implement these provisions.

The main provisions or their key components are set out below.

4.3.1 Policy 2.1.3.4

“Recognise the relationship of Ngai Tuahuriri with the land and associated resources in Maori Reserve 873 so as to enable the land to be used as intended by Kemps Deed of 1848 and the Crown Grants Act (No. 2) of 1882, for places of residence and living activities for the original grantees and their descendants.”

This policy is in the Maori chapter of the Plan. It establishes that land within MR 873 is to be used as intended by Kemps Deed of 1848 and the Crown Grants Act (No. 2) of 1862. It aligns with Policy 6.3.10 in Chapter 6 of the RPS, which the District Plan must give effect to. The policy also recognises that the rights lie with the original grantees and their descendants.

4.3.2 Policy 2.1.3.5

This policy is in the Maori chapter of the Plan. This policy sets out those matters that must be achieved by developments occurring within MR 873. While providing more detail than RPS policy 6.3.10 it is considered to be consistent with it and gives effect to it. The policy is reproduced in full below.
"Provide for the use, development and protection of Māori Reserve 873 based on its unique character and cultural values by:

a. maintaining and enhancing contained village areas that provide community facilities, convenience retail, recreational and business opportunities, residential housing, and compact, walkable neighbourhoods;
b. providing for cluster housing whilst still maintaining and enhancing an extensive rural hinterland in immediate proximity to, and surrounding the clusters, within MR 873 so that each cluster retains a rural outlook;
c. connecting to Council reticulated water and sewer;
d. avoiding land considered a high hazard risk including flood-prone land to the south;
e. protecting and ecologically enhancing the Cam River corridor;
f. re-establishing, protecting and ecologically enhancing the historic streams draining the eastern basin;
g. protecting and enhancing views from settlement areas to Maungatere and Ngā Tiritiri o te Moana;
h. recognising historic landscape and land use patterns; and
i. recognising a range of housing options."

4.3.3 Objective 14.1.2

This objective is in the Rural Zone chapter of the Plan. It seeks to recognise the historic and cultural significance of MR 873 to Ngāi Tūāhuriri and the different rural character arising from settlement by the original grantees and their descendants.

4.3.4 Policy 14.1.2.1

This policy is in the Rural Zone chapter of the Plan. It will apply to any development in the rural zoned areas within MR 873. Given it is a key policy it is reproduced in full below.

"Provide for subdivision and/or dwellinghouse development that enables Rural Zone land within Māori Reserve 873 to be used as intended by Kemps Deed of 1848 and the Crown Grants Act (No.2) of 1862 for places of residence for the original grantees and their descendants whilst:

a. recognising, within the intensive development opportunities, a range of housing options, provided housing density more than one dwellinghouse per 4ha is designed and constructed as part of an integrated comprehensive design for the whole site;
b. connecting to Council reticulated water and sewer for residential development at a density more than one dwellinghouse per 4ha;
c. avoiding residential development on land subject to hazards, including flooding from either breakouts or localised ponding;
d. recognising the movement linkages, open space, outlook, rural character and physical separation between contained village areas and more intensive residential development in the Rural Zone;"
e. protecting and ecologically enhancing the Cam River corridor;
f. re-establishing, protecting and ecologically enhancing the historic streams draining the eastern basin;
g. maintaining the rural environment, including between any intensive development opportunities; and
h. implementing an Outline Development Plan."

This policy is a key policy that provides for subdivision and dwellings subject to meeting specified matters. Any proposed plan rules will need to implement this policy, clearly managing development to maintain the rural environment, avoid hazard areas, connect to Council reticulated services, be part of a comprehensive design and be limited to descendants of the original grantees. If the rules do not achieve this then they are not implementing the policy.

4.3.5 Policy 17.1.1.5

This policy is in the Residential chapter of the Plan. It will apply to any residential zoned areas within MR 873, such as around the current Tuahiwi village. Given it is a key policy it is reproduced in full below.

"Provide for subdivision and/or business and residential development that enables Residential 3 zoned land within Māori Reserve 873 to be used as intended by Kemps Deed of 1848 and the Crown Grants Act (No.2) of 1862 for places of residence and living activities for the original grantees and their descendants whilst:

a. recognising a range of housing options and dwellinghouse densities providing for a variety of allotment sizes;
b. creating compact contained village areas;
c. providing for a centrally located, mixed use centre that recognises the need for community facilities, convenience retail, recreational and business opportunities at a size and scale appropriate to the development of Tuahiwi;
d. defining any increase in the Residential 3 Zone by natural features, landscape character areas and built features;
e. implementing an Outline Development Plan;
f. connecting to Council reticulated water and sewer;
g. avoiding residential development on land subject to hazards, including flooding from either breakouts or localised ponding;
h. maintaining a rural outlook and setting;
i. providing good connectivity via walking and cycling linkages;
j. providing active interaction with the street frontages;
k. re-establishing, protecting and ecologically enhancing the historic streams draining the eastern basin; and
l. protecting and enhancing views from village areas to Maungatere and Ngā Tiritiri o te Moana."
As for Policy 14.1.2.1, this policy is a key policy that provides for subdivision, residential and business development subject to meeting specified matters. Any proposed plan rules will need to implement this policy, clearly managing development to deliver the matters specified in (a) to (l).

4.4 Conclusions on the scope of any proposed Plan changes

As set out at the beginning of this section, the Resource Management Act creates a hierarchy of plans and provisions within plans and sets out how these are to relate to each other. Any new methods proposed as part of Action 21 must give effect to or implement higher order documents and the objectives and policies within the Waimakariri District Plan. They cannot seek outcomes that are inconsistent with these higher order provisions.

The existing provisions analysed above therefore provide a strong statement on the scope of the methods (e.g. rules) that can be proposed as part of any plan change. As an example, changes that would permit residential density development throughout the rural zoned areas of MR 873 would not be appropriate. Likewise, changes that permitted developments without connection to reticulated services would not be appropriate.

It is also important to note that the District Plan provisions were included in the LURP for recovery purposes. As such, it would be difficult to argue that wholesale unrestrained development or development that was intended to provide capacity beyond 2028 (the recovery period specified in the LURP) was appropriate.

Table 1 below sets out derived key outcomes from the higher order planning documents and the Waimakariri District Plan objectives and policies that must be achieved through any plan change under Action 21 of the LURP.

<table>
<thead>
<tr>
<th>Area</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Zone</td>
<td>Enable Kemps Deed and provide for the descendants of original grantees</td>
</tr>
<tr>
<td></td>
<td>Range of housing options, densities and allotment sizes</td>
</tr>
<tr>
<td></td>
<td>Compact contained village</td>
</tr>
<tr>
<td></td>
<td>Mixed-use centre</td>
</tr>
<tr>
<td></td>
<td>Residential 3 area defined by natural / built features and landscape</td>
</tr>
<tr>
<td></td>
<td>Implementation of an ODP</td>
</tr>
<tr>
<td></td>
<td>Connection to reticulated services</td>
</tr>
<tr>
<td></td>
<td>Avoidance of natural hazards</td>
</tr>
<tr>
<td></td>
<td>Maintenance of rural outlook and setting</td>
</tr>
<tr>
<td></td>
<td>Enhancement / protection of the Cam River and historic streams</td>
</tr>
<tr>
<td></td>
<td>Protection of views to Maungatere and Nga Tiritiri o te Moana</td>
</tr>
<tr>
<td>Rural Zone</td>
<td>Enable Kemps Deed and provide for the descendants of original grantees</td>
</tr>
<tr>
<td></td>
<td>Range of housing options</td>
</tr>
<tr>
<td></td>
<td>Comprehensive design for the whole site</td>
</tr>
<tr>
<td></td>
<td>Maintain rural a environment and amenity, recognising different rural character</td>
</tr>
<tr>
<td></td>
<td>Cluster housing with rural outlook, at densities greater or less than 1 dwelling per 5000m² – 10,000m²</td>
</tr>
<tr>
<td></td>
<td>Implementation of an ODP</td>
</tr>
<tr>
<td></td>
<td>Avoidance of natural hazards</td>
</tr>
<tr>
<td></td>
<td>Connection to reticulated services</td>
</tr>
<tr>
<td></td>
<td>Enhancement / protection of the Cam River and historic streams</td>
</tr>
</tbody>
</table>
4.5 Comparison with other district plans

A number of other Councils provide for a form of cluster housing, commonly referred to as Papakainga. The Council undertook a brief review of 14 other District Plans with provisions relating to Papakainga. The review indicated that this form of housing was generally exclusive to multiple owned Maori land, as opposed to general title land. In addition, only two Councils make provision for the subdivision of Papakainga housing, being Thames-Coromandel District Council and Waipa District Council. In the case of the Thames-Coromandel District Plan, it is understood that subdivision is a discretionary activity and a concept plan is required to be submitted.

5.0 Consultation

5.1 Issues and options consultation - 28 March to 17 May 2013

At the Resource Management and Regulation Committee meeting on 20th November 2012, the Waimakariri District Council’s Resource Management and Regulation Committee agreed:

“to undertake consultation on issues and options for development, and related District Plan Changes, to enable the land in the Kaiapoi Maori Reserve 873 to be used as intended by Kemps Deed of 1848 and the Crown Grants Act (No 2) of 1862.”

A Development Options Assessment report was prepared which identified five potential options that represent different forms of development. A brief overview of these options is provided below (a more comprehensive description of the five options is provided within the consultation document, Kaiapoi Māori Reserve 873 Development Options Assessment).

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – Development Adjacent to Woodend</td>
<td>An area of land approximately 94 hectares in area that bounds the Woodend Township has been identified for possible residential development, similar to the density of Woodend Township (Residential 2), known as WW6 within Proposed Change 1 (PC1) to the RPS.</td>
</tr>
</tbody>
</table>
2 – Tuahiwi Consolidation

This option involves the consolidation of the existing Residential 3 zone to enable further residential style development.

There are 17 empty sections within Tuahiwi Village that could be built on. In addition there are 57 1200m² or larger sections which could be subdivided to the 600m². Water and sewerage infrastructure is commented on in the servicing report in Appendix 3.

3 – Extend Tuahiwi Residential 3 zone

It would be possible to provide limited further opportunities for residential subdivision in Tuahiwi Village by extending the zone boundary.

4 – Kainga-Nohoanga Cluster Housing

This option would support the concept for whānau based housing clusters to support
Māori community living and cultural values, as a different form of residential development to that currently provided for. This concept would be built around whānau living in both village and rural clusters, better community facilities, and better connections in a sustainable environmental framework.

5- Individual Houses on Rural Sites

This option would allow for a dwelling on existing rural lots and/or enabling rural residential lots below the current 4 hectare minimum site size.

It is similar to the former Rural D zone provisions that were part of the District Scheme from 1980 to 2005.

The consultation period (from 28 March to 17 May 2013) included three information sessions held at Tuahiwi Marae, Woodend Community Centre and Tuahiwi School. A total of 21 comments were received. A hearing was held on 26 June 2013.

Comments Received

The Council report to the 20th June 2013 Hearing Panel listed the following consultation responses:

<table>
<thead>
<tr>
<th>Issue</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restriction to Descendants</td>
<td>Overall, it was noted from comments received there is some support for Option 5, by those who are not likely to have descendancy rights who have requested that it not be restricted to descendants.</td>
</tr>
<tr>
<td>Individual Land Rights</td>
<td>As of right, a person should be able to live and make a living from their property.</td>
</tr>
<tr>
<td>WW6 (Option 1) strong support and opposition</td>
<td>Comments have been received from those landowners within WW6 that are in favour of Option 1. Those that are in opposition to this Option consider that WW6 will become an extension of Woodend, and development is confined to a small part of the reserve, and therefore does meet the obligations of Kemps Deed and the Crown</td>
</tr>
<tr>
<td>Effects on special/rural character of the Reserve</td>
<td>Concerns have been raised on the potential detrimental impact of development on the whole character and landscape of MR 873.</td>
</tr>
<tr>
<td>Constraints</td>
<td>Areas in MR 873 will be constrained from development because there is no provision for services to some areas in the reserve, and the cost of getting services to these locations, and other issues such as flood risk, geotechnical issues and multiple ownership issues to overcome.</td>
</tr>
<tr>
<td>Standard of future housing</td>
<td>Some comments referred to substandard housing that already exists within the reserve. The comment was made that it does not bode well for any future development standards.</td>
</tr>
<tr>
<td>Feasibility of Option 4</td>
<td>The feasibility of such development(s) being implemented was questioned, given the expense in building and the ongoing maintenance and management of these areas within multiple ownership in the long term.</td>
</tr>
<tr>
<td>Commercial/Business Development</td>
<td>Comments propose a level of commercial and/or business development, based on local employment needs and convenience requirements.</td>
</tr>
</tbody>
</table>

**Hearings Panel Decision**

The Hearings Panel recommended that Council staff draft an ODP and rule framework to align with the objectives and policies contained within the draft LURP to be tested with Council staff and key stakeholders before seeking approval from the full Council meeting. At the Resource Management and Regulation Committee meeting 30 July 2013 the Committee resolved to support the Hearings Panel recommendations. This was recommended to the full Council in a report dated 8 October 2013.

**5.2 Draft Outline Development Plan and rule framework consultation – November and December 2013**

Consultation on the draft ODP and draft rules package was undertaken in November and December 2013. 11 submissions were received with six persons/groups speaking to the Panel at the hearing held 25 March, 2014. The report to the 20th May 2014 Resource Management and Regulation Committee noted that from a review of the previous hearing the key issue areas have remained consistent throughout the consultation processes. There were listed as:

1. The appropriateness of restriction of development rights (in the rural zone) to descendants of the original grantees under Kemps Deed
2. The constraints on development due to lack of availability of reticulated services throughout the reserve
3. Support for increased density along Rangiura Woodend Road (WW6) (Option 1 under first Consultation round)
4. Support for Rural D zoning provisions (Option 5 under original consultation round)
5. Uncertainty around the Kainga Nohoanga (Rural Cluster Housing) provisions.
6. Support for greater development rights, but not to a level where amenity and character values are compromised.
7. Have the ability to subdivide to less than 4 ha in the Rural Zone.
The Hearings Panel endorsed the development of an ODP subject to a number of amendments including:

- Deleting proposed village extension area B to the west of the village and replacing it with Residential 3 zoning that includes the Marae and north up to greens road, following existing boundary lines where practicable.
- Reducing the view shaft to a point where it is only necessary to control the height of buildings and structures to maintain the view from the Marae to Mount Grey and the Southern Alps.
- Removing the proposed setback buffer along Rangiora Woodend Road.
- That all necessary reports be commissioned to support the proposal (e.g. a desktop archaeological assessment, an assessment of the proposed plan change against the Iwi Management Plan; a landscape assessment).

5.3 Notification of amended proposals - 27th September to 17th October 2014

Consultation on the amended draft ODP and draft rules package was undertaken in September to October 2014. 26 submissions were received. The key issue areas noted from this round of consultation were:

- Mixed views on the restriction of development rights to descendants
- Mixed views on the requirement to connect to reticulated services
- Mixed views on the location and extent of the proposed village extension. Key matters noted were: the location of any proposed roading; the exacerbation of existing stormwater flooding; and possible adverse effects on rural outlook
- Mixed views on cluster housing
- Mixed views on unit titling vs fee simple subdivisions with covenants
- Desire for the maintenance of amenity in the rural areas
- Lack of consultation

As a result of the short consultation period and the nature of some of the comments received the Council resolved to provide a further consultation opportunity in early 2015. This consultation will include an amended proposed Tuahini village expansion area and technical reports on flooding and servicing being made available to those who made submissions on the plan change. The hearing will be held in March to consider the proposal and any comments or further comments from those who provided comments in the September – October consultation round.

5.4 Ongoing consultation with stakeholders – October 2014 to February 2015

Since the amended proposal consultation closed the Council has undertaken informal discussions with its recovery partners, Te Mana Waitaha Trust and Tuihiwi village landowners. The following key matters were raised:

- Flooding / drainage issues in the north west part of the proposed Residential 3 village extension;
- Adverse affects on rural amenity from the Residential 3 village extension;
The need for a setback and landscape buffer area between the new residential zoned areas and the existing rural zoned areas;
- The appropriateness of height restrictions in the viewshaft protection area;
- The appropriateness of re-zoning non-descendants land to Residential 3;
- Building consents appear to also be restricted to descendants of the original grantees;
- The extent of the north-west part of the proposed Residential 3 village extension.

These discussions have further informed the proposed plan change provisions, the location of the proposed Residential 3 village extension and the proposed ODP. The key changes proposed relative to the last provisions consulted on are: a reduction in the proposed extent of the Tuahiwi village Residential 3 area; and increased setbacks and a landscape requirement between the new Residential 3 zoned areas and existing rural zoned areas. These are shown in the ODP in Appendix 2.

Regarding building consents, the restrictions on non-descendants only apply to resource consents. Regarding flooding / drainage matters, these are addressed in the servicing report contained in Appendix 3. Stormwater from any new residential development will be assessed by the council as part of the consent process. The height restrictions in the viewshaft matter and the appropriateness of re-zoning non-descendants land to Residential 3 are covered later in this report in Section 6.

5.5 Consultation conclusions

The number of comments received at each of the three formal consultation exercises is considered to be relatively low. This could either because there is little interest in the topic, because the consultation was not well publicised, because the Council has got the proposed provisions about right, a combination of these, or other unknown reasons.

In terms of the comments received, there are recurring mixed views on:

- The restriction of rights to descendants;
- The requirement to connect to reticulated services;
- The protection of rural outlook and amenity;
- The appropriateness of cluster housing in rural areas; and
- The location and extent of any village extension.

6.0 Proposed Plan Provisions

6.1 Introduction

As indicated earlier in this report, the proposed plan provisions need to give effect to, not be inconsistent with or implement the higher order policies. The key outcomes of the higher order objectives and policies are set out in Table 1 in clause 4.4 of this report. The proposed plan provisions must also be cognisant of the comments received during the various consultation exercises and the conclusions from the various supporting reports.
Commentary on how the proposed plan provisions met the key outcomes identified in Table 1 in clause 4.4 are set out in the next two sections, split into the Tuahiwi village provisions and the rural area provisions. The proposed plan provisions themselves are contained in Appendices 1 and 2.

6.2 Tuahiwi Village – issues and considerations

6.2.1 Enabling Kemps Deed and providing for the descendants of original grantees

The proposed extension to the Residential 3 zone provides residential development opportunities for descendants. As such, the proposed changes enable Kemp’s Deed. However, the proposed changes also provide residential development opportunities for non-descendants and as such go beyond that required by Kemp’s Deed. Non-descendant land is interspersed amongst Maori owned land. If this land was not included this would significantly restrict the provision of infrastructure, such as roads and services, required to service the new Residential 3 area. In addition, extending residential development opportunities to non-descendants is considered appropriate in this instance as a key outcome is the creation of a cohesive village, rather than pockets of descendant development.

6.2.2 Compact contained village defined by natural / built features and landscape

There are no clear geographical boundaries that can be used to define the extent of any residential zone expansion. As such, it is only the roads and parcel boundaries that serve as a possible zone demarcation. On the basis of consultation responses, the higher order planning framework and the supporting reports, the final proposed boundaries are as per the proposed District Plan maps attached at Appendix 2.

This area is considered sufficient to provide housing choice, maintain a compact walkable village area, and is unrestricted by view shaft protection areas which would impact upon the form and function of the village.

6.2.3 Range of housing options, densities and allotment sizes

The Residential 3 zone provisions contain a minimum subdivision size of 600m² but no maximums. As such a range of densities and allotment sizes can be provided under this zoning. In terms of housing options, the Residential 3 zone provisions contain standard bulk and location provisions. There are no unusual prescriptive requirements relating to housing types.

6.2.4 Mixed-use centre

In terms of providing for business development in the Tuahiwi village, the existing Residential 3 zoning anticipates a degree of business development in the form of convenience retail or neighbourhood shops. Although this is provided for through a discretionary or non-complying pathway, in the case of MR 873, there is policy support in the objective and policy framework.
6.2.5 View shaft protection area

Of major importance to Maori are the views to Maungatere and Nga Tiritiri o te Moana. Originally a view shaft protection area was identified on the MR 873 ODP where development should not exceed a height of 5 metres. However, it is noted that the advice from Lucas Associates (page 5 of the Development Opportunities report referred to in Appendix 5), indicates that no structures should be allowed in this location in order to protect views to Maungatere and Nga Tiritiri o te Moana. As such, the original view shaft protection area method was questionable as to whether the proposal appropriately protects a view shaft as required under Policies 2.1.3.5(g) and 17.1.1.5(l). If dwellings are restricted completely in the protection area this would undermine the proposed re-zoning on the western side of Tuahiwi Road to Residential 3 as there would effectively be a large vacant gap between the existing village and the proposed development area.

Given the policy direction, staff consider that this view shaft protection area should remain and as such this makes the proposed north west extension of the village difficult in terms of residential character and form and function. In addition, given the lack of support for residential development in the area from Maori and the majority of affected landowners this Residential 3 expansion area is now proposed to be deleted.

6.2.6 Avoidance of natural hazards

As indicated in the servicing report, the proposed extension of the Residential 3 area in Tuahiwi village is outside the high flood hazard area where development must be avoided. The servicing report comments on stormwater management for the extension, noting that stormwater will be treated and attenuated in stormwater management areas prior to discharge to the downstream receiving environment. Proposed stormwater management areas are identified on the ODP.

6.2.7 Connection to reticulated services

As indicated in the servicing report, reticulated services are available for the proposed extended Residential 3 zone area.

6.2.8 Implementation of an Outline Development Plan

The proposed village expansion is set out in an ODP prepared by the Council. This village expansion is consistent with that ODP.

6.2.9 Maintaining rural outlook and setting

A rural outlook and setting has been maintained through his village expansion proposal as:

- The expansion is relatively modest;
- The expansion area adjoins the current village extent;
• The densities enabled provide sufficient development opportunity to meet demand, thereby safeguarding the wider surrounding area for rural activities (except where a rural cluster is developed).
• As set out on the ODP, the provisions require a generous setback and landscaping along boundaries with the Rural Zone in order to mitigate against amenity impacts.

6.2.10 Enhancing / protecting the Cam River and historic streams

The location of the proposed Residential 3 zone expansion is not located in the Cam River area and will not impact on historic streams. It is noted that the District Plan already contains a waterway setback requirement of 10m (Rule 27.1.1.2) from waterbodies, including those that have been modified such as natural farm drainage channels.

6.2.11 Other matters – environmental site assessment

The Coffey environmental report indicates that the proposed eastern village expansion area is suitable for rezoning to Residential 3 provided that identified elevated arsenic levels in soil and waste material are appropriately managed. The Coffey geotech assessment report confirmed that the village area proposed for rezoning is considered suitable for rezoning to Residential 3.

6.2.12 Other matters – archaeological assessment

The Council notes that an archaeological site is defined in the Heritage New Zealand Pouhere Taonga Act 2014 as any place in New Zealand (including buildings, structures or shipwrecks) that was associated with pre-1900 human activity, where there is evidence relating to the history of New Zealand that can be investigated using archaeological methods. As such, it is likely that any activity such as earthworks for residential developments, including building platforms, topsoil stripping, access way / road construction, trenching for telephone, power, and waste disposal within MR 873 will require an authority from Heritage New Zealand.

The archaeological assessment noted that parts of the area proposed for rezoning, namely Maori Reserve 873 92B Block and Lot 1 DP 69740, cover much of archaeological site M35/370 which contains borrow pits. The report stated that an authority will need to be obtained from Heritage New Zealand before any earthworks on or in the vicinity of the archaeological site M35/370 are undertaken. The report recommends that as a condition of the Authority the pits should be mapped with ground penetrating radar or other subsurface investigational methods before they are further disturbed.

The report also suggests that periodic checks for archaeological evidence should occur of any major excavations made for the provision of roading, services, or in large scale ground levelling that takes place as a result of the proposed plan change being implemented.

6.3 Rural Provisions – Issues and Considerations

6.3.1 Enabling Kemp’s Deed and providing for descendants of the original grantees
In the proposed rules cluster housing is enabled for descendants of the original grantees, thereby enabling Kemp's Deed. Cluster housing is not enabled for non-descendants however. This decendancy limitation has been a consistent matter commented on in written comments and raised at various hearings - a number of commenters supported this limitation and a number opposed it.

The intent of the relevant objectives and policies is for development rights to be provided for descendants of the original grantees. There is no policy direction to provide these rights to non-descendants. If development rights were also granted to non-descendants throughout the large rural zoned areas it is considered that this may compromise many of the other plan outcomes stated in the policy framework (see Section 4 in this report). As such, subdivision and the establishment of a dwellinghouse for non-descendants in the reserve will be required to continue to comply with existing rural zone provisions (i.e. a minimum site size of 4 hectares).

6.3.2 Providing a range of housing options

The proposed provisions provide for one dwelling to be built any site less than 5000m² that is owned by a descendant. The proposed provisions also provide for three to seven dwellings being developed on sites of 5000m² or greater on 20% of the site. While a cluster must indicate the position of a minimum of three dwellings, only one needs to actually be built. Through this approach there is significant flexibility to build one or more dwellings with different densities and spatial arrangements. In addition, apart from boundary setbacks external to the cluster and height limits the proposed plan provisions are largely silent on bulk and location standards and other amenity provisions. This approach therefore enables significant flexibility for achieving a range of housing options.

The cluster housing diagrams in Appendix 4 illustrate examples of houses that could be built as part of a cluster.

6.3.3 Maintain rural environment, providing cluster housing with a rural outlook, recognising different rural character

The cluster housing provisions have been crafted to provide flexibility to descendants in terms of housing location, density and design whilst seeking to maintain the unique rural environment and character which defines MR 873. The key provisions which maintain rural amenity are those controlling cluster dwelling numbers and area, boundary setbacks, structure coverage and cluster design.

Descendants can choose to design anywhere from three to seven dwellings depending on demand, site constraints, and the other key rules. The maximum cluster area able to be built on is a maximum of 20% of a site. This results in a minimum of 80% of the site being retained for rural activities and to retain rural outlook and amenity. Boundary setbacks of 15m are required to manage amenity at the boundary external to the cluster. Structure coverage is limited to 13%, thereby allowing more smaller dwellings or fewer bigger dwellings as required. Finally any cluster
development proposal must include a development plan for the whole site that addresses these and other matters identified in the provisions.

Appendix 4 contains a number of cluster housing examples that demonstrate how a complying cluster can be arranged for various lot sizes and dimensions.

6.3.4 Comprehensive design for the whole site

As indicated under 5.3.3, cluster development proposals must include a development plan for the whole site.

6.3.5 Implementation of an Outline Development Plan

An ODP has been prepared by the Council. The proposed provisions implement this plan.

6.3.6 Avoidance of natural hazards

The draft ODP includes areas of MR 873 that are subject to flooding by localised ponding or river break outs, that are determined to be ‘high hazard’. The proposed rules make cluster development a non-complying activity in these identified high hazard areas.

6.3.7 Connection to reticulated services

The proposed rules make cluster housing developments that do not connect to reticulated services a non-complying activity, consistent with the higher order planning documents.

6.3.8 Enhancing / protecting the Cam River and historic streams

The Cam River and other water courses within the reserve are identified on the proposed planning maps and draft ODP. As part of the proposed cluster housing provisions a cluster housing development plan must be submitted that demonstrates, among other things, any proposed planting and ecological enhancement of watercourses. It is also noted that structures must be setback 10m from any waterbodies.

6.3.9 Other matters – localised stormwater flooding

Locating a cluster in areas affected by a 1:200 year flooding event is non-complying, consistent with the higher order planning documents.

6.3.10 Other matters - subdivision and providing for multiple generations

A key restricting factor for land development in MR 873 is the difficulty of obtaining finance. Banks and other lenders are reluctant to lend money for mortgages on Maori land.⁸ Although they can

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⁸ Controller and Auditor General (March 2011): Government Planning and support for housing on Maori land
take Maori land as security for a loan, if the bank needs to take the land because of a default on the loan, it is difficult to sell the land to recover the money lent. If the land is able to be subdivided and held as a sellable parcel this finance hurdle can be overcome.

While the ability to subdivide is therefore important, adverse effects could potentially arise if cluster developments are able to be subdivided. This is because the proposed reduction in bulk and location, amenity standards between houses and increased density is based on the principle that generally, extended families will occupy individual cluster developments who have a desire to live communally, whilst maintaining some exclusive space; as opposed to separate, unrelated individual dwellinghouses. The ability for cluster housing to function effectively relies on the assumption those in the cluster want to live in close proximity to one another. If parts of a cluster are able to be subdivided, and on sold, then the management of the development as whole, and in particular the rural portion, becomes more difficult.

To best manage the above issues the proposed rules provide for subdivision through unit titling. Unit titles are the most widely used form of multi-unit property ownership. They allow owners to privately own an area of land and/or a building (known as a principal unit) and share common property with other unit owners (unit title background information is contained in Appendix 5). The Council is getting pro-forma unit title body corporate legal documentation prepared for use by those wishing to develop cluster housing.

It is considered that unit titling best provides for individual legal ownership whilst providing for on-going management and maintenance of common property. It is the best tool to manage the unique pattern and character of development anticipated within the cluster. Subdivision through unit titling will allow the underlying lot to be held in multiple ownership with the ability for separate ownership of dwellinghouses and their exclusive areas. The valuation report by Colliers International (see Appendix 5) indicates that there is little difference in value between land and dwellings owned by unit titles as opposed to fee simple titles.

In terms of providing for multiple generations, the proposed rules require a cluster to be designed at the outset, but the cluster can be built in stages. This provides flexibility for later generations to add on additional dwellings as required, in accordance with the original cluster design. The proposed unit title subdivision supports this multi-generational approach.

6.3.11 Other matters - co-governance

The design of the cluster housing is extremely important if effects on the environment are to be avoided or mitigated. Because of this the Council is proposing that they can request advice on the design of a cluster from design experts and also a representative nominated by the Runanga or the Tuahiwi Marae Trustees. It is noted that Waipa District Council uses a form of co-governance in respect of Papakainga housing via an Iwi Consultative committee that reviews concept plans before applications are lodged with the Council for resource consent.
6.3.12 Other matters - Iwi Management Plan assessment

The Council report states that the proposed plan change to enable development within MR 873 is consistent with the Mahaanui Iwi Management Plan (IMP). Key aspects of the IMP that align with the proposed plan change are the improvement of water quality and quantity, the enhancement of waterways and provision for Mahinga Kāi, recognition of mana whenua and undertaking meaningful collaboration with the Runanga and communities. It is considered that the plan change gives recognition to Ngāi Tahu cultural heritage values, including wāhi tapu and other sites of significance and cultural landscapes.

6.2.13 Other matters – resource consent lapsing period

In order to provide greater flexibility for descendants the Council is proposing to apply a ten year period for the lapsing of resource consents rather than the standard five year period.

7.0 Application of the Rural Zone Cluster Rules

The Council anticipates that a resource consent application for cluster housing will generally proceed as follows:

1. You will engage appropriate technical specialists to assist in designing and preparing plans for your cluster development, covering off the matters set out in the relevant rules. Attached at Appendix 4 are cluster housing examples as a guide. A cluster housing development plan must be submitted that will demonstrate:
   - the design and arrangement of any existing, proposed or consented dwellinghouses and clusters and the interrelationship between them;
   - if applicable, the staging of development, including that each sequential dwelling will be the next adjacent and contiguous dwelling in the cluster;
   - access, open space links and service areas;
   - proposed infrastructure, including that required for firefighting purposes;
   - areas to be exclusive and common and their dimensions;
   - existing topographical features including existing vegetation, streams and overland stormwater flowpaths;
   - proposed planting and ecological enhancement of waterbodies;
   - selected ground heights or contours

Note: It is your responsibility to prove descendancy. This can be done by seeking confirmation of descendancy from the whakapapa unit of Ngai Tahu. This proof will need to accompany any resource consent application.

2. It is your responsibility to address the District Plan’s reticulated servicing requirements. This information will need to be submitted with any resource consent application.
Note: In relation to these first two points, the Council understands that grant funding can be sought. Two such examples are Kainga Whenua loans for individuals seeking housing on multiple-owned Maori land and Kainga Whenua Infrastructure Grants (see Appendix 5).

3. You will need to submit a land use resource consent application with the necessary information to the Council. If a unit title subdivision is proposed, then a subdivision consent application will need to be submitted at the same time.

4. The Council will assess your application. This assessment will have regard to (but not be limited by) the following matters:

- the proximity of any proposed dwellings or clusters to existing or consented dwellings and clusters on neighbouring sites;
- the extent to which the rural character and amenity in the wider area is adversely affected by the cumulative impact of existing or proposed clusters;
- the extent to which any additional ancillary private use buildings proposed are necessary for rural activities or customary use and mainga kai;
- whether landscaping is proposed along boundaries and the extent to which it maintains or enhances rural amenity and outlook;
- the extent to which the proposed buildings compliment the rural environment;
- the extent to which the cluster provides open space and maintains rural amenity when viewed from public roads and accessways;
- the extent to which any watercourses are ecologically enhanced; and
- any cumulative effects of the proposed activity.

Note: The Waimakariri District Council may seek advice from design professionals and the Runanga or Tuahiwi Marae Trustees, as well as consider any relevant design guide.

5. Depending on how domestic wastewater is managed a resource consent from the Canterbury Regional Council may also be required.

6. If your resource consent application is approved by the Council you have ten years to begin and complete the development. While a cluster design must show a minimum of three dwellings the dwellings can be built in stages over a ten year period. All the dwellings must be built in accordance with the cluster housing development plan and any conditions imposed by the Council on the resource consent, unless a further resource consent application is sought to vary the plan or conditions.

7. If you are also doing a unit title subdivision you will need to engage a surveyor to complete your legal subdivision plans. You will also need a valuer to determine the value of each title so the appropriate share of the balance land can be apportioned to each unit.

8. You will need to prepare the unit title documentation as required, following legal advice. Information on unit titling is referenced in this report in Appendix 5. Pro-forma unit title body corporate legal documentation prepared by the Council will be made freely available.
for use by applicants. This will cover the requirements of the Unit Titles Act 2010 and the District Plan but will also be able to have additional rules added to by the developer of the cluster if desired.

9. Your lawyer will then apply for your individual titles.

10. Where an approved cluster development has not been completed within ten years of the issue of the resource consent or additional houses are sought to be added to the existing cluster, you will need to apply for a new resource consent. Provided the total number of dwellings within the cluster does not exceed seven and the cluster meets the requirements of the original consent then the consent application should have some merit for approval.
Appendix 1 – Proposed MR 873 Plan Change
LURP ACTION 21 – MR873 Proposed Plan Change

Understanding the Changes

1. Where a completely new provision is proposed to be added it is shown as bold and underlined.
2. Where an existing provision is proposed to be changed, the whole existing provision is deleted and replaced and shown as a new provision. To aid understanding of the specific changes to the existing provisions for MR 873, these are shown in RED.

Amend the Waimakariri District Plan as follows:

Chapter 1: Definitions

Delete Definition of dwellinghouse and Add new Definition of dwellinghouse to read as follows:

Dwellinghouse

Dwellinghouse means any habitable structure, occupied or intended to be occupied in part or in whole as a residence and, except in relation to any cluster housing within Maori Reserve 873, includes one additional physically separated dwellinghouse that is no more than 75 square metres in gross floor area and is located within 30 metres of the primary dwellinghouse. For the purposes of this definition there shall be only one kitchen facility under any individual roof structure.

Add new Definition of cluster housing development (kainga nohoanga) to read as follows:

Cluster housing (kainga nohoanga):

Cluster housing means kainga nohoanga dwellinghouse development that has been designed as a group and contiguous on a site or sites in the Rural Zone of Maori Reserve 873, as identified on Planning Map 176A.

Add new Definition of Maori reserves to read as follows:

Maori Reserve 873:

Maori Reserve 873 is an area of the district set aside under Kemps Deed (1848) for tangata whenua grantees and their descendants as set out in the Crown Grant Act of 1873 (descendancy will be determined by the whakapapa unit of Ngai Tahu). The location of Maori Reserve 873 is identified on Planning Map 176A.

Chapter 23: Land and Water Margins - Rules

Delete Rule 23.1 and Add new Rule 23.1 to read as follows:
23.1 Permitted Activities

Any land use is a permitted activity if it:

i. is not otherwise listed as a controlled, discretionary activity (restricted), discretionary or non-complying activity under this chapter, or is not a discretionary activity (restricted) under Rule 25.2.4;

ii. complies with the conditions under Rule 23.1.1; and

iii. complies with all the conditions and provisions for permitted activities in all chapters.

Delete Rule 23.1.1.16 and Add new Rule 23.1.1.16 to read as follows:

23.1.1.16 Within any Residential, Business, Mapleham Rural 4B Zone or cluster housing development within Maori Reserve 873, domestic wastewater generated within any site shall be disposed of by connection to a reticulated sewage disposal utility.

Delete Rule 23.1.1.17 and Add new Rule 23.1.1.17 to read as follows:

23.1.1.17 Within any Residential Zone, Business 1, 2, or 4 Zone, the Rural Zone including cluster housing within Maori Reserve 873 or Mapleham Rural 4B Zone, the supply of water to any site shall be by a reticulated potable water supply.

Delete Rule 23.3.6 and Add new Rule 23.3.6 to read as follows:

23.3.6 Except as provided for by Rule 23.5, any land use that does not comply with Rule 23.1.1.16 (disposal of sewage) is a discretionary activity (restricted).

In considering any application for a resource consent under Rule 23.3.6, the Council shall, in deciding whether to grant or refuse consent, and in deciding whether to impose conditions, restrict the exercise of its discretion, to the following matters:

i. the environmental standards of the proposed and existing sewage disposal systems;

ii. the scale, location, design, construction and standard of any sewage treatment and disposal system and outfall;

iii. contingency provisions and emergency response procedures in the event of a failure in the service, treatment disposal system or outfall;

iv. financial contributions as set out in Chapter 20: Financial Contributions and Chapter 34: Financial Contributions – Rules and development contributions as set out in Waimakariri District Council’s Development Contributions Policy;

v. those matters over which control is exercised for Controlled Activities in Chapter 32: Subdivision – Rules;

vi. effects on wahi taonga and mahinga kai;
vii. effects on effectiveness and efficiency of existing public systems;
viii. the need for ongoing maintenance, service contracts and standards;
ix. the protection of on-site and off-site domestic water supply;
x. buffers between any disposal field(s) and any dwellinghouse;
xi. the design, location, management of any sewerage system(s) in relation to soil or ground permeability and topography;
xii. buffers between water bodies, excluding aquifers and wetlands and sewage disposal fields;
xiii. the need to contain disposal fields within allotments; and
xiv. the effect land use will have on the water quantity of any water body.

Delete Rule 23.3.7 and Add new Rule 23.3.7 to read as follows:

23.3.7 **Except as provided for by Rule 23.5**, any land use that does not comply with Rule 23.1.1.17 (supply of water) is a discretionary activity (restricted).

In considering any application for a resource consent under Rule 23.3.7, the Council shall, in deciding whether to grant or refuse consent, and in deciding whether to impose conditions, restrict the exercise of its discretion to the following matters:
i. the potability and capacity of water supply;
ii. the environmental standards of the proposed and existing water supply;
iii. the means of supply and location of any water source;
iv. contingency provisions and emergency response procedures in the event of a failure in the service;
v. financial contributions as set out in Chapter 20: Financial Contributions and Chapter 34: Financial Contributions – Rules and development contributions as set out in Waimakariri District Council’s Development Contributions Policy;
vi. those matters over which control is exercised for Controlled Activities in Chapter 32: Subdivision – Rules;
vii. effects on wahi taonga and mahinga kai;
viii. effects on effectiveness and efficiency of existing public systems;
ix. the need for ongoing maintenance, service contracts and standards; and
x. the effect land use will have on the water quantity of any water body.

Add new Rules 23.5 and 23.5.1 to read as follows:
23.5 Non-complying Activity

23.5.1 Any land use that does not comply with one or more of Rules 23.1.1.16, 23.1.1.17 and 23.1.1.19 in regard to Maori Reserve 873, is a non-complying activity.

Chapter 27: Natural Hazards – Rules

Add new Rule 27.4.4 to read as follows:

27.4.4. The construction of, or additions to, any dwellinghouse, or cluster housing within the 0.2% Annual Exceedance Probability flood event hazard area within Maori Reserve 873, is a non-complying activity.

Chapter 30: Utilities and Traffic Management - Rules

Delete Rule 30.6.1.2 and Add new Rule 30.6.1.2 to read as follows:

30.6.1.2 Except where part of a cluster housing development under Rule 31.33.1 access to seven or more sites shall only be provided by way of a road which complies with the design attributes of Table 30.1, or Table 30.2 for the Residential 7 Zone.

Chapter 31: Health, Safety and Wellbeing - Rules

Delete Table 31.1 and Add new Table 31.1 to read as follows:

Table 31.1: Minimum Structure Setback Requirements

<table>
<thead>
<tr>
<th>Location</th>
<th>A setback is required from</th>
<th>Setback depth (minimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Zone</td>
<td>Any road boundary</td>
<td>20m for any dwellinghouse</td>
</tr>
<tr>
<td></td>
<td>Any internal site boundary</td>
<td>10m for any structure other than a dwellinghouse</td>
</tr>
<tr>
<td></td>
<td>Any existing dwellinghouse on an adjoining site</td>
<td>20m for any dwellinghouse</td>
</tr>
<tr>
<td></td>
<td>Any site boundary</td>
<td>3m for any structure other than a dwellinghouse</td>
</tr>
<tr>
<td></td>
<td>Holders of all permits required for construction and operation</td>
<td>10m for any structure (excluding a dwellinghouse)</td>
</tr>
</tbody>
</table>

140918101728
<table>
<thead>
<tr>
<th>Location</th>
<th>A setback is required from</th>
<th>Setback depth (minimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Zone, MR 873 Cluster Housing</td>
<td>Any road boundary</td>
<td>15m</td>
</tr>
<tr>
<td></td>
<td>Any site boundary external to the cluster</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Any existing dwellinghouse on an adjoining site</td>
<td></td>
</tr>
<tr>
<td>All Residential Zones other than the Residential 4A Zone (Wards Road, Mandeville North and Mill Road, Ohoka), Residential 6A and 7 and the Residential 4A Zone (Bradleys Road, Ohoka), except where an alternative setback is shown on District Plan Map 176B</td>
<td>Any road boundary (other than a boundary to a strategic road or arterial road) or any accessway</td>
<td>2m</td>
</tr>
<tr>
<td>NOTE: See Rule 31.1.1.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential 4A Zone (Bradleys Road, Ohoka) shown on District Plan Map 169</td>
<td>Any road boundary</td>
<td>15m</td>
</tr>
<tr>
<td></td>
<td>Any internal site boundary</td>
<td></td>
</tr>
<tr>
<td>Residential 4A Zone (Wards Road, Mandeville North) shown on District Plan Map 162, Residential 4A Zone (Mill Road, Ohoka) shown on District Plan Map 160 and Woodend Beach Road shown on District Plan Map 171.</td>
<td>Any boundary from a local road</td>
<td>10m</td>
</tr>
<tr>
<td>Residential 4A Zone (Mill Road, Ohoka) shown on District Plan Map 160</td>
<td>Mill Road boundary</td>
<td>15m</td>
</tr>
<tr>
<td></td>
<td>Any internal site boundary</td>
<td></td>
</tr>
<tr>
<td>All Residential Zones, other than Residential 6, 6A and 7, where the site fronts onto a strategic or arterial road</td>
<td>The road boundary of any strategic or arterial road</td>
<td>5m or 4m for any garage where the vehicle entrance is generally at right angles to the road</td>
</tr>
<tr>
<td>Residential 6 Zone</td>
<td>Any site boundary adjoining an accessway for allotments 15, 16, 17, 27, 28 and 29 shown on District Plan Map 140</td>
<td>4m</td>
</tr>
<tr>
<td>Residential 6A Zone (other than areas identified on District Plan Map 142 as excluded from the setback requirement)</td>
<td>Any internal site boundary, other than boundaries with accessways</td>
<td>2m for any structure other than garages and structures above garages</td>
</tr>
<tr>
<td>Location</td>
<td>A setback is required from</td>
<td>Setback depth (minimum)</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Residential 6A</td>
<td>Boundaries with accessways</td>
<td>10m for any structure other than a garage and structures above garages</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NOTE: Refer to Figure 31.1 and Rule 31.1.14</td>
</tr>
<tr>
<td>Residential 7</td>
<td>Any road boundary (other than to a arterial road) or any accessway</td>
<td>2m for any dwellinghouse within Area A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3m for any dwellinghouse within Areas B and C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.5m for any structure other than a dwellinghouse within Areas A, B and C</td>
</tr>
<tr>
<td>Business 2, 3 and 6 Zones, where the site fronts onto a strategic or arterial road</td>
<td>Any internal site boundary</td>
<td>8m</td>
</tr>
<tr>
<td>All Business Zones, other than:</td>
<td>Any site boundary of 309 Island Road being Lot 1 DP 62400</td>
<td>2m</td>
</tr>
<tr>
<td>(a) the Business 1 Zone at Pegasus,</td>
<td>The road boundary of any arterial road</td>
<td>20m</td>
</tr>
<tr>
<td>(b) any Business 4 Zone, and</td>
<td></td>
<td>40m</td>
</tr>
<tr>
<td>(c) the Business 1 Zones at Rangiora and Kaiapoi,</td>
<td>The zone boundary, or where the zone boundary is a road, the road boundary</td>
<td>10m</td>
</tr>
<tr>
<td>where the site is adjacent to a Residential Zone or a Rural Zone boundary</td>
<td></td>
<td>10m</td>
</tr>
<tr>
<td>Business 4: Williams/Carwe Zone</td>
<td>Any road boundary</td>
<td>5m</td>
</tr>
<tr>
<td></td>
<td>Any site boundary</td>
<td>5m</td>
</tr>
<tr>
<td>Location</td>
<td>A setback is required from</td>
<td>Setback depth (minimum)</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------</td>
</tr>
<tr>
<td>All Zones</td>
<td>All overhead high voltage electrical lines as shown on District Plan Maps where the adjacent span length is less than 375 metres</td>
<td>32 metres to the side of the centreline of the conductors</td>
</tr>
<tr>
<td></td>
<td>All overhead high voltage electrical lines as shown on District Plan Maps where the adjacent span length is between 375 and 600 metres</td>
<td>55 metres to the side of the centreline of the conductors</td>
</tr>
<tr>
<td></td>
<td>All overhead high voltage electrical lines as shown on District Plan Maps where the adjacent span length is greater than 600 metres</td>
<td>100 metres to the side of the centreline of the conductors</td>
</tr>
</tbody>
</table>

Delete Rule 31.1.1.22 and Add new Rule 31.1.1.22 to read as follows:

31.1.1.22 Any structure in a Residential 1,2,3,6 or 7 Zone (Areas B and C) shall not exceed a height of 8 m except within the View Protection Area identified in Maori Reserve 873 shown on District Plan Map 176B, where any structure shall not exceed a height of 5 metres.

Add new Rule 31.1.2.14 to read as follows:

31.1.2.14

Under Rule 31.33.1 within Maori Reserve 873, where an internal boundary of a site within the Rural Zone abuts an access leg providing access to a rear lot on a neighbouring property, the boundary setback depth required in Table 31.1 may be measured a maximum of 10 metres into the access leg on the neighbouring property.

Add new Rule 31.31 to read as follows:

Maori Reserve 873 - Rural Zone

31.31 Permitted Activities

Any land use is a permitted activity if it:

i. is not otherwise listed as a discretionary or non-complying activity under Rules 31.32 and 31.33;  
ii. complies with conditions under Rule 31.31.1; and  
iii. complies with all conditions and provisions for permitted activities in this and all other chapters.
Add new Rules 31.31.1 and 31.31.1.1 to read as follows:

31.31.1 Conditions

31.31.1.1 In the Rural Zone, within Maori Reserve 873, any dwellinghouse on a site which has an area of less than 5000m² shall:

a. be held on a separate Certificate of Title existing at [insert date that provisions are inserted into the District Plan];

b. not be located within the 0.2% Annual Exceedance Probability flood event area;

c. connect to a reticulated potable water supply and sewage disposal utility; and

d. be located on a site where it is demonstrated that one or more of the owners is a descendant of an original grantee of land within Maori Reserve 873 as set out in the Crown Grant Act of 1873.

Add new Rule 31.31.2 to read as follows:

31.31.2 Exemptions

31.31.2.1 Any dwellinghouse erected on, or relocated onto a site or an allotment that is within the Maori Reserve 873 under Rule 31.31.1.1 or for the purpose of cluster housing under Rule 31.32.1, is exempt from complying with Rules 31.1.1.1, 31.1.1.3.

Add new Rules 31.32 and 31.32.1 to read as follows:

31.32 Discretionary Activities

Add new Rule 31.32.1 to read as follows:

31.32.1 Cluster housing within Maori Reserve 873 within the Rural Zone where:

a. the owner or one of the owners of the site or sites is a descendant of an original grantee of land as set out in the Crown Grant Act of 1873;

b. the site or combined area of two or more contiguous sites is 5000m² gross or greater;

c. the total number of dwellinghouses is limited to a minimum of three and a maximum of seven only;

d. The height of any dwelling shall not exceed 8 metres;

e. The structure coverage of the net area of any site shall not exceed 13%;

f. a cluster housing development plan for the site or sites demonstrates:

i. the design and arrangement of any existing, proposed or consented dwellinghouses and clusters and the interrelationship between them;
ii. if applicable, the staging of development, including that each sequential dwelling will be the next adjacent and contiguous dwelling in the cluster;

iii. access, open space links and service areas;

iv. proposed infrastructure, including that required for firefighting purposes;

v. areas to be exclusive and common and their dimensions;

vi. existing topographical features including existing vegetation, streams and overland stormwater flowpaths;

vii. proposed planting and ecological enhancement of watercourses;

viii. selected ground heights or contours;

g. dwellinghouses, other private use buildings and any associated curtilages (excluding the accessway):

i. are designed as a group and are wholly contained within a single location;

ii. are clustered, such that they are contiguous (except where separated by the accessway), and in a location that does not exceed 20% of the total net area of the site or sites; and

iii. are not located within the balance of the site or sites.

h. not more than one accessway is provided to the cluster.

is a discretionary activity.

Note: An application for any resource consent under Rule 31.32.1 shall have a ten year lapsing period.

In considering any resource consent application under Rule 31.32.1 the Council shall, in deciding whether to grant consent, and in deciding whether to impose conditions, have regard to (but not be limited by) the following matters:

i. the proximity of any proposed dwellings or clusters to existing or consented dwellings and clusters on neighbouring sites and in the wider locality;

ii. the extent to which the rural character and amenity in the wider area is adversely affected by the cumulative impact of existing or proposed clusters;

iii. the extent to which any additional ancillary private use buildings proposed are necessary for rural activities or customary use and mahinga kai;

iv. whether landscaping is proposed along boundaries and the extent to which it maintains or enhances rural amenity and outlook;

v. the extent to which the proposed buildings compliment the rural environment;

vi. the extent to which the cluster provides open space and maintains rural amenity when viewed from public roads and accessways; and

vii. the extent to which any watercourses are ecologically enhanced;

Note: The Waimakariri District Council may seek advice from design professionals and Tuahiwi Runanga or Marae Trustees, as well as consider any relevant design guide.

Add new Rules 31.33 and 31.33.1 to read as follows:
31.33 Non-complying Activities

31.33.1 The erection of any dwellinghouse within Maori Reserve 873 that does not comply with Rule 31.31.1.1 is a non-complying activity.

Add new Rule 31.33.2 to read as follows:

31.33.2 Cluster housing within Maori Reserve 873 that does not comply with Rule 31.32.1 is a non-complying activity.

Chapter 32: Subdivision

Delete Rule 32.1.1.3 and Add new Rule 32.1.1.3 to read as follows:

32.1.1.3 Any allotment in the Rural Zone shall contain one or more building platforms, and, unless otherwise required to be serviced by a reticulated sewage disposal utility by Rule 23.1.1.16, a sewage disposal area for a dwellinghouse shall be provided.

Delete Rule 32.1.1.25 and Add new Rule 32.1.1.25 to read as follows:

32.1.1.25 Subdivision within the following areas shall generally comply with the Outline Development Plan for that area.

a. The Residential 4B Zone of Mandeville identified on District Plan Maps 91 to 93 and the Mandeville Outline Development Plan on District Plan Map 141.

b. The Residential 2 and Residential 4B Zones of North Rangiora on District Plan Maps 110 and 111 and the North Rangiora Outline Development Plan on District Plan Map 146.

c. Southbrook Business 2 Zone identified on District Plan Maps 118 and 119.

d. East Rangiora identified on District Plan Maps 113, 114 and 117.

e. West Rangiora (North of Oxford Rangiora Road) identified on District Plan Maps 110 and 112.

f. West Rangiora (South of Oxford Rangiora Road) identified on District Plan Maps 112 and 116.

g. East Woodend identified on District Plan Maps 128 and 131 and the East Woodend Outline Development Plan on District Plan Map 153.

h. Residential 5 Lees Road identified on District Plan Map 140.

i. Pegasus identified on District Plan Map 142.
j. Mapleham Rural 4B Zone identified on District Plan Map 147.

k. North Kaiapoi identified on District Plan Map 156.

l. The Residential 2 and 4A Zones of North West Rangiora identified on District Plan Map 155.

m. The Residential 2 Zone Ashley Street – Enverton Drive, North Rangiora identified on District Plan Map 165.

n. The Residential 2 Zone Northbrook Road Rangiora identified on District Plan Map 157.

o. The Residential 4A Zone North Eyre Road, Mandeville North on District Plan Map 159.

p. The Residential 4A Zone Waikuku Beach identified on District Plan Map 161.

q. The Residential 4A Zone Wards Road, Mandeville North identified on District Plan Map 162.

r. The Residential 2 Zone Enverton Drive - Ballarat Road North Rangiora identified on District Plan Map 166.

s. The Residential 7 Zone West Kaiapoi, identified on District Plan Map 164.

t. North Woodend identified on District Plan Map 158.

u. The Residential 2 Zone East Kaiapoi identified on District Plan Map 163.

v. The Residential 2 Zone Oxford Road West Rangiora identified on District Plan Map 168.

w. The Residential 4A Zone, Bradleys Road, Ohoka, identified on District Plan Map 169 and more particularly described in Appendix 32.2.

x. The Residential 4A Zone, Woodend Beach Road, Woodend, as identified on District Plan Map 171.

y. The Residential 2 Zone North East Woodend identified on District Plan Map 172.

z. South West Rangiora identified on District Plan Map 173.

aa. The Residential 4A Zone Mill Road Ohoka identified on District Plan Map 160.

ab. The Residential 4A Zone McHughs Road, Mandeville North identified on District Plan Map 174.
ad. The Todds Road Business 2 Zone identified on District Plan Map 175.

ae. The Business 6 Zone identified on District Plan Map 180.

af. Maori Reserve 873 identified on District Plan Map 176B.

Add new Rule 32.1.1.54 to read as follows:

32.1.1.54 Any new allotment within the Maori Reserve 873 shown on District Plan Map 176A shall be connected to a reticulated sewage disposal utility.

Delete Rule 32.1.1.73 and Add new Rule 32.1.1.73 to read as follows:

32.1.1.73 Accidental discovery protocol within Maori Reserve 873, East Woodend, North East Woodend, Waikuku Beach, West Kalapol, the North Woodend, South West Rangiora and Todds Road Business 2 Outline Development Plan Areas as shown on District Plan Maps 134, 53, 158, 161, 164, 172, 173, 175 and 176B:

a. within the identified Outline Development Plan areas, a suitably skilled and experienced cultural monitor or monitors nominated by the Runanga and agreed by the landowner shall be appointed to monitor all bulk earthworks on site.

b. where suspected urupa, wahi tapu, wahi taonga or any place associated with Human activity that occurred before 1900 and is, or may be able, through investigation by archeological methods to provide evidence relating to the Māori history of the area is discovered:

— earthworks shall stop immediately;

— all machinery shall be shut down immediately;

— all persons shall leave the area;

— the land owner shall be advised of the discovery;

— the NZ Historic Places Trust shall be advised of the discovery and either the Regional Archaeologist of the NZ Historic Places Trust has confirmed in writing that the archaeologist provisions of the Historic Places Act do not apply; or the requirements of the Historic Places Act have been met and, if required, an archaeological authority (consent) has been granted by the NZ Historic Places Trust;
Where the place is associated with Māori activity that occurred before 1900 the land owner shall consult Te Ngāi Tūahuriri Runanga to determine in consultation with the NZ Historic Places Trust, what further actions are appropriate to safeguard the site or its contents, and to avoid, reduce, remedy or mitigate any damage to the site; and

the Waimakariri District Council shall be notified.

c. where koivi tangata (human remains) are suspected:

steps shall be taken immediately to secure the area in a way that ensures the koivi tangata are untouched;

Te Ngāi Tūahuriri Runanga, the Police, the Waimakariri District Council and the New Zealand Historic Places Trust shall be notified;

the land owner shall arrange for his/her representatives to be available to meet and guide kaumatua, Police, Waimakariri District Council and New Zealand Historic Places Trust staff to the site, assisting with any requests that they may make;

earthworks in the affected area shall remain halted until the kaumatua, the Police and Historic Places Trust staff have marked off the area around the site and have given approval for earthworks to recommence, including notification that the archeological provisions of the Historic Places Act have been met and, if required, an archaeological authority (consent) has been granted by the NZ Historic Places Trust; and

where the kaumatua are satisfied that the koivi tangata are of Māori origin the kaumatua will decide in consultation with the NZ Historic Places Trust, what happens to the koivi tangata and will give their decision to the Police, the New Zealand Historic Places Trust and the land owner.

Add new Rule 32.1.2.14 to read as follows:

32.1.2.14 Unit title subdivision for the purpose of cluster housing within Maori Reserve 873 is exempt from the minimum allotment area requirement for the Rural Zone under Rule 32.1.1.1, Table 32.1.

Add new Rule 32.3.5 to read as follows:
32.3.5 Any subdivision of cluster housing within Maori Reserve 873 is restricted to unit title subdivision only.

Add new Rule 32.3.6 to read as follows:

32.3.6 Any unit title subdivision for the purposes of cluster housing within Maori Reserve 873 shall be accompanied by a land use consent in accordance with Rule 31.32.1.

Delete Rule 32.4.1 and Add new Rule 32.4.1 to read as follows:

32.4.1 Except where exempted under Rule 32.1.2, any subdivision that does not comply with Rules 32.1.1 to 32.1.1.26, 32.1.1.51 to 32.1.1.54 or 32.1.1.61 to 32.1.1.72, or 32.1.1.74 and 32.1.1.76 to 32.1.1.78 or 32.1.1.87 is a non-complying activity.

Add new Rule 32.4.10 to read as follows:

32.4.10 Any subdivision of cluster housing within Maori Reserve 873 other than by unit title subdivision is a non-complying activity.

Delete District Plan Map 47 and 132 and Add new District Plan Maps 47, 132 and 132A.

Add new District Plan Maps 176A and 176B.

Apply any consequential renumbering or amendments throughout the District Plan as necessary.
Appendix 3 - Servicing Report
WAIMAKARIRI DISTRICT COUNCIL

MEMO

FILE NO: DDS-06-05-02-36 / GOV-01-07

DATE: 28th January 2015

MEMO TO: Victoria Caseley (District Plan Manager)

FROM: Gary Boot, Project Delivery Manager

SUBJECT: Servicing Issues Associated with Tuahiwi MR873

Introduction

The purpose of this report is to provide a brief summary of water, wastewater and stormwater servicing issues associated with the proposed rezoning of Tuahiwi MR 873, associated with Land Use Recovery Plan Action 21.

The Council has consulted the community over the proposed rezoning and has received submissions from the public.

This report covers the status of the existing services, opportunities for expansion to cater for growth, and then specifically discusses the relevant submissions.

Background

The Tuahiwi Community primarily consists of a Residential 3 village, surrounded by rural land, with a large number of rural lifestyle blocks. While the village is zoned Residential 3, permitting development down to 600 square metres, the average property size is typically between 1,000 and 2,000 square metres.

The specific services are discussed in the following sections.

Water Supply

Existing Supply

A new water supply was installed in Tuahiwi in 2013 and now provides an on-demand supply to the Residential 3 village and a restricted supply (2,000 litres per day) to parts of the surrounding rural area.

The Tuahiwi water supply was extended from Woodend, and therefore forms part of the Woodend water supply. A plan showing the general extents of the water supply to the Tuahiwi area is shown in figure 1.
The water supply is available to all properties in the Residential 3 area, and approximately 50% of the properties have physically connected to the supply. The water supply was extended to rural areas where there was sufficient interest from the community to fund the extension.

The water supply was principally funded by the existing Tuahiwi Community, with the Council carrying approximately 50% of the cost to be recovered by way of Development Contributions from future property owners.

The cost to connect to the scheme when it was established was approximately $6,000 (including GST) per property in the village and $7,000 per property in the rural area. These costs were effectively discounted to encourage early take-up of the water supply.
Capacity to Cater for Growth

A large diameter trunk main has been installed through the village from Tuahiwi and has ample capacity for future growth to service both development within the village and expansions into the rural area.

The pipeline extensions into the rural areas are constructed from 50mm diameter mains, and have some capacity for growth. However, the exact capacity to accommodate a specific development in the rural area cannot be determined until the nature, size, and location of that development is known. That is largely because the capacity of the rural pipelines is at its greatest when close to the main trunk pipeline in the Tuahiwi Village.

The costs for a new development to connect to the water supply are also dependent on the location and size of the development. If a development is proposed adjacent to an existing water main, and there is sufficient capacity, then the only costs to connect are the water supply Development Contributions and the physical connection cost.

For a typical single lot development in the Residential 3 area, these costs would be as follows:

- Water Development Contributions: $6,280
- Physical Connection Cost: $1,265
- Total: $7,545 (incl GST)

For a typical single lot development in the Rural area, these costs would be as follows:

- Water Development Contributions: $5,025
- Physical Connection Cost: $1,380
- Total: $6,405 (incl GST)

There are also on-site costs associated with connecting to the water supply and these can vary significantly.

If a development were to occur in the rural area where the water mains had not already been extended, then the cost of extending the main would be in addition to the above costs.

Cost of Extending Services

The Council has a policy relating to the extension of services beyond the existing serviced area. This policy effectively permits the extension of services provided:

1) There is adequate capacity to service the property or properties requesting the service.

2) The extension must be cost neutral to the existing ratepayers. This essentially requires that both the cost of extending the services is met by the applicant and that the additional cost of maintaining and operating the services are met by the additional rates income from the new connections.

3) There is no other reason the 3 Waters Manager would have for declining the application. This is a general provision that has not been applied in any applications to date.
The key factors in determining whether the water supply can be extended to a development lot are capacity and cost. The capacity has been discussed above.

The affordability of extending the water supply to service a development area outside the existing serviced area is dependent on a number of factors including:

- The distance of the proposed development from the existing infrastructure.
- The required size of the main to service the proposed development.
- The number of properties that would be available to fund the water extension.

The cost to extend the water mains is also dependent on a number of factors and is therefore difficult to predict. However, to provide some indication, the cost to extend the water mains from the village into the existing rural serviced area was between $80/m and $120/m.

**Wastewater**

**Existing Service**

Reticulated wastewater is currently provided to the Residential 3 zoned properties within the Tuahiwi village by way of a Septic Tank Effluent Pump (STEP) system. This type of system comprises a privately owned on-site septic tank and pump system that collects wastewater and provides primary treatment on-site. The treated effluent is then pumped into a Council owned pressure pipe system.

A conventional gravity sewer system was not feasible for Tuahiwi due to the sparsely populated area and the high cost of installing the gravity mains.

The pressurised reticulated system in Tuahiwi extends along Tuahiwi Road from the corner of Bramleys Road to Turiwhaia Road. A pump station at the corner of Turiwhaia Road and Tuahiwi Road then pumps the effluent along Turiwhaia Road to the reticulation in Woodend.

A plan of the area currently serviced by the wastewater system in Tuahiwi is shown in Figure 1.

Many of the privately owned septic tanks within Tuahiwi are not adequately sealed and as a result of this groundwater enters the sewer system during periods of high rainfall and high groundwater table. This has resulted in the wastewater system becoming overloaded at times of very high rainfall, resulting in some properties being unable to pump into the wastewater systems. Some comments from the submitters make reference to concerns over the capacity of the wastewater system to cater for growth.

**Capacity to Cater for Growth**

Upgrades to the sewer reticulation were undertaken at the same time as the water supply was installed for Tuahiwi. This upgrade was intended to increase the capacity of the Tuahiwi sewer system and make provision for an additional 160 lots between Bramleys Road and Turiwhaia Road.

However, it is important to note that the true additional capacity will be dependent on the location of the development. While the wastewater reticulation has been upgraded to cater for an additional 160 lots, the capacity would be less if all lots were
located closer to Bramleys Road and would be more if all lots were located closer to Turiwhaia Road.

It is expected that an upgrade to the Turiwhaia Road pump station will be required at some time in the future, but this will be undertaken as required and need not represent a significant impediment to growth in the Tuahiwi area.

Cost of Extending Services

As with the water supply, the costs for a new development to connect to the wastewater system are met by the applicant and are dependent on the location and size of the development. If a development is proposed adjacent to an existing wastewater main, and there is sufficient capacity, then the only costs to connect are the wastewater Development Contributions and the physical connection cost. However, if the wastewater main needs to be extended to a development, then the cost of extending the main is also met by the development.

For a typical single lot development in the Residential 3 area and the rural area, these costs would be as follows:

Wastewater Development Contributions: $5,075
Physical Connection Cost: $1,500
Total: $6,575 (incl GST)

The issues and costs associated with extending the sewer reticulation beyond the existing extent of the system are largely the same as those for the water supply.

Significantly, as the existing wastewater reticulation system largely does not extend beyond the Residential 3 area, any properties in the rural area wishing to connect into the wastewater network would need to fund the cost of extending the reticulation from the village to the development location.

If the proposed development were a considerable distance from the village, then the cost of the wastewater extension could be considerable. The variable cost of servicing can best be demonstrated by a series of examples.

Tables 1, 2, and 3 provide a range of rough order costs for connecting to the reticulated sewer based on the distance of the development from the existing sewer reticulation and the number of dwellings involved.
Table 1: Cost of wastewater service at a distance of 0m from existing services.

<table>
<thead>
<tr>
<th>Distance of Development from Existing Reticulation (m): 0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Clusters</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Total Number of Dwelling within Clusters</td>
<td>1</td>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Development Contributions</td>
<td>$5,075</td>
<td>$20,300</td>
<td>$40,600</td>
<td>$60,900</td>
</tr>
<tr>
<td>Boundary Connection Cost</td>
<td>$1,500</td>
<td>$6,000</td>
<td>$12,000</td>
<td>$18,000</td>
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<tr>
<td>Sewer Main Extension Cost</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Total Estimated Cost</td>
<td>$6,575</td>
<td>$26,300</td>
<td>$52,600</td>
<td>$78,900</td>
</tr>
<tr>
<td>Total Cost per Dwelling</td>
<td>$6,575</td>
<td>$6,575</td>
<td>$6,575</td>
<td>$6,575</td>
</tr>
</tbody>
</table>

Table 2: Cost of wastewater service at a distance of 500m from existing services.

<table>
<thead>
<tr>
<th>Distance of Development from Existing Reticulation (m): 500</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Clusters</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Total Number of Dwelling within Clusters</td>
<td>1</td>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Development Contributions</td>
<td>$5,075</td>
<td>$20,300</td>
<td>$40,600</td>
<td>$60,900</td>
</tr>
<tr>
<td>Boundary Connection Cost</td>
<td>$1,500</td>
<td>$6,000</td>
<td>$12,000</td>
<td>$18,000</td>
</tr>
<tr>
<td>Sewer Main Extension Cost</td>
<td>$69,000</td>
<td>$69,000</td>
<td>$69,000</td>
<td>$69,000</td>
</tr>
<tr>
<td>Total Estimated Cost</td>
<td>$75,575</td>
<td>$95,300</td>
<td>$121,600</td>
<td>$147,900</td>
</tr>
<tr>
<td>Total Cost per Dwelling</td>
<td>$75,575</td>
<td>$23,825</td>
<td>$15,200</td>
<td>$12,325</td>
</tr>
</tbody>
</table>
Table 3: Cost of wastewater service at a distance of 1,000m from existing services.

<table>
<thead>
<tr>
<th>Distance of Development from Existing Reticulation (m):</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Clusters</td>
<td>1</td>
</tr>
<tr>
<td>Total Number of Dwelling within Clusters</td>
<td>1</td>
</tr>
<tr>
<td>Development Contributions</td>
<td>$5,075</td>
</tr>
<tr>
<td>Boundary Connection Cost</td>
<td>$1,500</td>
</tr>
<tr>
<td>Sewer Main Extension Cost</td>
<td>$138,000</td>
</tr>
<tr>
<td>Total Estimated Cost</td>
<td>$144,575</td>
</tr>
<tr>
<td>Total Cost per Dwelling</td>
<td>$144,575</td>
</tr>
</tbody>
</table>

The following points should be noted in relation to the costs in the tables above:

1) The reticulation costs are of rough order only and include GST, but exclude design and contingency costs.
2) The reticulation costs assume that a 50mm diameter main will be installed at a rate of $120/m (+ GST). Therefore the costs will be higher if a larger diameter main is required.
3) The above costs do not include on-site costs for collecting the wastewater and pumping it into the reticulation.

The tables above highlight that the affordability of providing wastewater services to cluster housing developments in the rural area beyond the existing extents of servicing is highly dependent on the distances from the existing services and the number of proposed development units.

The Council has not made any budget provision for funding extensions of the wastewater network into the rural area. In theory, it would be possible for the Council to fund the extension of wastewater mains into rural areas and recover the costs through Development Contributions from connecting properties. However, this is unlikely to be favoured by the Council as the rate of take up would likely be very low and the debt servicing of such expenditure makes such speculative installation of infrastructure uneconomic.

In short, while the wastewater network is available in the village area and can be extended to the rural area, the likely costs of doing so are likely to be only affordable where the development is relatively close to the village and/or there are multiple developments over which to apportion the costs.

**Stormwater Drainage**

The existing stormwater drainage system in Tuahiwi is largely based on a network of open drains, which are managed and maintained by the Council or the riparian landowner. The principal drain in the area is Maori Drain, which discharges to the Cam River.
There is evidence of some springs within MR873 and soakage to ground is poor and limited by silty loam soils, which prevents discharge to ground as an effective stormwater disposal method.

*Residential 3 Zone Extension*
Within the proposed extension of the Residential 3 zoning in the village, stormwater will be treated and attenuated in stormwater management areas prior to discharge to the downstream receiving environment. The proposed stormwater management areas as shown on the ODP have been based on the following principles:

- The stormwater system should mimic the natural runoff as much as possible and return the stormwater to its natural disposal point. That is, areas that currently discharge to a certain drain should continue to discharge to that drain.
- The stormwater discharge after the development should achieve stormwater neutrality to ensure the quality and quantity is equivalent to that of the pre-development discharge.

It is expected that stormwater from most development areas would be serviced by way of grassed swales to provide treatment and attenuation ponds prior to discharging into the existing drainage system.

*Cluster Housing*
Cluster housing within the wider MR873 will need to manage stormwater onsite to achieve stormwater neutrality. This can be achieved by using rainwater tanks or onsite swales or ponds to achieve stormwater attenuation or by incorporating Low Impact Design measures into the design of the buildings and associated hardstanding areas. Obviously the larger the impervious area of the cluster housing development the larger the stormwater device needs to be. As a rule of thumb an allowance of 2m$^3$ of storage is required for every 100m$^2$ of impervious area.

It is not possible to determine likely costs for possible development, as each solution will depend on the relative drainage constraints and the nature of the individual development.

*Flooding*
The MR873 is a risk of flooding both from breakout flooding from the Ashley River and also from localised flooding from the upstream catchment. The work undertaken by Environment Canterbury in 2008 shows that the southern and western part of MR873 is prone to high hazard flooding in the 200 year event (refer Figure 2, below), which is not suitable for habitable dwellings. The proposed extension of the Residential 3 zoning around the village is not prone to breakout flooding from the Ashley River.
Figure 2: Ashley River Breakout Flooding

The flood hazard maps for the localised flooding are similar to the breakout flooding maps except the additional low hazard flooding is shown within the central area of MR873 (refer Figure 3 below). This is effectively out of bank flow from Maori Drain and other smaller drains during the 200 year event.
The building of habitable dwelling in no (clear) or low (green) hazard areas is appropriate provided the advice from Council relating to minimum floor levels is achieved (refer Table 4 below).

Table 4: Council Advice on Building Floor Levels

<table>
<thead>
<tr>
<th>Hazard Classification</th>
<th>Council Advice</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Hazard</td>
<td>The standard requirements of the Building Code for floor levels apply. Note that in rural areas the advice is that all floor levels should be a minimum 400mm above the surrounding ground. There is still a risk of shallow flooding and overland flow in these areas.</td>
</tr>
<tr>
<td>Low Hazard</td>
<td>It is recommended that building sites are located clear of the green and on the white area with a floor level 400mm above the surrounding ground. Otherwise if located in the green area, floor levels should be a minimum of 600mm above the surrounding ground. If the applicant wishes to build a lower floor level this must be supported by a flood risk report accompanying the building consent application showing the 50 year flood level and proposed floor level.</td>
</tr>
</tbody>
</table>
The building of habitable dwellings in medium or high hazard areas is generally not appropriate. A specific flood risk assessment needs to be prepared in medium hazard areas, while high no buildings should be placed in high hazard areas due to the significant risk of flooding.

Response to Submissions

Submissions Relating to Water and Wastewater Servicing

A total of 26 formal submissions were received on the proposed rule changes during the September / October 2014 consultation. From these submissions, the following general themes were expressed in relation to water and wastewater servicing:

1) Support for requirement for intensified development to connect to reticulated services (ECan).
2) Concern over the use of septic tanks in an area with elevated water table (Mustonen).
3) Opposition to the requirement for connection to reticulated services (Stanley).
4) Query regarding the capacity of water and wastewater services to accommodate development (Stott).
5) Query ability to continue using existing wells to service development (Rahurahu).
6) The NZFS requests that a rule be included requiring that an on-site firefighting water supply be provided wherever the reticulated supply does not provide fire fighting protection.

These submissions points are discussed below:

1) **Support for requirement for intensified development to connect to reticulated services (ECan).**

WDC Response:

The support of ECan for connecting to the reticulated services is noted. This requirement is included in the proposed plan change in order to give effect to the Regional Policy Statement. It is noted that while connecting to the reticulated wastewater in particular will reduce the risk of contaminated ground and groundwater, it may also place a significant financial burden on cluster developments in the rural area that are not within the existing reticulated area.

2) **Concern over the use of septic tanks in an area with elevated water table (Mustonen).**

WDC Response:

The concern of Mustonen relates to the intensification of development, and the potential effect on ground and groundwater quality if wastewater were to be treated by way on site treatment systems with discharges going to ground. This concern is largely addressed through the requirement of the RPS and the proposed Plan Rules that require intensified development to connect to the reticulated services. Any development not wishing to connect to the reticulated services would require a non-complying resource consent and in which case the effects on the environment would be considered carefully before any consent were granted or declined.
3) **Opposition to the requirement for connection to reticulated services (Stanley)**

WDC Response:

The submission of Stanley presents the opposing view to that of ECan and Mustonen. The examples of servicing costs presented in tables 2 and 3 demonstrate that for developments situated a considerable distance from the existing reticulation (especially the wastewater), the cost of connecting to reticulated services may be very high, and may in some instances be prohibitive. Given the vast area of potential development with the MR873 rural area, it simply is not practicable or affordable for the Council to extend reticulated services to this area. Therefore, the cost must be borne by the developers, who are the beneficiaries of the work.

The proposed servicing arrangement is likely to restrict development to areas close to the existing serviced area, unless a consent can successfully be obtained for development without connecting to the reticulated services.

While the requirement to connect to services is clearly restrictive for developments in the rural area, it is important to be mindful of the reasons for such a requirement. Tuahiwi is known to have ground conditions that are generally not well suited to on-site wastewater disposal. This risk of not restricting servicing provisions in this way is that there could be a proliferation of on-site wastewater treatment and disposal systems that could ultimately lead to contamination of the ground, groundwater, and waterways. This would have corresponding adverse environmental and public health effects.

4) **Query regarding the capacity of water and wastewater services to accommodate development (Stott).**

As discussed in the earlier sections of the report, the Woodend water supply and the Eastern Districts sewer scheme both have adequate capacity to cater for the planned and foreseeable development within Tuahiwi. It is acknowledged, that there are some sections of the reticulation systems that may require upgrading as growth occurs, but this work is generally planned and undertaken by the Council and funded through the recovery of Development Contributions levied against new developments.

5) **Query ability to continue using existing wells to service development (Rahurahu)**

It will be possible to continue to use existing wells for irrigation purposes, but the rules require that potable water be provided by reticulated supply. Alternatively a consent could be sought to continue using an existing well, although this would be a non-complying activity.

6) **Provision for fire-fighting water supply**

The New Zealand Fire Service have submitted that a rule be included in the Plan requiring that if the reticulated potable water supply is unable to meet the requirement set out in SNZ PSA 4509:2008 for reticulated supplies, alternative fire-fighting water supply as outlined in SNZ PSA 4509:2008 shall be provided.
The water supply within Tuahiwi village has capacity and fire hydrants to provide a fire fighting water supply. However, the water supply in the rural area does not have capacity given the restricted nature of the supply.

The key question here is whether it is appropriate and necessary to include a rule in the Plan requiring provision for on-site fire-fighting protection which is over and above the requirements of the Building Code. This should be considered further and incorporated into the rules if required.

Submissions Relating to Stormwater and Flooding

The following general themes were expressed in relation to stormwater servicing and flooding:

1) Land has high water table, is wet in winter, is subject to flooding and watercourse not being maintained (Cromwell / Mustonen).
2) Land is low lying and has existing drainage problems (Evans).
3) Any development will make existing flooding worse (Cromwell / Evans / Mustonen / Manson / Newton).
4) Supports avoidance of development in high hazard areas (Environment Canterbury).
5) Current drainage system inadequate and should be resolved before development (Manson / Newton).
6) Existing flooding getting worse and retention ponds not practical (Moody)
7) Land is boggy for most of the year and prone to flooding (Wise).

These submissions points are discussed below:

1) **Land has high water table, is wet in winter, is subject to flooding and watercourse not being maintained** (Cromwell / Mustonen).

WDC Response:

Tuahiwi experiences high groundwater and spring flow during winter months, which affects the performance of the drainage system including the roadside drains.

The existing flooding at 261 Tuahiwi Road (Cromwell property) and 273 Tuahiwi Road (Mustonen property) is associated with the unnamed drain at the rear of the property, which is recorded on the Council’s drainage maps as a drain maintained by Council. It is acknowledged that the current state of the drain requires attention and Council has arranged for the drain to be inspected and cleaned. In addition to this there are several private culverts across this drain that hold back the flow during rainfall events and cause localised flooding issues. Council will, as part of the cleaning work, advise any landowners who need to upsize their private culverts. This work will improve the localised flooding issues referred to in the Cromwell submission.

2) **Land is low lying and has existing drainage problems** (Evans).

WDC Response:

The land around Tuahiwi is relatively low lying compared to the rest of the District. Tuahiwi Road generally traverses a localised ridge with land either side
of the road falling on a 1:200 fall either towards Maori Drain or the Cam River. The Residential 3 zone extension area has adequate cross fall to collect and convey stormwater from to the proposed stormwater management area located in the low point of the site.

3) Any development will make existing flooding worse (Cromwell / Evans / Mustonen / Manson / Newton).

WDC Response:

Any development within the Residential 3 zone or MR873 cluster housing area will need to manage the stormwater runoff such that it does not have an adverse effect on adjacent properties. This will require the provision of stormwater management areas to treat and attenuate stormwater prior to discharge. While large scale filling is not anticipated, any filling within these areas will need to ensure that flood waters are not displaced or redirected onto adjacent property.

4) Supports avoidance of development in high hazard areas (Environment Canterbury).

WDC Response:

The support of Environment Canterbury for the requirement that development avoids high hazard areas is acknowledged. This requirement is included in the proposed plan change in order to give effect to the Regional Policy Statement. Any development in medium or low hazard areas will still need to provide minimum floor levels above the 200 year flood level as per the Regional Policy Statement.

5) Current drainage system inadequate and should be resolved before development (Manson / Newton).

WDC Response:

The property owned by the Manson’s at 166 Greens Road boarders on Maori Drain and the property owned by the Newton’s at 109 Te Pouapatuki Road was flooded in the June 2014 event due to flow from the Maori Drain overtopping its banks and overflowing Te Pouapatuki Road. Extensive maintenance work, including tree removal work, was undertaken on the Maori Drain between Turiwhaia Road and Te Pouapatuki Road following the June 2014 flood event. While this work has improved the drainage system in the area the land is still prone to flooding. The Council has no plans to increase the capacity of the current drainage system, but will actively maintain the designated drains in this area to ensure the system is fully functional in future storm events.

6) Existing flooding getting worse and retention ponds not practical (Moody).

WDC Response:

The property owned by the Mr Moody at 803 Main North Road is low lying and positions in a localised low point. A spring is located to the north of the property and the area is drained via Moodys Drain which discharges into the Cam River via the Maori Drain diversion (aka Maori East Drain). The area is prone to flooding from high groundwater, runoff from upstream properties during rainfall events and backing up of flow from the Cam River.

Historical development within the Cam River catchment, in areas such as Rangiora, Tuahwi and Woodend, may have had an impact on the flooding resulting from backing up of flow from the Cam River, however all modern developments within the previous 10 years have had to provide stormwater attenuation to mitigate any potential downstream effects. Similarly, any future
development will need to manage the stormwater runoff such that they do not have an adverse effect on adjacent or downstream properties.

Following the June 2014 event and feedback received from residents on the lower reaches of the Cam River, Council has arranged for the willows in the reaches of Cam River between Revells Road and the Northern Motorway to be removed by Environment Canterbury. This will improve the flow in the Cam River and reduce the backing up of flow onto this property.

The main reason for the seasonal flooding on this property relates to the spring flow, high groundwater levels and low lying topography nature, which means the land is wet for extended periods of time during winter months.

7) Land is boggy for most of the year and prone to flooding (Wise).

WDC Response:

Maori Drain traverses the middle part of the property owned by the Wise’s at 440 Tuahiwi Road. This part of the property as well as upstream and downstream areas on adjacent properties are shown as low flood hazard classification. Council’s advice for low flood hazard areas is to either relocate proposed building to a no hazard area or to raise the floor level a minimum of 600mm above the existing surrounding ground level. Any cluster housing development in this area will need to consider both flood risk and site drainage (i.e. to address the wet / boggy ground) as part of the positioning of buildings within the property.

Gary Boot
Project Delivery Manager
Appendix 4 - Cluster Housing Examples
2 hectares / CLUSTER HOUSING
Option 1

PARCEL SIZE = 20,000m²
DEVELOPABLE AREA = 4,000m²
No. DWELLINGS = 7
AVERAGE DEVELOPED LOT SIZE = 571m²
MAXIMUM SITE COVERAGE = 13%
AVERAGE DWELLING SIZE = 115 - 200m²

COMMUNITY SPACE - 80%
INDIVIDUAL ALLOTMENTS - 20%
2 hectares / CLUSTER HOUSING
Option 2

PARCEL SIZE = 20,000m²
DEVELOPABLE AREA = 4,000m²
No. of DWELLINGS = 6
No. of COMMUNITY BUILDINGS = 1
AVERAGE DEVELOPED LOT SIZE = 571m²
MAXIMUM SITE COVERAGE = 13%
AVERAGE DWELLING SIZE = 115 - 200m²
COMMUNITY SPACE - 80%
INDIVIDUAL ALLOTMENTS - 20%
ROAD
2 hectares / CLUSTER HOUSING
Option 3

PARCEL SIZE = 20,000m²
DEVELOPABLE AREA = 4,000m²
No. DWELLINGS = 7
AVERAGE DEVELOPED LOT SIZE = 571m²
MAXIMUM SITE COVERAGE = 13%
AVERAGE DWELLING SIZE = 115 - 200m²

COMMUNITY SPACE - 80%
INDIVIDUAL ALLOTMENTS - 20%
ROAD

BIRDSEYE VIEW

PLAN VIEW
5000m² / CLUSTER HOUSING

PARCEL SIZE = 5,000m²
DEVELOPABLE AREA = 1,000m²
No. DWELLINGS = 3 or 4
AVERAGE DEVELOPED LOT SIZE = 142m²
MAXIMUM SITE COVERAGE = 13%
AVERAGE DWELLING SIZE = 45 - 132m²

COMMUNITY SPACE - 80%
INDIVIDUAL ALLOTMENTS - 20%
ROAD

---

Option 1

BIRDSEYE VIEW

PLAN VIEW
5000 m² and 2 hectares/ CLUSTER HOUSING

PLAN VIEW OF MULTIPLE CLUSTERS (5000 m² plots)

3 x 5,000 m² = 15,000 m²
3 + 4 +4 = 11 dwellings

PLAN VIEW OF MULTIPLE CLUSTERS (2 hectares plots)

3 x 20,000 m² = 60,000 m²
3 x 7 = 21 dwellings
Appendix 5 – List of Supporting Technical Reports

The following technical reports have informed this Further Information Report. Given the size and specialist nature of these documents they are not included with this report but are available on the Council’s website, with copies available on request.

1. Waimakariri District Council (October 2011): Kaiapoi Maori Reserve Kainga-Nohanga Pre-Consultation Concept and Scoping Report
4. Common Ground (September 2014): Maori Reserve 873: Cluster Development
8. Waimakariri District Council (September 2014): Iwi Management Plan Assessment
11. Waimakariri District Council (February 2015): Unit Title Background Information
12. Kainga Whenua Grant Information (December 2013)
Kaiapoi Māori Reserve Kainga-Nohoanga
Pre-Consultation Concept and Scoping Report

Community Development on Māori Reserve 873
Waimakariri District
October 2011
Introduction

The Tuahiwi Marae Trustees, Mana-Waitaha Trust and Ngāi Tūāhuriri Runanga are looking to initiate an opportunity for sustainable community development on the land known as the Kāiapoi Māori Reserve 873 (MR 873).

The desire to recreate a kainga nohoanga (traditional home) has been increased with the recent earthquakes.

The Kāiapoi Māori Reserve 873 is an outcome of the 1848 Canterbury Purchase, a contractual agreement between Ngāi Tahu and The Crown, which promised among other things, that their Kainga-Nohoanga would be placed aside as settlement land for Ngāi Tahu and their descendants to live upon.

This proposal for resettlement would have the benefit of providing housing options for those recently displaced from Christchurch, but also to reinvigorate the Tuahiwi area as it was originally envisaged.

This concept provides a simple development scenario for whanau land within the reserve as a basis for discussion. It serves purely as a starting point for consultation and discussion on how a development proposal might be advanced.

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Contributors
Site Information

Village

Tuahiwi Village

Rural

Koratuwhetekamon River

Tuahiwi Urupa

Open Field

St. Stephens Church

Housing Clusters

Tuahiwi School

Enclosed Rural Landscape

Maatohi Marae

Rangiora

Community Facilities
- Full rural town facilities
- Rangiora High School (school bus access from Tuahiwi)
- Railway Connection

Woodend

Community Facilities
- Convenience shops
- Primary School/Preschool
- Medical practice
- Restaurant/Pubs/Cafes
- Council Parks/Playgrounds
- Postboxes

Tuahiwi Village

Facilities listed to left plus
- Preschool

Notable exclusions
- Public bus
- Convenience shops
- Remain on surrounding towns for other services

Kalapoi

Community Facilities
- Full satellite town
- Kalapoi High School (school bus access from Tuahiwi)

Key

Existing Site Elements
- MR 873 Site Boundary
- Buildings
- Floodplain
- Wells
- Drain
- Sewer
- River/Stream
- Roads
- 1m Contour Intervals

Planting
- Forestry
- Orchard
- Shelter belts
- Trees
- Greenbelt cluster
- Polo Field

Existing Soils
- Elevated drier fertile soils
- Lower, wetter varied fertile soils

Zoning Provisions

- Proposed West Woodend Residential Development (WW6) (ECan RPS Proposed Change 1)
- Proposed West Woodend Commercial Development (WW5) (ECan RPS Proposed Change 1)
- Existing Residential 3 zone (WDC District Plan)
- *all other land within MR 873 is zoned Rural (WDC District Plan)
Site Heritage

Important Viewshaft of Maungatere (Mt Grey) from Tuahwii Village

Viewshaft & Winds

Connections and Facilities

There is a strong need for better public transport connections to surrounding towns and better pedestrian cycle connections within the reserve.

Soil and Water

The earliest habitation patterns respected the natural landscape but since then development has proceeded which doesn’t respect natural factors such as soil and hydrology.

Zoning Provisions & Land Ownership

Existing Zoning
- Tuhahi village - WDC District Plan, residential 3 currently. All remaining land within MR873 is currently zoned rural.

Land Status: West Woodend
- WW5 Commercial (RPS PC1)
- WW6 Residential (RPS PC1)

Land Ownership
- Maori Title Land
- General Title under Maori Ownership
- Community Held Land
- MR 873 Boundary

KEY:
- Improve public connections
- Improve pedestrian connections
- Community Hub based in Tuahwii Village
- Existing Roads
- Existing Highways
- MR 873 Boundary

Existing Soils
- Probable living soils - higher, fertile, drier, possibly more stable soils, geotechnical assessment of sustainability for building required

Probable non living soils - lower, less fertile, wetter, possibly less stable soil, geotechnical assessment of suitability for building required

Existing Water
- Floodplain
- Private Existing Wells
- Natural Waterways
- MR 873 Boundary
Concept Vision

The following vision, principles and elements are set out for the purpose of pre-consultation:

Kainga-nohoanga Concept Vision

The kaupapa for the original MR873 as it was formed in 1840 is as follows:

Kainga nahoanga (place of residence). This meant that the land was set aside for our ances-
tors and their descendants to live upon.

Mahinga kai: The right of our people to cultivate, hunt and gather their traditional and modern
foods was assured. The fundamental right here was that “fresh flowing water” was assured
by the Courts for all our mahinga kai.

The right to subdivide. In 1862 our ancestors demanded the right to sub-divide the land before
Governor Gore-Browne. This right to sub-divide was qualified by the principal that land
was to be: “That as a fundamental condition of the proposed grants, the estates and interests
created thereby should be entailed, so as to make them inalienable to persons of other than
the Māori race.”

Concept Principles

To complement the original kaupapa the following Concept Principles are proposed:

Whakatū Kaupapa - The overarching principle is to fundamentally enrich the human and
natural character of this land and it’s people through this proposal.

Te Ao Māori - To provide an opportunity for full expression of Māori community living and cultural
values.

Whakatū Mauri - To recreate the full natural health, character and life supporting capacity of
this land.

Kainga-Nohoanga - To recreate Tuahiwi (MR 873) as the true dwelling place of Ngāi Tūāhuriri.

Concept Elements

To achieve the design principles stated above, the following elements are included and may be
developed as part of this model.

Whanau Living Models
- Create models for whanau-based living (multi house and family) into whanau clusters in rural
and village settings. The development of these clusters would also suit other living situations as
will be shown in the concept.

Community Facilities
- Propose an extension of the existing community facilities to recognise the proposed size and
status of the community, but also as part of a wider cultural regeneration.

Commercial and Community Food Production
- Create opportunities for a range of potential, suitable production options for the site and
community, such as: vegetables/fruit/nut crops; organic/free range meat; fish; wood production;
energy; and carbon credits from ecological planting, and link this to community
development.

Cultural Development
- Propose land to be allocated for a range of cultural, educational and commercial facilities
that may also have the benefits of employment, education, revenue and cultural expression.

Connections
- Create a permeable community where vehicle traffic is minimised and safe cycle/pedes-
trian connections are maximised for social and sustainability reasons.

Ecological Framework
- Recognise the underlying indigenous ecosystems of the land, respect and recreate these
where possible with emphasis on water health, cultural concepts, natural habitats (mahinga
kai) and wise resource use within a strong ecological framework.

Permaculture
- Base production and environmental aspects of the concept on a permaculture (as nature
intended) approach to land health, ecology and production.

Low Impact Design
- Recognise and include Low Impact Design measures in the concept, recognising cultural
sensitivities and including house design, power supply, transport, water supply and reuse,
treatment and reuse of effluent; sustainable materials and development character.

Possible Design and Consultation Process

There are well recognised design and consultation process examples for kainga nahoanga.
One established model involves:

1. Kaupapa
   Develop an idea that summarises your vision.

2. Rangahau
   Fact finding- Gather relevant information about the land and its governance.

3. Whakihāri
   Working with people sharing the vision with whanau.

4. Mahi Hangarau
   Detailed technical design, options and associated costs.

5. Mahere
   The final papakāinga development plan.

[Author Unknown, 2009. Te Kei Parearea Mo Ngā Papakāinga, Māori Housing Toolkit.]

The process for this project may well follow this model in principle, but recommendations will be
made as to how this might be varied to suit this project.
Pre-Consultation Concept

Whanau Living
- Village Clusters
- Rural Clusters

Better Community Facilities
- Cultural Studies/Expression
- Land Based Studies/Commerce
- Marae/Community Hub
- Education/Recreation

Better Connections
- Existing Road
- Ecology/Habitat Corridors
- Heritage Pathways
- Waterways
- Pedestrian/Cycle Paths

Environment
- Permaculture
- Low Impact Design & Development

West Woodend
- Medium Residential Sites
- Large Residential Sites
- Commercial Space

*Assessment of residential and commercial land needs to be made in association with a broader urban development assessment for Woodend Township

Design Inspiration
- Mahaanui
  - The name of the Rūnanga Hall at the marae in the Taurangi village and the name of Maui’s famed waka, from which he “fished up” Te Ika a Maui, the North Island.

- This land will be our waka and carry our people forward

Identity
Progress
Community
**Whanau Living Models**

To explore the concept of whanau living, the following models are provided.

**Whanau Village Cluster**

Village house sites (say 600m²) are based around a wharenui with planting for ecology, privacy and production. Pathways connect to the community and LIUDD sustainable systems and production are laid out to suit the site.

**Whanau Rural Cluster**

Rural clusters allow generous space for house sites (say 1500m²), communal open space, sustainable systems and rural production within the cluster. These may be placed at modular intervals to allow for further rural clusters or productive land use.

**Independent Village Cluster**

Independent houses may be based around a common space. The layout would still involve sustainable systems but may allow non-whanau living options.

**Studio Village Cluster**

Connected apartments or studios would create opportunities for single, temporary or education based accommodation containing the same sustainable systems.
Green Framework
planting around houses, for privacy, shelter and along Connections

Village House
600m² family house site

Rural House
1500m² family house site with gardens

Connecting pathways
between houses and community facilities maximised

Intensive Production
area for community to grow own food

Power System
for community to generate their own power

Water System
clean water storage for family use

Extensive Production
area for community to graze animals, crop food and fuel and recreation opportunities

Recreation Space
be used by the surrounding rural community

Stormwater System
place to catch all stormwater/grey water for later use

Access Road
vehicle access minimised

Effluent System
sewage storage, treatment and cleansing

Wharenui
the community meeting place

Sustainable System Models:

Water System Model

Effluent System

Power System Model

Waste System Model
Recommendations

Concept Issues

Sustainability – This concept takes a sustainable approach to the land for which it is proposed, increasing the life supporting capacity of the MR 873 land has obvious long term benefits, particularly in relation to the culture of the hapu. But there are also likely costs. These may include a higher upfront cost to this development than for more conventional developments. This premium will need to be carefully assessed in relation to the factors listed below.

Social Cohesion – A whanau based concept such as this relies on a high degree of social cohesion and cooperation. This is an overwhelmingly positive aspect of the concept, but the implicit responsibilities of such social living need to be explored by the community during consultation.

Flexibility and Staging – Because no-one is sure at this stage of the likely pace or scale of development, the plans for the development need to be flexible. The planning process will need to look at options for development that allow sensible economies of scale and logical patterns of development for services. Also any Plan Change proposal would need to accommodate this flexibility.

Capacity – As stated above, we are unsure of the likely pace or scale of development. Early responses from whanau will greatly assist with this.

Existing Information has 300 families keen to move to Tauiwi, however more detailed information on demand and location will greatly assist with planning.

Ownership Pattern – The existing pattern of Maori owned land is fragmented. This has obvious implications for a cohesive, whanau and ecology based development.

There will also need to be assessment of the future ownership issues. If whanau based living means multiple ownership and occupation of multiple land titles, this will have implications for future property and occupation rights as well as issues such as insurance and finance.

Planning – There is a complex planning process to be undertaken with any project of this scale and ownership complexity. However this is secondary to the community process for development of the concept. As will be seen from the proposed process, only after the community has shaped the development proposal will it be submitted for planning approval. Of course the councils will be involved in the process as it develops and currently there is opportunity to move the development proposal forward quickly due to the need created by the earthquakes.

A planning summary of the existing provisions has been prepared and will be available with other project information.

Servicing – There are a number of detailed servicing issues to be addressed when looking at increasing the population of any area such as is proposed. This project has a clear ecology, cultural and sustainability focus and this will affect what options are assessed and what outcome is reached.

A review of the existing servicing issues has been conducted and this information is available with other project information. The conclusion of that review is that there are a number of technically feasible options and these will be assessed in more detail when there is more information on likely development demand and location.

Tauiwi is currently undergoing a water supply review and planning process. It is recommended that that process is run concurrently with the consultation for this concept so that complementary options can be prepared.

Concept Summary

This proposal is an opportunity to develop a socially cohesive and environmentally responsible project. There are significant aspects that do not fit a conventional assessment and consenting framework. There are also complex servicing options to be addressed. But these situations also represent the opportunity to provide innovative solutions and can be dealt with using appropriate design, consultation and strong vision.

In the short term there is an need to complete a geotechnical assessment of the site to confirm development options. There are also gaps in the existing site information, especially land ownership, demand and location which need to be resolved before further assessment is carried out.

This proposal is a rare opportunity, but it is also an urgent one. The need to re-house people is well known and the opportunity to work together with the existing CERA land development process needs to be capitalised on for the benefit of all involved.

Below is a series of steps that may be taken in the short term to assess the known outstanding issues and some recommendations on how the process might unfold.

Proposed Consultation Process

October 8
- Maori land owner release of Pre-Consultation Concept for Poroporoaki

October 11
- Mall out and feedback form to Maori land owners
- General Information letter to remaining MR 873 land owners

October
- Whanau discussion on Concept, ownership confirmation, known whanau land demand and other questions arising

November 4
- Initial Feedback Closed

November
- Geotechnical report compiled
- Further site information compiled
- Land ownership confirmed in detail

December 6
- Wananga/workshop to discuss land owner feedback and geotechnical and site information

November
- Public release of Concept for feedback
- Whanau discussion/ful on development ideas, visions and constraints and likely location for development
- Technical Assessments completed and draft options prepared

March
- Wananga/workshop to discuss development options

March
- Outline Development Plan prepared from favoured options

April
- Formal Consultation with the community and then the public

June
- Plan Change Application lodged with councils
Development Examples and References:

Te Keteparaaha Mo Nga Papakāinga
The Māori Housing Toolkit is a step-by-step guide designed to assist Māori to develop papakāinga proposals (development plans) on multiple owned Māori land.

Permaculture in New Zealand’s mission is to act as a national hub in promoting and empowering permaculture education, activism and advocacy in Aotearoa NZ.

A Deeper Shade of Green
Sustainable Urban Development, Building and Architecture in New Zealand

Low Impact Urban Design & Development Principles for Assessment of Planning, Policy and Development Outcomes
By: Majore van Roon & Henri Van Roon

Earthsong (Ranui, Waitakere City) was self-developed as an eco-neighbourhood by a group of people with a motivation of living in both a more cooperative and a more environmentally sustainable way.

Whangarei District Council

Hastings District

Earthsong Eco-Neighbourhood

Bibliography


Earthwork Landscape Architects, Site Information. July 2011.


Image References:

Heritage imagery:
http://christchurchcitylibraries.com/Heritage/Photos/Disp/6161/A100011/M879/asp;
http://aoraki.hkirocks.blogspot.com/; (bottom middle) terara.govt.nz; fairfactsmedia.com

Other website imagery from various sources including: Ngāti Tahu, SPARC.

Cadastral Information/Maps:
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print double sided, A3 landscape & bind on left

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• 'Water Gresser' by Ida Lougheed, 1974
  Christchurch Art Gallery Collection
  https://culture.chchcity.govt.nz/collection/objects/74-152/
**INTRODUCTION**

The landscape implications of various development options for in and around Taahiti, within Kaiapoi Māori Reserve 873, are explored. Biophysical, socio-cultural and perceptual landscape attributes are all addressed.

The reserve land was set aside 165 years ago for generations of Ngai Tahuuri to live upon, to cultivate food, and, for wetlands and fresh flowing water for mahinga kai. This intent and subsequent events are recognised in addressing combinations and variations of development options to identify potential landscape issues and opportunities.

Zoning for development within and of an area currently zoned Rural requires consideration of potential effects on rural character and amenity both within the zone and of the surrounds. The Waimakariri District Plan (WDP) seeks that land use activities avoid, remedy and mitigate adverse effects, and that alternative methods be explored.
The current character of the land tells a story of the subsequent challenging relationship Ngāi Tuhurū have had with this inadequate resource. More than half a century ago most owners were forced to move to the city. Whilst Tuahini Bush was a former feature of these lands, the native forest has been removed. The swale lands have been drained. Former well-vegetated streams and wetlands, that were prime mahinga kai, have been severely degraded. Groundwater through the reserve is frequently contaminated. Waterways are largely devoid of native riparian vegetation. Most of the land is farmed. Thus, whilst the natural features have been degraded over the last century, opportunity is needed to enable restoration of aspects of the natural systems in these lands.
SITE ARTICULATION IN CONTEXT

The site, MR 873, is on the lower edge of the outwash fan to the Ashley River, involving a pair of gentle stony ridges formed by Ashley flood paths, with broad boggy swales from the silts shed either side. Existing development is concentrated along the well-drained ridges. (refer to Existing Development map on the left)

The site, located on the richer soils to the east of the lower plains, exhibits a landuse intensity and settlement patterning that is somewhat typical of these lower plains. (refer to Rural Settlement Patterning maps & graphics on p. 6-7)

MR 873 is predominantly rural in character, encircling a small core of village development zoned Residential (Res 3) of Tualahwi Village. Elsewhere, houses are scattered and grouped in the Rural zoned land of MR 873, particularly alongside roads on the higher ground such as the central Tualahwi Road.
Rural Settlement Patterning in the Lower Plains

Coastal fringe, including coastal wetlands, estuaries & lagoons
L1

Naturally poorly drained plains (tends to be lower plains)
L2

Naturally well drained plains (tends to be upper plains) & inland basins (e.g., Colwooden, Hakataramea)
L3

Recent floodplains (both alpine-sourced braided rivers and foothill rivers)
L4

Source: LINZ Topo 50, LINZ datasets, WDC District Plans, Lucas Associates and ton.lyn, Landcare Research
Many of the rural houses are of modest and older origin. Many are well-surrounded and screened by substantial, long-established plantings of rural character. The smattering of groups of houses hints at a rural residential character. Whilst some groups of farm buildings are legible, and also some properties read as of lifestyle character, active relationships between most of the roadside house groups and the rural lands behind them is difficult to read. Considering typical older rural areas on good plains soils elsewhere, many residences of MR 873 appear from the road more as large suburban-sized sections that are likely unrelated to the broad rural lands behind. (refer to image on right)
With houses and associated plantings concentrated alongside roads on the gentle ridge lands, the broad swales are typically more open. Large areas of these lower lands are much less trenched and less built. (refer to graphic on left)

Whilst VIMOR has been closely subdivided for more than 130 years, with further subsequent subdivision, many lots have not been built on and the fine-grained cadastral pattern is only partially evident in the landscape. (refer graphic above)
Shelter plantings provide the main spatial divisions in the landscape. A number of poplar-surrounded blocks support horticultural activity such as orchards. Others surround paddocks of pasture that suggest the shelterbelts are a relic of a former horticultural era currently dispensed with. (refer to images & map on left)

Thus the MR 873 landscape has a fine-grained pattern involving a mosaic of groups of buildings within a treed framework contrasted with open, unbuilt and minimally treed areas.

With houses primarily grouped along the ridge roads, much of MR 873 is open, pastoral land. The open areas have particular character and amenity that is enjoyed in over-view from roads and surrounding houses. The pasture, crop and horticultural activity evident on the more open rural lands contribute importantly to rural character and amenity. Views out north beyond to Maungatere (Mt Grey) are variously visible from throughout MR 873. (refer to map & images on p 11)
1. **View of Maungatere (Mt Grey)** from Tushie Road ridge.

2. **View of Maungatere (Mt Grey)** from Turewaha Road swale.
The boundary to the north along Harris Road is not clearly defined, with no legible rationale. The well-treed stream corridor of Kawari meanders beyond, but is well outside MR 873. The reserve is confined between the Kawari and the Ruaatiniwha (Cwm).

The south-east boundary adjoins the dune country, with the boundary across SH1 along Sandhill Road. The dunes provide a rather natural eastern boundary.

With minimal boundary definition, a number of entrances to the ancestral sites lack legibility.

For all boundaries to MR 873, there is opportunity to retain, reinstate or create a distinctive character to enable this ancestral land to be distinct within the landscape.

The full western and southern boundary to MR 873 is well defined in the landscape, being the tree-lined Ruaatiniwha (Cwm River) corridor. The more open rural lands beyond are quite separate.

A central length of the eastern site boundary abuts Woodend Village. The small groups of roadside houses within MR 873 alongside the Rangitata-Woodend Road do not prevent a clear distinction either side between the urban character of Woodend and the rural character of MR 873. (Refer to map on right & images on p 13-15.)
PHOTO LOCATION DESCRIPTIONS:
1. North west boundary on Camside Road
2. Marshs Road entrance into MR 873
3. Bramleys Road entrance into MR 871 & Cam River
4. Nevley Road entrance into MR 873 & Cam River
5. Pk Road entrance into MR 873
6. Waterway along Pk Road
7. Greens Road drain near Te Puiautahi Road corner
8. Te Puiautahi Road open to the east
9. Reserve open to highway, looking north towards Woodend
10. Reserve open to highway, looking south
11. Reserve open to highway, looking north towards Woodend
STATUTORY FRAMEWORK

From Council's various consultations with tangata whenua, the Waimakariri District Plan (WDP) provides specific direction for appropriate management that respects the particular regard Ngai Taahuriri have for natural and cultural resources (Objective 2.1.2, Policies 2.1.2.1, 2.1.3.4).

Hence in considering development options for MR 873, particular consideration is given to “provision for the manawhenua concept and practice of kaitiakitanga in the management of natural and physical resources”, “to manawhenua and spiritual kaitiakitanga in the management of natural and physical resources”, and to recognition of “the relationship of Ngai Taahuriri with the land and associated resources in Māori Reserve 873 when providing for future use, development and protection of that land”.

The WDP recognises “There is an ongoing need to provide for development in a way which meets the needs of both Māori and other residents, and protects natural and physical resources.”

The landscape assessment is prepared under this mandate.


CONSTRAINTS

FLOOD HAZARD

The flood hazard threat from the Ashley River breakout or from the Ruataniwha (Cam) provides a substantial limitation for much of the lower areas of MR 873. (refer to Flood Hazard map on right)

It is recognised that for individual locations an elevated floor level might be an adequate solution, but require case by case analysis. However, the landscape and visual effects of substantial earthworks or pole platform designs and the like as a permitted solution can be adverse. Changed landforms can also affect both flood flows and flood proneness beyond. Thus flood-prone areas have been assumed to be most appropriately avoided in considering development options for a plan change.

GEOTECHNICAL ISSUES

Whilst some areas of MR 873 have greater risk of liquefaction, and/or require greater geotechnical input for development, further information is required to fine-tune development options.
**Access / Transport**

Two main ridgeline roads are bisected by a series of secondary roads that cut across the grain of the landscape. Some of the secondary legal roads through the broad swales are only partly formed. (refer to map on p 20)

Traditional routes through MR 873 that connected Tuahiwi with Kaiapoi Pa to the north-east, Otatara to the south, and inland to the north, have been in part preserved as formed roads. (refer to map on p 20)

A small isolated village with few facilities and dispersed rural houses has resulted in a highly car dependent community. Roads are car dominated and there is scarcely any appealing walking or cycling opportunity. None have been developed along berm.

The network of rural roads available, and the dispersal of houses along them, has resulted in a sprawling and fragmented settlement model that is contrary to compact, sustainable urban form. Retrofitting and infilling to convert MR 873 to being a less car-oriented community is challenging, but options are explored.

**Servicing Limitations**

Access to services has the potential to be a substantial prescriber of, and limitation to, landscape change. The anticipated extent of mains sewer access significantly constrains and distorts opportunity for appropriate landscape change as people will seek to build close alongside. Hence in considering conceptual development options, the potential for other servicing has also been recognised, including other reticulation routes, semi-reticulated and stand-alone options. With concentrated areas of development, stand-alone deep-bore water supply and grey (and perhaps black) wastewater systems can be considered.

Stormwater is currently in open drains. Many with stock access and little riparian cover. With any new housing and hard surfaces, vegetated swales would be appropriate. Re-naturalisation of off-site waterways, in both alignment and riparian management, and provision of cleansing wetlands and flood detention, are preferably addressed comprehensively to assist in reinstating cultural heritage and biodiversity values in the reserve.

In the planning, design and management, care will be needed to avoid naturalised drainage infrastructure being disrupted by vehicle crossings and earthworks.

The need for responsible users being associated with more natural systems, the challenge of stand-alone components, and, the need for responsibility for long term monitoring and management, are appreciated and hence the need for care in the decision-making on appropriate blackwater management systems for options such as rural housing clusters.

As well as the naturalised stormwater systems, the semi-reticulated and stand-alone blackwater and greywater management systems have the potential to contribute positively to the landscape attributes of developments with vegetated corridors and wetland features (refer Skelton report appended).
HERITAGE

The heritage of the cadastral pattern and tenure complexity within MR 873 is less evident in the visual landscape than might be anticipated. However, this heritage, with very narrow lots and considerable multiple ownership, is anticipated may apply considerable constraint on achieving cohesive landscape change.

Owners and others with an interest in MR 873 likely have varying sensitivities to change to landscape attributes through increased development. The original intent for the land, and that the whole reserve is ancestral land with highly important heritage value, is of considerable significance in assessing the appropriateness of different forms of landscape change.

The natural waters flowing within the reserve, which have very important heritage value, have been significantly degraded through time. Development scenarios that support the remediating of adverse effects on the important surface and groundwater are therefore sought.

The potential is explored to avoid, remedy and mitigate landscape effects whilst achieving a sustainable and appropriate solution for this significant block of ancestral land that is now enjoyed by diverse stakeholders.
LAND TENURE

The 1068 ha reserve is densely subdivided and has about 470 separate rural titles arrayed in an intense pattern resulting from colonial settlement influences. However, only a quarter of the titles currently have buildings on them. Of these, around 50 houses are on lots of greater than 4 ha, and around 160 are on smaller lots. A proportion of the lots are Māori land with multiple ownership. Whether owned by descendents or not, other lots are unencumbered freehold. With regard to management, many of the smaller lots appear to be grouped into farm-scale management units.

The fine pattern of rural subdivision, with a dominance of long narrow lots, is not particularly evident in the landscape. Many lots are managed jointly. Thus the cadastral pattern is not the legible landscape pattern.

The land within the village, zoned Res 3, involves a number of titles which extend beyond into rural zoned land. These north-west and south-east lots have the house at the village end of the lot - typically adjoining Tūwhiwi Road - and the balance is rural.

The rural land involving long narrow lots that, if having a house, the house is typically at one end closely adjoining the road. Individually, the long narrow rural lots are inappropriate to support most development options.

CHARACTER & AMENITY

Whilst all ancestral land, the history of use of and association with MR 873 has resulted in a physical landscape character that has been substantially altered from that previously valued by tangata whenua. Whilst maintaining and restoring water quality and quantity continue to be very important Ngāi Tahuuri aspirations, with changed associations and minimal involvement in management of much of the land, this has not been achievable.

The older development evident through the reserve contributes to a cohesiveness of the character of MR 873. Some more recent houses are of a different character - whilst setback from roads, they are larger, more obvious, and less nestled into the vegetated matrix of the reserve. They detract from the cohesiveness of MR 873 as a special place. Many lots are now owned or managed by people who do not whakapapa to a grantee - their ancestors not being of this place.

With the tenure pattern and a multiplicity of owners and interests, the potential to achieve substantial cohesive development within MR 873 will require comprehensive planning, design guidance and decision-making structures.
OPPORTUNITIES

As suggested by Waimakariri District Council, a series of development options are assessed for application to MR 873.

The options address:

- **Increased urban**, through expansion of Woodend into MR 873, the WWG land, or, through the increased density or size of Toaahiri Village, the Res 3 area; and,

- **Increased rural density**, either through houses on smaller rural lots, or through clusters of rural houses, on the unconstrained rural zoned back of MR 873.

Each option potentially results in different landscape and visual effects on the distinctiveness of MR 873 in total and on the landscape attributes enjoyed within MR 873.
A substantial challenge arises from the flood-proneness of many of the lots, thus the exclusion of development opportunity but the desirability for these lands to include substantial ecological restoration and re-naturalisation of waterways and wetlands for improved environmental and cultural management of the whole reserve.

Thus methods to address swale-land restoration in association with ridge-land development appear necessary, and are likely a major challenge. (Refer to graphics below, on right & p. 25-27)
Woodland

shallow silts overlaying fine gravels and
depth silts over coarse gravels

stony channel edge

stony channel edge
deep silts overlaying fine gravels

Shrubland

shallow silts overlaying
fine gravels and depth silts
over coarse gravels

stony channel edge

stony channel edge
deep silts overlaying fine gravels

Stream ecosystems include the body of water, riparian margins, and the floodplain. Protecting or allowing the water and margins. Healthy stream ecosystems are valuable.

Graphic source: Caring for streams of the Canterbury Plains
Laura Associates 2001

Legend:
- margin or edge of stream
- backswamp
- lower bank
- terrace face
- upper bank
- crest or levee
- upper terrace
INCREASED URBAN

OPTION 1
DEVELOPMENT ADJACENT TO WOODEND (WW6)

The western urban boundary to Woodend, along the Rangiora Woodend Road, adjoins MR 873. A half kilometre deep band of lots largely front this road between Posapatuki Road and Okaihau Road, and opposite the Woodend Primary School. This rectangular 94 ha block of land is known as the WW6 urban growth area in the Canterbury Regional Policy Statement. (for location, refer p 29)

Compared with the rest of MR 873, this block is technically easier to develop as it is free-draining and flood-free ridge land that is easy to access and service from Woodend and the Rangiora Woodend Road along that ridge.

If developed conventionally to form a block or band of suburban expansion across west of the Rangiora Woodend Road, this would read in the landscape as expansion of Woodend. It would not read as development of the reserve lands centred on Tuahiwi. Hence the existing and potential distinctiveness of MR 873 would be eroded.

Instead of a residential development band expanding Woodend, with relationship to Tuahiwi and the Reserve not evident, a substantial setback is recommended to allow for a vegetated buffer between new development on WW6 and the Rangiora – Woodend Road. (refer to graphic on p 29)

To avoid a continuous strip of suburban style development, it would be preferable to develop WW6 as a series of housing clusters allowing views through between clusters to the open and vegetated swale lands of MR 873. Such clusters might be more substantial than those contemplated (below) in other parts of the non-flood-prone Rural Zoned lands of MR 873. Each would require visual containment and separation from other clusters and good MR 873 connections. The layout should be supportive of Tuahiwi and the heritage of MR 873.

These peri-urban clusters have the option of being fully serviced. (refer to graphics on p 34 - 39)

Setback from the Rangiora Woodend Road, with a vegetated buffer and vegetated stormwater system, associated ecological restoration in the lower lands and outlook and connections to Tuahiwi, clusters of housing within the band of WW6 land could more appropriately retain the identity of MR 873 than a suburban extension to Woodend.

It is assessed that WW6 would appropriately be developed according to an Outline Development Plan which includes management planning for the clusters, their separation and buffering, view management, stormwater and wastewater within a vegetated system, food gardens, and, visual, pedestrian and cycle connections to the waterways and to Tuahiwi. Development of appropriate entrances to MR 873, that go to and through WW6, would also be addressed in the master planning (refer to graphic on p 29). Landscape guidelines and specific enforceable development and management provisions would be appropriate to provide confidence for all interests in the development.

If the WW6 lands were to be addressed comprehensively, and comprehensive management assured, there is very real potential for housing clusters to be designed that would contribute positively to the landscape, heritage and ecological value of MR 873 and to not detract from the amenity of the Woodend-associated landscape.
**Option 2**

**Tuahiwi Consolidation**

Due to the existing development layout and character, development of vacant sites and subdivision of existing lots to densify Tuahiwi as an urban area would likely have only minor landscape effect. Some reduction in the rural village character might occur if the consolidation increased more urban characteristics in both public and private space. Currently the village is well-vegetated and built elements do not entirely dominate. With smaller lots and new housing, built elements would likely increasingly dominate. Opportunity to consolidate and increase the urban-rural contrast and legibility of the urban boundary could have positive landscape effects. However there appears minimal opportunity within the current boundary and thus the consolidation option likely provides little assistance for achieving growth in MR 873.

**Option 3**

**Extend Tuahiwi Residential 3 zone**

Tuahiwi village is located centre-stage within MR 873 (refer to graphic on left and p 31). High and dry on the central ridge,

Expansion of the existing Residential 3 zone (Res 3) to enable further residential development within nearby areas able to be serviced, but not limited by flood risk, could result in substantial landscape change within the core of MR 873.

The existing Res 3 zone includes a narrow band of lots from around the marae southwards, huging the west side of Tuahiwi Road. Rather than the current form extended along the roadside, developing away from existing roads could provide better urban form and village character. In the northwest and southeast, the urban zone does not include the full depth of the lots.

Assessing the landscape character of the village and environs, and the constraints, the expanded village boundary would be appropriately confined within the non-flood-prone lands and less than 800 m from the marae and Tuahiwi school centre. (refer to graphic on left) In the short-term at least, expansion to include more of the north-west and south-east lots already partly zoned Res 3, and toward the encircling roads (Topito Road and Greens Road) would embrace and associate with a scatter of house groups and assist in providing a cohesive village form.
Further expansion of ribbon development along roads would not contribute positively to landscape character. A broadening of the village to enable non-road public space and circulation, to enable an encircling of a village centre, to enable easy pedestrian access, to enable a village to be legible in the broader landscape, has the potential to contribute positively to the local landscape. A considerably broadened Tuahini village area has the potential to improve the overall distinctiveness of MR 873. The surrounding rural lands are the scene-setters and green buffers for the village.

To minimise adverse landscape effects and enhance landscape attributes, the expansion of the urban area should be undertaken not as a zone extension but through a master planning exercise. Heritage sites, associations and connections need to be respected, and open spaces secured. Views and connections to the rural and water-oriented surrounds require protection management. Complementing the existing vegetated character, the expansion plans would need to ensure an appropriate vegetated character is achieved.

The servicing approved by WDC to be undertaken will likely encourage roadside development and may require review to ensure the layout best supports an urban form most conducive to good landscape outcomes. To contribute to remediating adverse effects on the waters of the reserve, as well as a vegetated stormwater system within the expanded village.

An expanded village is assessed as appropriate and could absorb dense groups of houses along with open areas, with planning, design and management assurance of a low key rural village character for both private development and works in public or shared spaces. Given development constraints, including tenure, funding and a willing market, too large an initial expansion zone risks dispersing, diluting and reducing the value of the existing village through inadequate take-up. This could have significant adverse landscape effects and limit achievement of a sustainable community.

Along with connections and restoration support achieved for adjacent watermanagement areas, once culturally, socially and environmentally appropriate village expansion is proven and adequately dense, then further urban expansion north and/or south could be contemplated. Alternatively, peri-urban clusters could be designed to complement and support the village. (refer to graphic on p 34)
INCRESED RURAL DENSITY

OPTION 4
KAINGA-NOHOANGA / RURAL CLUSTER HOUSING

Due to the landscape importance of the suite of open rural areas through MR 873, provision for rural housing clusters has the potential to have considerable adverse landscape and visual effects unless appropriately located, designed and managed. Close groups of individually diverse and/or substantial houses could affect valued open areas and viewsheets, and degrade the overall landscape character of MR 873.

The existing pattern of small groups of modest houses spread along the predominantly elevated roads is an important characteristic of the MR 873 landscape. Groups are small, with typically only 3 to 6 houses per group. Around and beyond these are open areas with productive paddocks and views beyond. To introduce larger housing clusters to the open areas has the potential for adverse landscape and visual effects.

However the intricacy and varying spatial enclosure of the MR 873 landscape is such that there is substantial opportunity for larger housing clusters to be integrated provided they are appropriately located and designed.

As the waters of MR 873 have been degraded over time, and as ecological values have been substantially reduced, there is opportunity for comprehensive planning, design and management to enable rural housing clusters on elevated lands.

Ensuring and achieving cohesive cluster development including a comprehensive vegetated framework would be essential to landscape integration. Master planning, landscape principles and landscape guidance will be essential for success, along with decision-making and ongoing management and monitoring methods.

Restorative environmental management for each cluster would begin with on-site water management and link through to include associated rural water management areas. Stormwater and greywater management would be addressed and perhaps also black water, swales, streams and wetlands would be naturalised to enhance water quality, biodiversity, cultural attributes and amenity.

Rather than dependence on a connected sewer, there is potential to service all or some clusters as integrated components of comprehensive cluster development plans. Whilst clustering might enable economic reticulation, adequately undertaken and managed, vegetated components of stand-alone or hybrid systems could contribute importantly to landscape character.

(see appended report by Skelton)

Any housing cluster would have combined access and be setback from roadsides, or involve retrofitting of existing residential sites to improve their environmental management. House clusters of up to 20 residences would likely be appropriate and they would preferably be developed comprehensively, not piecemeal.

As described under Option 1 - WW6, with an ODP and management regime assured, a series of clusters introduced on the WW6 lands could have positive effects by strengthening the identity and landscape integrity of MR 873. Whilst scattered into the Water Management Area, the surrounds and intervening lands to the clusters need to be managed comprehensively to maintain and enhance cultural, landscape and amenity values, and to contribute to improved water and biodiversity management within the reserve.

The minimal lot size is not an adequate or appropriate method for managing integration of such development into this rural landscape or for enhancing cultural values. New and comprehensive methods are required. To provide adequate guidance and certainty to landowners and other stakeholders, following consultation, an ODP could indicate an appropriate spread of clusters.

Providing for adequate buffering of a cluster, and adequate protection of rural landscape character, graphic 20 indicates a quantity of dispersed rural clusters that might be appropriate. 10 clusters are suggested dispersed along both ridges and also possibly one down Greers Road.

Rather than dispersing clusters through the Rural - Cluster Area (refer to graphic on p 33), clusters might be confined to peri-urban areas (refer to graphic on p 34), to assist servicing and minimise potential adverse landscape effects. Developing housing clusters within the peri-urban areas indicated north and south of an expanded Tuahiwi village, and within WW6 alongside Wooloolea, provide for more straight-forward development opportunities. Setback from roads and with comprehensive vegetation management regimes, adequate ODP, management and design methods would be essential to ensure these contribute positively and have minimal adverse effects on landscape character in the short, mid- and long term.
Option 5

Individual Houses on Smaller Rural Lots

Further intensifying the scatter of houses across the rural lands merely through a minimum area method would likely have significant adverse landscape and visual effects. This option has the potential to clutter valued open areas whilst achieving little increase in household number.
CROSS SECTION LOCATIONS

Legend
- MR873
- Waterway
- Cross Section
- 0.5m contour interval

Development Concept (Indicative only)
- Expanded Village
- Rural - Cluster Area
- Rural - Water Management Area
- Woodend Buffer
- Existing Buffer
- Per-urban Cluster Area

Scale 1:25,000 @ A3
0 200 400 600 800m 1km

north
SUPPORTING DOCUMENTS

Since the Council decisions in November 2011 discussions have progressed with several parties who wish to promote housing opportunities in Maori Reserve 873.

As a result some investigations into environmental conditions have been commissioned and earlier work reviewed.

These include:

- A report into geotechnical issues and liquefaction risk by Geotech Consulting Limited
- A report into geotechnical issues and liquefaction risk by Aurecon?
- A review of potentially contaminated land, by Pattle Delamore Partners
- A scientific/ ecological study of surface waterways, undertaken by Dr Henry Hudson
- A study of the ecological conditions of surface waterways from a Tangata Whenua perspective, coordinated by MKT
- A review of flood risk in the area, using both Environment Canterbury and Waimakariri District Council Information
- A cultural impact assessment (for Tuahiwi Water Supply Project)
- Kairapoi Maori Reserve Draft Concept Plan & Summary Report by Common Ground Studio, February 2013
Development Opportunities

in Kaiapoi Māori Reserve 873 Tuahiwé

Landscape Assessment

re draft Waimakariri District Planning Provisions
Panorama looking toward Southern Alps from Marae
Alongside Common Ground, Waimakariri District Council has engaged Lucas Associates to provide a landscape assessment of proposed Land Use Recovery (LURP) and Waimakariri District planning provisions proposed for increased residential development of MR 873. For, under Kemps Deed of 1848, this 1000 acre Kaiapoi Māori Reserve 873, between Kaiapoi, Woodend and Rangiora, was intended for settlement by Ngāi Tūhuriri. An Outline Development Plan has been proposed for the entire Reserve, plus and ODP for the Residential area.

Additional housing associated with Tuahiwi Village, as well as substantial clusters of rural houses, were identified as appropriate to enable the whānau living needed.

In 2013 Lucas Associates assessed "The Landscape of Tuahiwi & Kaiapoi Maori Reserve 873" for Waimakariri District Council and contributed to the Development Options Assessment. Plan amendments to allow for village expansion and rural housing clusters were assessed would be appropriate.

Background

Post-quake, following the red-zoning of many whānau elsewhere, Lucas Associates in 2011 assisted Ngāi Tūhuriri Runanga and a professional team with development of preliminary scoping of the opportunity for increased development of MR 873. The concept sought:

- **Whakatau Kaupapa**, to enrich the land’s human and natural character.
- **Te Ao Māori**, to provide expression of whānau living and cultural values.
- **Whakatau Maori**, to recreate the health, character and life supporting capacity of the land.
- **Kainga-Nohoanga**, to again be the true dwelling place of Ngāi Tūhuriri.

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Lucas Associates

Tuahiwi MR873 residential development provisions

September 2014
Summary

Public consultation thus far has supported the increased development provided that character and amenity values are not compromised. Maintaining the view from the Marae to Maungatere and the Southern Alps was considered important.

A proliferation of housing clusters beyond the village, and also the possibility of dispersed large clusters, has potential for very significant adverse landscape effects. There is a high risk of apparent suburban sprawl that is contrary to urban design principles and contrary to rural landscape management and that would likely result in no apparent distinctiveness.

With provision of adequate mitigation methods, 5 types of development by descendants can be supported:

1. **Village expansion** as Residential 3 zone, with houses on 600 m² lots as a permitted activity, as per a revised ODP. For the western area, allow for wetlands and an unbuilt green area for 150 m westward of the marae, to enable a central village green space and protect views of the Alps. Building and planting heights limited to 4.5m in the west beyond this green area.

2. **Rural cluster** of 3 - 7 households on any lot greater than 5000 m² that is able to be serviced, is not flood-prone, and, is owned by descendants as per Kemps Deed, as per an approved cluster plan meeting development standards and design controls, covering a maximum of 20% of a lot area, have a single accessway, integrated within a vegetated framework, via a controlled activity consent.

Or, with less definitive design controls, allowed as a restricted discretionary activity.

3. **Large cluster** on rural land at a density of up to 4 households per ha., located on 20% of any lot on the Tuahiwi Ridge south of Waikoruru and Okaihau Roads, that is owned by descendants, is not flood-prone and is able to be serviced, for coordinated design developed via a staged comprehensive plan and fully discretionary or non-complying consent.

4. **Small lots** provision for a house and small secondary dwelling on lots less than 5000 m² as a controlled activity.

Plus the continuance of:

5. **Single house** on any non-flood-prone lot greater than 4 ha. as a permitted activity whether the owner is a descendant or not.
EXPANDED VILLAGE

As with the former area zoned for the Village, the expanded Village land is zoned as Residential 3. The expanded area involves an Outline Development Plan (ODP) to provide guidance to achieve adequate access.

The village is located "high and dry" on the central Tuahiwi Ridge through the Reserve. It is a very appropriate site for expanded development. Expansion is zoned northwards from the marae, as well as eastwards from south of the Tuahiwi School with an ODP for these 2 areas.

The LURP amended the District Plan's Chapter 17 Residential to not only expand the Village, but also to maintain and enhance a particular Village character. Aspects to be ensured include a high proportion of smaller dwellings. Aspects previously identified in assessments and supported in these amendments include addressing provision for a mixed use centre including business opportunities, limiting advertising, ensuring intimate and informal streetscapes, minimal kerb and channelling.

A landscape review endorses the need to address these aspects. However no draft rules yet address any of these aspects.

Policy 17.1.1.5 (d) requires the expansion to be defined by natural features, landscape character area and built features. (h) requires the rural outlook and setting to be maintained.

Maunga

Policy 17.1.1.5 (l) requires protection and enhancement of village areas to Maungatere and Ngā Tiriti o te Moana. The ODP seeks to protect these views as experienced from the Marae.

The new whare, Maahunui II has been specifically designed to orient to Maungatere and provide expansive views to Ngā Tiriti o te Moana. To enable their appreciation from the Marae, avoidance of structures and upright vegetation for at least 150 m from the west of the Marae is needed. Beyond this, vegetation and structures should be limited to less than 4.5 m in height.

As adequate centrally located public or communal open space will be important within the expanded village and densified rural surrounds of MR873, provision of the 150 m space west of the Marae is recommended be addressed as a multi-use open green space.

Developing on all sides of the open green space would enable a compact contained village area. A playing field might be accommodated.
Waterway

The waterway that has been channelized to flow around the western boundary of the Marae would be appropriately naturalised through re-alignment, gentle profile and well-vegetated buffers either side.

As currently aligned and managed, the channelized waterway does not comply with the development kaupapa or the policy intent. The need for improved stormwater, groundwater and waterway management through naturalised water bodies has been clearly identified in several professional reports on MR873. On-site management of these waters is the preferred method.

As ground water is close below the surface, excavation to create naturalistic wetlands in association with the naturalised waterway flow could contribute importantly to the character, identity, outlook and usefulness of the green open space west of the Marae. Such works could support the intent for re-introducing rongoa and mahinga kai, and be a valued demonstration in this central space. Management of rainwater through naturalised water bodies has the potential to contribute to flood mitigation.

The ODP, objectives, policies and methods need to provide encouragement for such work, with councils' explicit support.

Naturalised management of spring, stream, groundwater and stormwater is assessed as an important contributor to the sustainable management of MR 873, including it's character, identity and value.

Developing the open green space as a blue-green space, with naturalised waterway and wetlands, would enable protection and enhancement of natural features and cultural values associated with this compact contained village area.
Rural Residential Intensification

The kaupapa being to enable more descendants to reside within MR 873, and to reside as whanau, be provided for along with the heritage recognition and ecological enhancement sought for these lands.

Provision of densification opportunities for descendants can address historic grievances and be located, designed and managed to retain valued landscape qualities for descendants and for existing and future residents. However, to achieve this, care is needed. Design controls and enforcement provisions are necessary.

On all rural lots provision for protection of food production capacity would be provided. Restoration plantings would be encouraged where local native plants can be included for shelter, screening, rongoa and habitat. With the shallow water table and springs, reinstatement of naturalised waterways and wetlands, where tuna and koura would flourish for example, could be encouraged in plan development.

As some non-descendants have purchased into the Reserve likely unaware of the ancestral kaupapa, some mitigation can be assured for the adverse effects of unexpected densified development by descendants through the design controls and consenting process, and their enforcement by the administering body and council.

Rural Clusters

The location, coverage and scale of rural clusters have been assessed with regard to landscape effects. The tradition of clustering around 3 – 6 houses in close association on the Reserve ridgelines is noted, along with the tradition of farm node building clusters. A number of low key buildings clustered within rural land, that through their character, planted framework, proximity and access demonstrate some relationship to one another, can contribute positively to landscape character.

Following assessment of the existing landscape character, it is evident that not only the location and coverage of a lot by house cluster will affect the ruralness and the landscape character, but the character of the cluster itself will potentially have a significant effect.

Within any rural lot, a cluster’s location, coverage, scale and character needs to be managed to ensure the rural outlook and rural character are retained.

To avoid ribbon development along rural Tuahiwi Road and retain rural and mountain outlook, association of some clusters with side roads is proposed.
Site A

Assessment of a 5.6 ha sample site around the Topito-Tuahiwi corner, at 319 Tuahiwi Road. A Maori Title with no current house, servicing is available at the road corner and extension on both roads is anticipated as “moderate”.

1. To avoid contributing to ribbon development along rural Tuahiwi Road, and retain intermittent rural and mountain outlook, development of housing to Topito Road is instead proposed.

2. Under the LURP planning regime, either a single house could be built, or a 3 – 7 house cluster developed in accordance with a comprehensive development plan.

3. 20% of the lot involves 11,000 m², which is adequate for a 7-house cluster along the southern side including curtilage.

4. There would also be plantings, shared space and access through to the balance lot.

5. A drain runs along the southern roadside boundary, and, with the shallow groundwater of the site, there is likely opportunity to form a multi-use wetland within the lot.

Cluster Concept

1. A south-side linear development would maximise solar access, outlook, and allow for retention of versatile productive space.

2. Avoiding housing toward Tuahiwi Road allows for retention of rural character for the main road and ridge corridor, and for mountain views to be enjoyed along this major route and ridge.

3. Allowing for a balance of shared space and privacy, away from the main traffic, with discrete rear access, a practical balance lot, a sunny rural outlook and mountain views, plus proximity to village facilities, such a housing layout would be expected to have wide appeal. The expressed desire of enabling both whanau sharing and separation would be achievable.

4. A rural buffer is to remain along the south side of Topito Road opposite the site, north of the expanded Village.

5. The roadside drain is naturalised and widened in the southwest to create a cleansing wetland and habitat.

6. Housing suggested to be single storey only, to 5 m high.

7. All building forms to be simple gable, mono and or flat roofed.

8. All roofs to be no steeper than 33° pitch.

9. All cladding to be earthy coloured and mid-tone, with roofs no lighter than 20% reflectivity and walls no lighter than 37% reflectivity. A comprehensive colour scheme to integrate a cluster would assist. No structures, including tanks, fences, spouting and sheds, are to be lighter than 37% reflectivity.

10. No paling fences or solid walls excepting connected to a house and surrounding a small adjoining courtyard maximum 30 m² in area.
11. Any fencing is to be of rural character, being standard wire or wire mesh character, or 3-rail wooden, and no higher than 1 m. for roadside fencing or fencing associated with curtilage.

**Issues**

1. Access for management of the balance lot might be desirable from Tuahiwi Road, however may lead to informal development of a second access to the houses. Hence access for management of the balance lot is proposed from Topito Road.

2. The site is in the viewshaft from the Marae, and hence the height of vegetation and structures needs to be limited to avoid interfering with mountain views.

3. Development of a well-vegetated linear house cluster along the north side of Topito Road would limit the rural and mountain outlook of houses in the proposed Res 3 to the south of Topito Road.

**Methods**: RULES need to require:

1. A single drive only to access any cluster. [A second drive may be appropriate if a cluster straddles a feature creating a physical barrier limiting access to all, involves a minimum of 3 houses for each drive entrance, and, either provides access to different roads or each access point would be more than 100m.? apart.]

2. Minimum setback to houses is 15 m, with a minimum of 5 m setback being comprehensively planted and managed shared land outside of the individual unit titles.

3. A planted buffer between a road boundary and a parallel drive would be a minimum of 5 m. wide.

4. Spacing between houses.

5. Separate v shared space.

6. Each house to be within a private area, as a unit title, and adjoining shared space, whether amenity space or the balance land.

7. Garages and sheds are to be setback from the road boundary with the space densely screen planted.

8. Drains, site runoff and waterways are to be naturalised in terms of their form and plantings to trap sediment, uptake nutrients, cleanse and partially shade the water, and, to provide habitat.

9. Several of the houses could involve double/duplex or secondary studio units.
SITE A Concept

Notes:
Site location: 319 Tuahiwi Road (5.7ha)

- 7 dwelling cluster plus central focal building and storage buildings.

Cluster area = 8029m² / 14% site coverage

scale 1:1000 @ A2  September 12, 2014
Location

To maintain the rural outlook and setting valued in MR 873, the location of a cluster within a lot requires careful consideration. Whilst practical considerations of proximity to services and avoidance of flood proneness will be key drivers, protection and enhancement of the character and landscape integrity of MR873 requires further measures.

Setbacks

Due to the narrowness of lots, to enable cluster development on most non-flood prone rural lots, setbacks can be less than 20 m.

A 15 m minimum setback for any dwelling from a road or other boundary, would be appropriate provided the dwellings are low rise and not visually intrusive. Single storey dwellings would be appropriate to avoid experience of excessive encroachment on adjoining rural roads and lots.

To support retention of the identity of MR 873, and avoid it's merging into Woodend, a setback of at least 30 m from the Rangiora-Woodend Road should be encouraged. From a landscape consideration, a setback of 50 m would be preferable. However within a 30m setback, some substantial framework planting can assist in separating the cluster from Woodend.

For non-residential buildings, lesser setbacks are appropriate providing there is an associated planted buffer of adequate scale in relationship to the building. Thus for a large shed setback of 10 m from a boundary, or 3m for a garage, provides adequate space for comprehensive planting.

Coverage

Various lots have been tested with regard to coverage by house clusters. To retain the rural setting and outlook, to retain the food production and habitat potential of the land, confining individual clusters to a single area of 20% of any lot is supported. An increase to 30% coverage would adversely affect the ruralness.

Scale

Existing built nodes, residential clusters and the scale of lots have been assessed. To support whanau housing being achieved within individual or amalgamated lots, clusters of 3 – 7 houses are supported, provided they are closely grouped within a single area, with a single access, are low key in character and within a vegetated framework.

To provide an enabling approach, design standards could provide adequate certainty to allow these clusters to be addressed as a controlled activity. However as there may be proposals for adjoining lots that are not evident, restricted discretionary status may be preferable.
Large Rural Clusters

Placement of clusters larger than 7 dwellings was tested. For larger lots, the 20% quota was found to have ample capacity to contain several times more dwellings. For example, the 5.7 ha Site A fronting both Topito Road and Tuahiwi Road shown (page 10) with a 7 dwelling cluster, was found could accommodate close to 28 dwellings (see page 13). The design shows 2 accessways, which would be appropriate for this larger number of dwellings.

However larger clusters potentially produce competing hamlets, detracting from Tuahiwi Village, the core of MR 873. Thus any larger rural cluster would need to be located and comprehensively designed to avoid such effects, to ensure walkability is encouraged, to avoid a substantial concentration of development that reduces ruralness and suggests an urban character.

Non-complying status for clusters larger than 7 dwellings is thus supported. Assessment of their contribution to Tuahiwi Village would be needed. Also, compliance with design standards should be encouraged.

To mitigate against substantial cul-de-sac style urbanisation along the ridge over time, at least pedestrian and cycle permeability should be planned, developed and managed within and between public space and clusters.

The Lakes

The Residential 5 Zone that is nearby in the Waimakariri District has enabled the development of 37 dwellings variously clustered around shared space that has mostly been excavated to create water bodies (District Plan Map 140). The Lakes involves a western group of 24 dwellings mostly more closely clustered around a single access way (page 11).

An administrative structure and specific design controls have enabled this complex to develop successfully. The Lakes example is considered to have some applicability for MR873.

The dominance of the blue-green landscape created across so much of The Lakes site contributes importantly to its identity and desirability. Whilst these water bodies are spring-fed and mostly deep, from sand quarrying in the past, shallow water bodies can be created to provide important habitat, character and mahinga kai. As has been demonstrated at Pegasus Town, even shallow wetlands are quickly colonised by tuna (eel). Appropriately constructed and vegetated, such as with wiwi, pukio, kiokio and raupo, they can quickly provide low maintenance, but high value, areas.

However the importance of the initial planning cannot be over-emphasised.
SITE A Concept

Notes:
Site location: 319 Tuahiwai Road (5.7ha)

28 dwelling cluster plus central focal building and storage buildings.

Cluster area = 12329m2 / 21% site coverage

scale 1:1000 @ A3  August 14, 2014
Character

A “family of forms” is proposed be required to guide integrated design within and between rural clusters to ensure the retention of rural outlook and character. Our assessment recommends specific design rules or standards to assist landowners in planning and developing a cluster comprising a coherent family of forms. A series of low impact, coherent clusters will together contribute to enhancement of an appropriately distinct identity for MR 873.

To “read” in the landscape as whanau housing, as a cluster that involves shared interests, and to mitigate effects on rural amenity including on rural outlook, some simple design controls would be appropriate to ensure a cluster of dwellings is desirable.

Standards involve limiting to low rise buildings and avoiding more than a single storey, and ensuring the exterior is unobtrusive. The measures allow for substantial diversity and individuality within a cluster, and between clusters. Addressing the scale of buildings and their lightness or brightness through design standards provides some assurance for all with regard to the landscape setting and amenity. Clusters of low profile buildings of simple form with mid-tone finishes can be unobtrusively nestled in to allow for cluster integration with rural amenity and outlook retained.

Methods need to be introduced to ensure a low key and rural design character. Solid or paling fences, entranceway structures, lighting beyond buildings, and kerb and channelling, need to be avoided in the Rural Zone.

Design standards:

- Buildings to be no higher than 5 m, of gable and/or monopitch form, with a roof pitch no steeper than 33°.
- Soffits to be encouraged for summer shade on facades, to visually enhance building forms, and, to reduce the glint particularly from glazing.
- To minimise glint and glare and visually nestle the cluster development into the landscape, exterior finishes of any structure are to be between 12 % and 37% reflectivity, with roofs darker than 20% reflectivity.
- All structures, excluding farm buildings and farm-style fences, are to be confined within the cluster area.
- A Development Plan for the cluster within 20% of the site with dwellings clustered around central shared space.
- Framework plantings to shelter, backdrop, link and integrate various buildings, and to be established prior to dwelling construction. Plantings would grow to a minimum of 2 m high, but largely taller. (refer planting guide)
- A Landscape Plan provided for the full site to ensure all structures and plantings are addressed comprehensively, to address heritage values, linkages, naturalised waterways and wetlands, spaces, outlook and viewshafts.
SITE C CONCEPT

Notes:

Site location: 13 Woodend - Rangiora Road (3.4ha)

7 dwelling cluster plus central focal building and storage buildings
Cluster area = 4986m² / 15% site coverage

scale 1:500 @ A3  September 12, 2014

Lot 1 313m²
Lot 2 258m²
Lot 3 226m²
Lot 4 282m²
Lot 5 427m²
Lot 6 290m²
Lot 7 283m²

Average Lot size = 296m²
Small Rural Sites

Almost all sites outside of the Village are greater than 5000 m². Provision in the methods for a dwelling and 75 m² flat is assessed as appropriate for sites smaller than 5000 m². To allow for more housing on small rural sites would have potential adverse landscape effects through the lack of potential buffering from unbuilt space and thus a potential sporadic suburban character.

For sites larger than 5000 m², 3 or more houses might be accommodated within 20% of the site.

Various sites have been assessed. Some very narrow sites are difficult to provide an adequate cluster.

On an 8,300 m² site on Topito Road (Site D) 3 to 4 semi-detached dwellings could be accommodated (see over)
Conclusions

A rural cluster approach confined to a maximum of 20% of any lot, of low key and integrated design and with a vegetated framework, is assessed as an appropriate method of achieving residential settlement for descendants on MR 873 along with Village expansion.

Whilst only a quarter of sites are currently Maori owned, tenure has changed historically and is expected to continue to change. Hence all MR 873 sites have been considered, rather than only those currently owned by descendants.

The Village limits and the rural cluster approach will ensure suburban-type sprawl is avoided across MR 873 and amenity retained.
Maori Reserve 873
CLUSTERED DEVELOPMENT
July 2014
About this Report

Common Ground has been engaged by Waimakariri District Council to help assess the structure and performance of the Draft Provisions for Maori rural clusters in MR873.

This work follows development of concepts around alternative approaches to rural development for Maori land holdings in MR873, initially prepared by Lucas Associates (October 2011) and expanded by Common Ground (March 2013) for Ngai Tuhuriri.

Waimakariri District Council have taken these concepts on board and developed them as a draft package of objectives, policies and rules for cluster housing for the Ngai Tuhuriri people.

This report tests the proposed rules package and assesses whether they give effect to this policy framework and will deliver cluster developments of quality.
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Kemps Deed (1848) and the Crown Grants Act (1862) established MR873 as a specific settlement area, a consolidated and defined cultural landscape within general rural surrounds.

In laymen’s terms the purpose of MR873 is to provide a small part of Canterbury for the Maori owners and their descendants in which to house and sustain their families inter-generationally. This right exists in a Crown Act but was weakened by changes to the Waimakariri District Plan.

The WDC is committed to restoring the rights of the descendants through alterations to their District Plan to more closely align to the intent of Kemps Deed.

Several amendments have already been made to the District Plan to give effect this, and a set of Proposed Provisions have been submitted for inclusion in the LURP.

METHODOLOGY

Common Ground Studio and Lucas Associates were asked to look at the controls and assess the impact on the environment and also how the Provisions provide sustainable development opportunities for the descendants.

There are four controls within the Provisions that have the most impact on outcomes: minimum site size, coverage, setbacks and density.

To arrive at our recommendations, there are three aspects to considered which must be considered.

- Effects within the site
- External effects

Is it returning the right to occupy the land by the Kemp deed descendants in a minimum way

RECOMMENDATIONS

We carried out extensive modelling and believe that adverse effects of development can be mitigated by having:

1.5m boundary setbacks

20% cap on land within site that can contain development

That a simple density of 4 h/ha can accommodate cluster development

If a cap of seven houses is to be placed on sites of between 5000m2-4 hectares that policy is strong enough to allow a discretionary application that responds to Design Guidelines for increase of density of 4h/ha.

The Design Guidelines are referred to in the plan and mandatory for development applications above a threshold of two dwellings.
MAJOR PROVISIONS

There is general agreement that the open landscape character of Tuahiwi is important to the residents and descendants but lets not confuse that with rural character. Separation from the sprawl of Woodend was seen as important. For real rural character we must look beyond Tuahiwi to the large colonial land parcels (the 100 acre releases). On that basis we have followed the following sequence to establish external effects:

1. Setbacks
2. Coverage
3. Minimum site area
4. Density

The four major controls were tested against a range of site sizes and with a number of variations. The intention was to be able to prove and/or refine the controls to produce the simplest, most flexible and most robust outcome providing the greatest degree of certainty for residents, for Council, and to satisfy the inter-generational needs of descendants.

1. MINIMUM SITE AREA

We have found in testing that it is proportion – not size – that constrains development of smaller sites (circa 5000m² and below). The narrower the lot, the harder to get a cluster and achieve setbacks from boundaries. Whereas for larger sites the effects of development and the effects of change are easily managed by the conventional controls (site coverage, front side and rear setbacks). In testing the few smaller sites that were wide enough to achieve boundary setbacks, we found they could only contain two dwellings in general.

Although the number of lots below 5000m² is nearly a third of all those in Maori ownership, the number outside the flood constraints and the Village Zone is very small. Therefore, to be able to offer development potential to all sites in this group we accept the 5000m² limit for cluster development but support a further control for sites smaller than 5000m²:

We recommend the minimum site area for cluster development be 5000m²;

We recommend for all sites less than 5000m² that 1 house and a secondary dwelling <75m² be allowed.

2. COVERAGE

This control manages the proportion of the site that can contain building development. This is the most crucial way of controlling the visual effect. This is not a case of preserving what is there but in creating a community that sits within a landscape environment and not urban sprawl over the land.

Having carried out very detailed modelling we agree that 20% maximum site coverage is the appropriate level to manage development effects.

We recommend that the maximum area of a site that can be developed to contain dwellings and ancillary buildings for whanau is 20%.
3. SETBACKS

MR873 area has a large number of long, narrow lots. Early testing of the recommended 20m setback control revealed a major problem for lots of less than about 60—70m wide. Where a cluster was even possible it forced a strange, inefficient, inappropriate and unnatural development pattern. In response to this we tested a slightly reduced setback of 15m.

This resulted in a great deal more flexibility, usability and better design outcome for only a small decrease in the perceived separation between adjacent clusters and the road.

We recommend that the setback of clusters from all boundaries is 15m.

4. DENSITY

The draft rules proposed:

3—7 dwelling limit for sites below 4ha
and;
20 dwelling limit for sites greater than 4ha

These rules cap the number of dwellings as a way of managing perceived effects of density—but in testing produced wildly different outcomes and effects for different sized sites.

Furthermore, testing found that visual, land-use and environmental effects were, by and large, managed by the Coverage and Setback Provisions regardless of the number of dwellings on a site.

The theoretical maximum density generated by the proposed draft ‘rules’ varies from 14dph (dwellings per hectare gross) on the smaller sites capable of taking 7) to a low 1.75dph for a 3.99ha site. This significant variation isn’t logical for a number of reasons:

» It creates intense clusters on small sites and potentially sprawling clusters on large sites that are under the 4hectare limit in MR873
» It is inherently inequitable, penalising owners of larger sites (but sub 4 hectare). It undermines the intent of some of the Provisions for the less dense sites eg “the arrangement pattern clearly demonstrates a close relationship between the dwellings”. It creates a potential burden on larger sub 4 ha sites with only 7 families sharing cost of maintaining the “common land”
» It reduces the capacity to provide for future generations.

We have taken the second density ‘rule’ in the Provisions as the benchmark – a cap of 20 dwellings for sites greater than 4ha. This equates to a maximum gross site density of 5dph. While this is to some extent arbitrary, we have taken this figure as a principle for testing and applied it to all sites in order to determine the variation in effects between sites of different size.
In brief, our findings are that there is virtually no difference in outcome or effect for any site; all clusters were consistent in grain; the number of potential residents always matched the servicing load. Importantly, it reduced the over-intensification of the smaller lots produced by the 3—7 rule and it protected against the under-intensification and inefficient use of land for sites as they approached the 4ha mark.

All testing assumed developing to the maximum yield and produced clusters that were consistent in form with what has been discussed in public consultation. In testing, the 5dph density level proved achievable, though the more intense the density, the more skill is required in design. Therefore we suggest that a density of 4dph might be more appropriate. This means that a 4ha site would yield 16 dwellings rather than the 20 dwelling cap suggested in the Proposed Provisions.

Only 5 sites exceed 6ha, and 4 of those only just. Rather than adopt an arbitrary dwelling cap as another control, we suggest simplifying the rules and having a single density rule (4dph gross) for all sites above 5000m². The largest sites would therefore reach a limit of 24 dwellings, which is manageable and appropriate for a large cluster.

We recommend that the maximum number of houses in a cluster is calculated at 4dph of the total site area.
MINOR PROVISIONS

THE CLUSTER HOUSING DEVELOPMENT PLAN (CHDP)

When an application is for more than one house on the site a CHDP must be produced that anticipates the full potential development of the site. This should follow Design and Landscape Guidelines to be produced by Council.

We recommend that a Cluster Housing Development Plan must be prepared for the full 20% cluster area developed to its full potential along with a Landscape Management Plan for the balance of the land.

WATERWAYS

In our view the stated setbacks from waterways, the Cam River and protection of waterways from stock are entirely appropriate minimums and do not impinge on the ability to create well-designed cluster developments.

FLOODING

The exclusion of dwellings from the major flood zone shown on Outline Development Plan 176 is an appropriate hazard management measure.

Lesser ‘flooding’ (ie areas of standing water in heavy rain within the east and west basins) is a management issue to do with drain / stream function, overland flow paths and subtle differences in ground level. In consideration that mitigation measures will require some use of land we suggest that any cluster within these areas (outside the ‘peri-urban’ and dashed green area of Lucas Associates drawing) be constrained initially to a maximum of 7 dwellings, all other controls applying and dependent on the satisfactory avoidance and mitigation of flood risk.

RURAL PROTECTION

MR873 is an area set aside for the settlement and industry of Ngai Tuhuriri. It currently has a general agricultural overlay as a ‘holding pattern’ land-use. It is an inappropriate land use. looking at the Title patterns tells a different story. Outside MR873 the general rural zone comprises of farms of over 100 acres.

The land use in Tuahiwi was determined by the ability to sustain (only sustain) Maori families. It would be inappropriate to impose a foreign set of values of Arcadia on what is a cultural reserve. Therefore whilst we are wary of stressing ‘rural character’ too much, we also feel that it should be taken into account.

‘Rural’ clusters are an appropriate initial settlement form to get people back in the area whilst keeping a ‘rural’ activities and feel.

Having 80% of any site kept as open space with development contained in remaining 20% cluster form will develop a special character for the area , the openness of the landscape and food production capacity.
We support protection of the two culturally significant views from clusters, but prefer a more subtle control. The use of broad view shafts/planes usually diminishes the quality of outcome by producing awkward and unnatural settlement and building forms. In a rural environment this can also be rendered irrelevant due to tree and shelter planting.

Lucas Associates have calculated and demonstrated the changing height/distance relationship. We suggest this is used in combination with the identification of at least one significant and meaningful vantage point for each cluster, in front of the wharenui for example, so that the view can then be framed and concentrated for greater intensity of meaning and value.

The Provision relating to access to public reticulated services would be equitable if these services were available for all.

Under current conditions, the planned roll-out of new pipelines has the effect of constraining or greatly increasing the development costs for some owners but not others.

Certainly it is not unreasonable to require sites that can connect to publicly reticulated services to have to do so. For distant sites that may not see public reticulation for many years it seems like an unnecessary restriction of rights not to allow a satisfactory interim measure such as a monitored aerobic sewage treatment plant for example.

Having passed a cultural, environmental and management test, this sort of solution in combination with rainwater collection may have the effect of limiting the level of settlement in such clusters, but it will enable something to occur for the more remote sites.

Clusters could then be required to connect to services at a later date when the services ‘arrived’ in recognition of the provision of this kind of infrastructure needing to operate at the scale of the wider community.

In the interim, for these sites it would have the effect of forcing, in many ways, a more ‘green’ response to development such as water conservation, grey water utilisation, wastewater pretreatment, etc.

These measures would continue to be active and would be of general benefit to the whole community even after public services are extended to the clusters.
A Housing Cluster has a form that is quite different from normal New Zealand suburban patterns but has similarity when viewed from a distance to clusters of rural buildings around the farmhouse. A cluster (or Hamlet) is more intimate and collective in nature, providing its residents a lifestyle quality that would be costly to attain on an individual basis.

In brief, the main reasons for clustering are:

- To preserve potential land-uses on the larger balance of the lot
- To enable the better development of small, contained family communities
- To enable individual lots to share in increased levels of amenity
- To provide for a wider and more flexible set of housing options
- To enable the provision of more affordable housing solutions
- To slow the rate of change in the character of an area and allow it to develop in a more natural and organic way

As a form, clusters are felt to be most closely related to traditional Maori settlement patterns and management systems based on collective living for whanau.

Each cluster creates a ‘family of forms’ that can match provision with need. The development pattern will more accurately reflect Maori social structure where amenity is shared and all elements of a family (youth, families, elderly) can be accommodated.

Typically, clusters are able to deliver much higher levels of amenity to residents at a much lower individual cost.

Providing common amenity is not limited to a central park or community building (wharenui), but extends to implement sheds, tools, the balance of the rural lot and many other aspects of everyday life.

When some of the requirements of a lot and/or house can be devolved to shared facilities then housing can be provided that is more appropriate, better attuned to needs and has the potential to be much more affordable than normal industry-standard buildings.
CLUSTER QUALITIES

A wide spectrum of social conditions are sought in quality urban environments, such as sociability, affordability, safety and participation.

Diversity is one of the primary qualities required to achieve this. Key components leading to diversity are:

- A level of residential density
- A mix of housing types
- Provision of shared amenity

When diversity is achieved, a number of social and economic advantages are achieved for residents including:

- Lower entry costs
- Appropriate housing to stage of life and circumstance
- The ability to remain within a community for every stage of life
- Ability to share/lower living costs
- Ability to maintain an active and meaningful contribution to the whanau

Cluster form and development attributes from Waimeku Estate.
There are four basic physical attributes common to all clusters that drive the physical layout and distribution of buildings.

These are:

- POSITION
- PATTERN
- CENTRE
- SHAPE

Testing of the Provisions that follow have assumed these qualities and then used them in each case where a typical design is presented.

The concept and form of a rural cluster should closely resemble other rural forms that consolidate building placement, minimise building footplates and shape a distinct identity.
WHAT IS THE POTENTIAL FOR CLUSTERED DEVELOPMENT IN MR873?

Of the original 1068 hectares, just 19% (~220ha) remains as Maori Land, in 90 titles with 2,500 owners.

Another 5% (~57ha) is owned by individual Maori owners in general title.

As illustrated on the plan, outside the Village Zone there are:

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<td>TOTAL LOTS</td>
<td>15</td>
<td>50</td>
<td>33</td>
</tr>
</tbody>
</table>

**WIDTH CONSTRAINTS**

- **<0.5ha**
  - Sites below 0.5ha are being treated separately. Of the 15 lots, 9 are below 30m in width

- **0.5—4ha**
  - 14 of 51 sites affected

- **>4ha**
  - 10 of 33 sites affected

**FLOOD/STORMWATER MANAGEMENT CONSTRAINTS**

- **0.5—4ha**
  - 14 of 51 sites affected

- **>4ha**
  - 10 of 33 sites affected
TESTING THE DRAFT PROVISIONS
Setbacks are principally focused on maintaining or enhancing the visual character of the landscape and the functionality of the balance lot.

Proposed Provision:

- All dwelling/houses to be set back 20m from any boundary.
- All farm and accessory buildings (e.g. garages) to be set back 10m from a road boundary and 3m from any other boundary.

*Except for the building line setbacks from Raugions Woodend Road shown on Outline Development Plan.

Setbacks are as much about lot proportions as they are about absolute dimensions.

If the minimum 20m setbacks are applied, then the minimum site width able to contain a cluster is 50m. Even then, this would result in a 10m wide ‘development’ area, leading to at best inappropriate building forms for a rural area.

To provide greater development opportunities for MR873, we have tested a 15m setback option.

**FRONT YARD SETBACK**

As outlined previously (1. Rural Cluster Development), one of the objectives of cluster development is to preserve the integrity and functionality of the balance lot.

Locating the cluster as close to a road boundary as possible helps:

- Optimise the size and shape of productive land in the balance lot
- Reduces the length of vehicle and pedestrian access ways
- Reduce connection length to reticulated services
- Brings an element of safety (overlooking) to the public roads

Reducing the setback on this boundary from 20m to 15m will have little discernible impact on external visual amenity.
SIDE AND REAR BOUNDARY SETBACKS

Non-road boundaries provide separation between neighbouring buildings. Reducing the setback to 15m still provides a minimum 30m wide separation corridor, which will generally appear larger once house curtilage is included.

As demonstrated above, maintaining setbacks on side and rear boundaries at 20m has little additional benefit in terms of visual effects to the rural landscape beyond compared to the 15m option.

It does however make a noticeable difference to the cluster itself, even with 20% coverage, by reducing the depth of the developable area resulting in a better cluster and lots shapes whilst also maximising the effectiveness of the balance lot.
TEST: NARROW SITE

Of the 50 conforming sites (0.5 - 4ha) within MR873, 38 are above 50m on the primary frontage (street) which is sufficient to accommodate a wide range of cluster development forms.

Of the remaining 12 lots, 9 are below 40m in width. If the setback is maintained at 20m these would be undevelopable. Even reducing the setback to 15m, the development area on a 40m wide site is only 10m wide. While it is still possible to produce a conforming design for such sites (see illustration below), the built form outcome is not particularly appropriate for rural locations.

Of the 3 sites between 40-50m wide, a more useful and flexible development area is created however a high level of design will still be required to achieve quality outcomes.

TEST: LARGER LOT

To assess impacts on a larger scale, a 6ha site that fronted Tuahiwi and Totito Roads was selected.

Applying the two setback options (20m or 15m) illustrates that the impact of the smaller setbacks on larger lots is minimal.

On this basis we support a minimum 15m setback on all boundaries.
COVERAGE

Site coverage directly impacts on the values underpinning cluster development (green, innovative and sustainable) which translates as a lifestyle with quality of life and a greater sense of community.

This is best delivered through compact development that allows each community to shape its own identity and character. It cannot be generated through large, separated individual lots.

TEST SITE

The following pages refer to a 3.3ha site on Topitio Road which is used to illustrate tests of coverage and density provision.

This is a typical ‘qualifying’ site in terms of lot size and proportions. It is less than 4ha and is long and narrow (though not excessively so).

It is also vacant and will be in close proximity to the water and sewage infrastructure route, making it easy to service.
Site coverage of a cluster will directly impact on:
- Preservation of rural character
- Maintaining the integrity and land-use potential of the balance lot

Proposed Provision:
- No more than 20% of the area can be taken up with buildings, their associated curtilage, access ways and any areas private to the dwelling, with the balance of the land (80%) held for rural activities;

Two options have been proposed for maximum site coverage of the cluster – either 20% or 30%.

METHODOLOGY: CALCULATION OF THE COVERAGE AREA

We have used the following criteria to define the coverage area for clusters.

Included:
- Each house site with sufficient curtilage to contain a living court
- Individual access ways
- Lanes and paths within the cluster
- Common buildings (eg. wharenui) and surrounds

Excluded:
- Farm buildings and associated yards
- Site entry road and farm paths
- Buffer areas, setbacks, screening

This means that lots can, for example, be smaller and utilise some of the boundary setback area as semi-private open-space amenity as a compensation.

Houses (and therefore lots) can be smaller if some functions are picked up by the wharenui and surrounds.

Shared open-space can be used for some activities that would normally take up a disproportionate amount of land if provided privately.

Parking and garaging might be consolidated and made common towards the edge of a cluster, relieving the lot and the cluster interior of the need to provide large amounts of land for vehicles.
Almost by definition, the smaller the coverage level the better it satisfies the aims above, so long as it can absorb the required amount of development.

To test the absorptive capacity we applied a theoretical range of site sizes against the maximum number of dwellings permitted.

<table>
<thead>
<tr>
<th>Development Coverage 20%</th>
<th>Cluster Residential Area (m²)</th>
<th>Average lot size (m²) for 7 houses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Size (ha)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>1,000</td>
<td>143</td>
</tr>
<tr>
<td>1</td>
<td>2,000</td>
<td>286</td>
</tr>
<tr>
<td>2</td>
<td>4,000</td>
<td>571</td>
</tr>
<tr>
<td>4</td>
<td>8,000</td>
<td>1,143</td>
</tr>
</tbody>
</table>

Inconsistency in average lot size.

For all but the smallest sites, 20% coverage is more than able to absorb the maximum 7 dwellings proposed in the Provisions. However, as illustrated in the table above, this approach delivers markedly different urban form outcomes.

Of particular concern are the impractically sized lots generated on the smaller sites. Realistically, such sites are unlikely to be able to develop any meaningful uses on the balance land other than for visual or recreational amenity therefore 20% might be too constraining.

On that basis, we recommend that the maximum coverage be set at 20% but with discretion to allow increased coverage to 30% in particular circumstances, including:

- Smaller lots
- Provision of extra central amenity
- Provision of a facility that provides employment for residents
MANAGING DENSITY WITH DWELLING CAP

The Setback and Coverage rules for clusters effectively manages landscape and land-use effects equally for all site sizes. The proposed Provisions use a cap on the number of dwellings to establish built form outcomes.

Proposed Provision:

Between three and seven dwellings are proposed as part of either an individual development; a unit title development; or other empowering instrument, for multiple ownership, to enable on-going sustainable management of the cluster housing development;

However, as the table on the previous page shows, managing density across a range of site sizes with a fixed dwelling cap is not logical. A dwelling cap creates:

- An overall density per site, and;
- A cluster intensity.

The table below shows the extent of variation in density, intensity and the resulting average lot size.

---

**SMALLER SITES**

For the small sites, and average 143m² lot size won’t realistically provide 7 quality dwellings unless some form of apartment (eg. a maisonette) is used. Even then, to achieve the 7 it would exclude some housing forms such as large family houses.

Smaller sites are the more problematic. Fortunately there are only 4 qualifying sites outside the village less than 1ha in size. The largest of these is 0.88ha, giving a theoretical average lot size of 254m². Including access and shared space, instinct says this is not only inappropriate, but perhaps not even achievable when taking access and shared space into account.

For the remaining 45 lots between 1 and 4ha the cap has the effect of creating constraints unevenly for landowners and producing (often) divergent and inappropriate outcomes, not least of which is potentially preventing some descendants from being able to settle on their land.

**LARGE SITES**

Larger sites with the 20% coverage applied produce larger individual average lots (see previous page).

Larger lots separate people and actively work against the development of community living. Some housing forms such as for the aged and disabled are very badly served by having too large a lot.

Larger sites will require more money to develop and maintain.

A seven household cap effectively increases the burden on a limited number of households for no extra benefit compared to the smaller sites.
TEST: 7 DWELLINGS

Assuming the maximum 20% coverage on our 3.3ha site we have applied the proposed maximum 7 dwellings. We have located the access way to one side within the 15m setback to optimise developable area.

Pro's
Easy to design and distribute lots and access ways

Con's
- Little variation in lot sizes
- To achieve variation in building forms (diversity) and a sense of concentration then buildings are placed in a manner that is inefficient

Summary
The 7 dwelling cap inherently limits and constrains growth for future generations in lots of this size.

QUESTION
The Councils proposed provisions for sites above 4ha is a 20 dwelling cap - what is the effect of increasing the number of lots on the sample site using the same development footprint?
EFFECTS OF INCREASING DENSITY

TEST: INCREASED DWELLING CAP

Increasing the number of lots to 12 within the same development footprint as the 7 Dwelling Cap Design.

Pro's
- Equally easy to design
- Greater variation of lot size and house types - therefore more adaptable to whanau needs
- Efficiency (access ways, communal facilities)
- Creation of intensity/community in the core
- Larger number of residents to share development and maintenance costs

Con's
- None

Summary
There is much to be gained and no disadvantages from increasing the number of dwellings in this instance.

Given that development effects from outside the site are managed consistently by the coverage and setbacks rules, there would be no difference in external effects.

QUESTION:
Is there a better approach to managing density?
DENSITY AS A CAP?

There is a significant change in the Proposed Provisions, from 7 dwellings to 20 at the 4ha mark.

<table>
<thead>
<tr>
<th>Maximum Dwellings</th>
<th>8.95ha</th>
<th>4.01ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Density (dwellings/ha)</td>
<td>1.75</td>
<td>5</td>
</tr>
<tr>
<td>Net Density @ 20% coverage (dwellings/ha)</td>
<td>5.6</td>
<td>16</td>
</tr>
<tr>
<td>Average Lot Size</td>
<td>1,143m²</td>
<td>400m²</td>
</tr>
</tbody>
</table>

Using dwelling caps creates a significant range of net density outcomes from 5.6dph to 70dph.

**This is counter to the outcomes sought.**

20 dwellings for 4ha, equates to a gross site density of 5dph and a net density within the cluster of 16dph.

(Although not calculated in exactly the same manner, this compares with a net density in the Village Zone of circa 17dph (an average lot size of 600m²).)

Having tested this on several small and large sites using 5 houses per hectare density we recommend using 4 H/ha as this provides a better outcome at the smaller lot size of the spectrum:

1. A dwelling cap for all Maori land within MR873
2. That development extent (yield) is related to site size - increases yield for large sites and reduces yield for small sites
3. That development effects are managed equally for all sites by Setback and Coverage controls

Does this also work for lots below 0.5ha?

As illustrated above, the simple answer to this question is yes, provided the site is wide enough (>40m). However only 5 of 15 sites meet this criterion.

On this basis, we support the Proposed Provision of 1 Main dwelling and a secondary dwelling on these sites.
TEST: DENSITY / INTENSITY
Another Way To Express the Density Rule

A larger sample site was selected to test whether any issues arise from a larger number of lots in a cluster, whether it still functions as a compact, single unit or whether intensity can't be contained and it turns into a different sort of settlement form.

The site is slightly irregular in shape and straddles the corner of Tuahiwi and Topito Roads. Assuming 5dph as a density target, the maximum sized cluster should contain 28 dwellings and cover 1.1ha.

Defining an entry road – in this case connecting to both public roads – and then positioning a central common area containing the whareiwi was enough to outline the maximum cluster extent. Spaces created on the balance lot are all of meaningful size and proportion.

The cluster layout is obviously related to dwelling typology. Both the spatial and intensity distribution indicated is balanced, robust and flexible. The 5dph applied produces an average lot size of 400m².

Regardless of different site sizes, using the 5dph/400m² average lot size will always produce a similar pattern and grain to that illustrated.

This example has produced lots ranging from 135—844m². Half of the lots are clustered around the 400m² median (300—500m²), which was anticipated and is appropriate.

This sample design is sufficient to show that large clusters work well and that if sites are to be developed to their maximum potential under the proposed rules are generated simply with the 5dph control.
DENSITY: FURTHER QUESTIONS

In testing the previous example, two questions became apparent:

1. Does the overall density control (5dph) also work for small sites?
2. What happens if less that the maximum number of dwellings fill the 20% coverage area on large sites?

1. SMALL SITES

At 5dph, if rounding is allowed, then for the four sites below 1ha in MR873, each could contain a cluster of between 3—4 houses with average lot sizes ranging from 330—440m².

Rounding the yield figure balances out the coarse ‘stepping’ effect for similar sized sites at this level. Variation due to rounding or the lack of it diminishes rapidly beyond the 1—2ha level.

2. VERY LARGE SITES – LOW DENSITY

The example below shows the minimum 3 lots within 20% coverage on a large lot.

The Proposed Provisions give guidance as to the arrangement pattern or intensity of the cluster, being clear that the dwellings must demonstrate a close relationship with each other and also involve shared areas. This is important both to reinforce the nature of whanau housing and also to protect Ngai Tuahuriri against the subtle and unintentional loss of their land.

- Lots function independently therefore little sense of community.
- Undermines the ability of the land to support future generations of Ngai Tuahuriri.
- Inefficient use of land resource.
- Small residents pool to fund enhancement and maintenance of the balance lot.
CONCLUSIONS

Testing proved that using 5dph as an alternative control produced consistent outcomes across all site sizes that were much closer to what has been envisaged and consulted on by WDC and the public. Although we easily managed to produce good designs in all cases, we accept that this might not be so easy for others.

Therefore we suggest a slightly lower density rate of 4dph be adopted.

This would have the effect of reducing the yield on the smallest sites (which are the most difficult to design for) and generating a maximum yield for the very largest sites only slightly higher than the 20 dwelling cap in the Proposed Provisions.

By using 4dph as a single density control means that:

1. Development extent (yield) is related to and limited by site size
2. Development effects are managed equally for all sites by Setback and Coverage controls
3. Cluster intensity is the same throughout MR873
4. The largest sites would contain clusters of about 24 dwellings
5. The smallest sites above 5000m² would contain 3 dwellings

Therefore our recommendations are to:

1. Remove all dwelling cap and site size differentiation
2. Treat all sites the same with a simple and robust density rule of 4dph of the gross site area.
Two aspects of Tuahiwi – country life and St Stephen’s church, built in 1867 for the Maori community.

Archaeological Assessment for Proposed Rezoning at Tuahiwi, Canterbury

Michael Trotter
5 July 2014

Introduction

The Waimakariri District Council is currently considering a District Plan change within Kaiapoi Maori Reserve 873 under which it is proposed to expand Tuahiwi Village by changing the zoning from Rural to Residential 3 in areas adjacent to the present village. Residential 3 is the current zoning of the Tuahiwi Village, and rezoning in the adjacent areas would allow the village to expand if the property owners wished to develop them.

The Council has asked for an archaeological assessment of the areas that would be affected if the rezoning goes ahead, noting that one archaeological site, identified as M35/370 in the database maintained by the New Zealand Archaeological Association and available on line through ArchSite, has been recorded there.

The Council has requested that the assessment should include an appraisal of effects of residential development on any locations that have actual or potential archaeological sites on them, and recommendations on how the plan change proposal should proceed to ensure obligations under the Heritage New Zealand Act and the Resource Management Act are met.

Tuahiwi has long been a centre of Maori settlement, with St Stephen’s church (pictured above) being one of the most tangible reminders of the nineteenth century settlement, and there could well be archaeological evidence of early occupation extant in the ground throughout the area.
Legal Requirements

There are two main pieces of New Zealand legislation that control work affecting archaeological sites. These are the Heritage New Zealand Pouhere Taonga Act 2014 and the Resource Management Act 1991.

The Heritage New Zealand Act is administered by Heritage New Zealand Pouhere Taonga and there is a consent (authority) process for any work affecting archaeological sites. For the purpose of the Act an archaeological site is defined as any place in New Zealand, including any building or structure (or part of a building or structure), that—

(i) was associated with human activity that occurred before 1900 or is the site of the wreck of any vessel where the wreck occurred before 1900; and
(ii) provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand.

Places associated with human activity that occurred in or after 1900 may also be declared archaeological sites by Heritage New Zealand Pouhere Taonga.

Anyone who intends to carry out work that may damage, modify or destroy an archaeological site, or to investigate a site using invasive archaeological techniques, must first obtain an Authority from Heritage New Zealand Pouhere Taonga. The process applies to sites on land of all tenure including public, private and designated land, and the Heritage New Zealand Pouhere Taonga Act defines penalties for unauthorised site damage or destruction.

The Authority process applies to all archaeological sites that fit the Heritage New Zealand Pouhere Taonga Act definition, regardless of whether:

- the site is recorded in the Site Recording Scheme of the New Zealand Archaeological Association or is registered by Heritage New Zealand Pouhere Taonga,
- the site only becomes known about as a result of ground disturbance, and/or
- the activity is permitted under a district or regional plan, or a resource or building consent has been granted.

Heritage New Zealand Pouhere Taonga also maintains the Register of Historic Places, Historic Areas, Wāhi Tapu and Wāhi Tapu Areas, and can include archaeological sites. The purpose of the Register is to inform members of the public about such places and to assist with their protection under the Resource Management Act (below).

The Resource Management Act requires City, District and Regional Councils to manage the use, development, and protection of natural and physical resources in a way that provides for the well-being of today’s communities while safeguarding the options of future generations. The protection of historic heritage from inappropriate subdivision, use, or development is identified as a matter of national importance.

Historic heritage is defined as those natural and physical resources that contribute to an understanding and appreciation of New Zealand’s history and cultures, derived from archaeological, architectural, cultural, historic, scientific, or technological qualities.

Historic heritage includes:

- historic sites, structures, places, and areas,
- archaeological sites,
- sites of Maori significance, including wāhi tapu,
- surroundings associated with natural and physical resources.

The above categories are not mutually exclusive and some archaeological sites may include above-ground structures or may also be places that are of significance to Maori communities. Where resource consent is required for any activity the assessment of effects is required to address cultural and historic heritage matters.
Tuahiwi Archaeological Sites

The earliest record of an archaeological site in Tuahiwi was made by Canon Stack in 1893 when he wrote “In peaceful times the inhabitants [of Kaiapoi] were dispersed over the country.... They either dwelt during such periods in partially fortified Pahs like those, the remains of which may be seen near S. Stephen's Church, on the Maori Reserve, or in open kaingas, consisting of a few unprotected whares.” (Stack 1893: 28).

Stack had been closely associated with Tuahiwi and its St Stephen’s church for many years and at one time had a dwelling there, and while it is likely that he observed first-hand the remains he referred to, they have not subsequently been positively identified.

Other writers such as Hawkins (1957: 44–49) and Taylor (1950: 34–45, especially page 37) refer to the pre-European occupation of the area as well as to the historic settlement on the Kaiapoi Reserve, which was marked out by Walter Mantell in 1848. An early Press item also refers to “Tuahiwi, an old pa in the centre of the reserve” (Press 1869: 2).

Sixty-five years after Stack’s account, in 1958, Tony Fomison noted the presence of an oblong raised-rim pit close to the roadside fence on the south side of St Stephen’s church, with at least three other pits across the paddock – two of these had the asymmetrical vague form usually recognised as borrow pits made in the extraction of gravel for spreading on kumara gardens. Nearer the back of the church, oven stones could be seen in the edge of a “gully.” He considered that these features could be field signs of a pre-European Tuahiwi settlement (they could possibly be the remains that Stack had mentioned). In 1964 Fomison recorded this site as number S76/9 in the site recording scheme operated by the New Zealand Archaeological Association – with the later metricalation of the base maps used in this scheme the number was changed to M35/14 (ArchSite).

In 1998 Trotter and McCulloch filed a new site record, M35/370, for borrow pits a little further south than those recorded by Tony Fomison. Until the early 1990s the pits could be seen as an almost continual series of irregularly-shaped narrow hollows extending from west of the Tuahiwi School (at that time) at GPS co-ordinates c. 1571120 x 5202015, across an open paddock east of Tuahiwi Road to GPS co-ordinates c. 1571290 x 5201740, a distance of over 320 metres. The pits were up to 20 metres wide and followed a low gravel ridge. Within a few years those near the school had been filled with soil and built over (an extension of the school) and the rest filled with rubbish and largely covered with soil. There was also what appeared to be a European gravel pit closer to the road at around GPS co-ordinates 1571145 x 5201775.
The aerial photograph of Tuahiwi on the left above is part of one taken in 1942 and has been marked up in yellow to indicate the locations of the two recorded archaeological sites. The two uppermost arrows point to what are assumed to be Fomison’s M35/14 raised-rim and group of three pits respectively – these pits have not been relocated and have probably since been filled in with soil that has been dumped there. While the larger pits of M35/370 are clearly visible between the two lower arrows, there are also a number of smaller ones not easily discernible at the reduced scale of the above image. On the right is an aerial photograph of much the same area (with slightly different orientation) taken in 1995. Here, the patches of white around the largest pit are household and commercial rubbish that has been dumped into it.

It seems likely from these photographs that Fomison’s pits are really a continuation of the same group of pits that cross the paddock as M35/370.

During the 1990s a great deal of rubbish including vehicle bodies and soil was dumped into the main pits of M35/370 as can be seen in the above photograph. More photographs of rubbish dumped into the pits are shown at the top of the following page.
**Site Evaluation**

Although only site M35/370 will be affected if the proposed rezoning takes place, it is convenient to consider both it and M35/14 here as they are both relevant to the general archaeology of the Tuahiwi area, and the pits of M35/14 may in fact be an extension of M35/370.

<table>
<thead>
<tr>
<th>Site</th>
<th>Value</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M35/14</strong></td>
<td>Condition</td>
<td>These features have probably not been examined since they were reported by Tony Fomison in 1958. Dumped soil in the area has probably covered some, and others could have been affected by development.</td>
</tr>
<tr>
<td>(raised-rim</td>
<td>Rarity/uniqueness</td>
<td>Borrow pits and ovenstone sites are not rare in the Tuahiwi/Woodend/Kaiapoi area though raised rim pits are.</td>
</tr>
<tr>
<td>pit; pits;</td>
<td>Contextual value</td>
<td>Borrow pits are an important part of the archaeological landscape in this area.</td>
</tr>
<tr>
<td>ovenstones)</td>
<td>Information potential</td>
<td>Low if disturbed/destroyed.</td>
</tr>
<tr>
<td></td>
<td>Amenity value</td>
<td>Very low (due to their likely condition).</td>
</tr>
<tr>
<td></td>
<td>Cultural associations</td>
<td>Ngāi Tahu.</td>
</tr>
<tr>
<td><strong>M35/370</strong></td>
<td>Condition</td>
<td>Mostly obscured by dumped rubbish which covers the pits. Some damage from earth-moving when levelling the rubbish and dumped soil.</td>
</tr>
<tr>
<td>(borrow pits)</td>
<td>Rarity/uniqueness</td>
<td>Borrow pits are not rare in the Tuahiwi/Woodend/Kaiapoi area, though few are currently identifiable on the surface.</td>
</tr>
<tr>
<td></td>
<td>Contextual value</td>
<td>Borrow pits are an important part of the archaeological landscape in this area.</td>
</tr>
<tr>
<td></td>
<td>Information potential</td>
<td>Low (due to their present condition) except by use of ground penetrating radar or similar techniques.</td>
</tr>
<tr>
<td></td>
<td>Amenity value</td>
<td>Low (due to their present condition).</td>
</tr>
<tr>
<td></td>
<td>Cultural associations</td>
<td>Ngāi Tahu.</td>
</tr>
</tbody>
</table>
Scope of the Proposed Rezoning

The plan below shows the present Tuahiwi Village (Residential 3 zone) shaded in light green, and the proposed extension in hatched yellow with a red dot on each property. The yellow arrows point to the approximate location of archaeological site (borrow pits) M35/370.
Effects of Rezoning

Parts of the area proposed for rezoning, namely Kaiapoi Maori Reserve 873 92B Block and Lot 1 DP 69740, cover much of recorded archaeological site M35/370. Any development, particularly house foundations, roading, and services installation, on these parcels of land could adversely affect the archaeological site, as the loose nature of the un-compacted rubbish in the pits is likely to make the ground unsuitable for building or road foundations, and it may have to be replaced with more suitable fill before the ground can be compacted.

The excavation of the rubbish would inevitably destroy the contours of the pits, and hence their values as given in the table on page 5 would be reduced, particularly their potential to provide information on the activities that produced them.

The gravel that was once mined from these borrow pits would have been spread on the ground as part of the cultivation process for growing kumaras, and although the areas that were used for gardening must have been close to the pits they have not been identified. (Once the European potato was introduced in the late eighteenth and early nineteenth centuries, the practice was discontinued.) Areas of ground that have not already been built on may contain evidence of the spreading of this gravel and other signs of gardening operations. Where such ground has been mechanically cultivated in European times the evidence of gardening may be harder to identify but it should be discernable in any ground that has had little or no European cultivation. This evidence could also be destroyed by development of the land in the vicinity of site M35/370.

Discussion and Recommendations

To comply with the requirements of the Heritage New Zealand Pouhere Taonga Act, an Authority will need to be obtained from Heritage New Zealand before any earthworks on or in the vicinity of site M35/370 are undertaken.

In mitigation for the disturbance and/or destruction of archaeological evidence, it is recommended that as a condition of the Authority the pits should be mapped with ground penetrating radar or other subsurface investigational methods before they are further disturbed. This disturbance is likely to be extensive as the loose nature of the un-compacted rubbish in the pits is likely to make the ground unsuitable for building or for road foundations, and it may have to be replaced with more suitable fill before the ground can be compacted.

Having such mapping done would provide information on the pits which cannot otherwise be obtained now that they have been filled and covered over.

There is, however, another consideration: although the Maori garden soils that were modified by the addition of gravel have not been identified or recorded, it is likely that they were situated adjacent or near to the pits (see Trotter and McCulloch 2001: 209), but they could well extend some distance from where the pits have been recorded. It is thus possible that archaeological evidence of gardening or other activities associated with the pre-1900 occupation of Tuahiwi might be uncovered elsewhere during development of the rezoned land.

It would be impracticable to have all earthworks in the extended Residential 3 zone area monitored by an approved archaeologist, but it is recommended that periodic checks for archaeological evidence should be made of any major excavations made for the provision of roading, services, or in large scale ground levelling that take place as a result of the proposed Plan change being implemented.

Any archaeological evidence uncovered that might provide information on the pre-1900 utilization of this area should be recorded and investigated in accordance with current archaeological practice. This may include, but is not limited to, the production of plans of site location and extent, excavation, section and artifact drawings, and the sampling, identification and analysis of faunal and floral remains and modified soils, as well as radiocarbon dating of samples.

If any human remains are encountered during excavations, all work should cease in the vicinity of the discovery, and the Police, the Tuahiwi rūnanga and Heritage New Zealand are to be notified.
Work should not be recommenced until they have responded. Maori human remains may be subject to cultural protocols which could inhibit them being submitted for laboratory examination. In such a case, they should be photographed and measured sufficiently in the field to obtain and record fundamental information on the individual(s) represented.

References and Reports


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[Illustrations in this report have been compressed to facilitate electronic transmission.]
Waimakariri District Council

Geotechnical Assessment Report

Plan Change for Tuahiwi Village, Canterbury

18 September 2014

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18 September 2014

Waimakariri District Council
Private Bag 1005
Rangiora 7440

Attention: Tammy McMahon

Dear Tammy

Coffey Project No: GENZCHRI5672AA

GEOTECHNICAL ASSESSMENT REPORT FOR THE PLAN CHANGE FOR TUAIHIWI VILLAGE, CANTERBURY

Please find attached our geotechnical report presenting the findings of our geotechnical investigation for the approximately 30ha area of land known as Site 1 and Site 2 which are proposed to expand Tuaihiwi Village by changing the zoning from Rural to Residential 3 within the Māori Reserve 873 (MR 873).

Our investigation and reporting has been conducted in accordance with our proposal dated 14 March 2014.

If you have queries or you require further clarification on any aspects of this report, please contact the undersigned.

For and on behalf of Coffey

Nick Harwood
BEng (Hons) MSc DIC MIPENZ CPEng
Principal Geotechnical Engineer
Geotechnical Assessment Report

Prepared for
Waimakariri District Council

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18 September 2014
GENZCHR115672AA

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Coffey Geotechnics (NZ) Ltd
1. Introduction

Coffey Geotechnics (NZ) Limited (Coffey) was commissioned by Waimakariri District Council (WDC) to provide geotechnical reporting pertinent to the Tuahiwi Plan Change area which is located within the Kaiapoi Māori Reserve 873 (MR 873) situated approximately 4.5km south east of Rangiora and approximately 2km south west of Woodend (Figure 1).

It is our understanding that the investigations are being undertaken to confirm the suitability of the site for a land use change from “Rural” to “Residential 3” land use in accordance with the Waimakariri District Plan\(^1\), some of the characteristics for Residential 3 include but are not limited to the following:

- Predominant activity is living;
- Detached dwellings;
- High proportion of smaller dwellings;
- Diverse styles and ages of dwellings;
- Range of housing options, including comprehensive housing development focussed around village areas in Tuahiwi;
- Reduced size and nature of individual lots within Tuahiwi;
- A rural outlook and setting;
- Provision of a mixed use centre in Tuahiwi focusing on community facilities, convenience retail, recreational and business opportunities;
- Intimate and informal streetscapes;
- Limited services and utility capacities in most zones.

Reference should be made to the District Plan document\(^1\) for the full description of the Residential 3 zone.

The current proposed Plan Change area comprises 2 sites; one to the northwest of Tuahiwi Village centre (Site 1) and the other to the south east (Site 2). Site 1 covers a land area of 20 hectares (approx.) and Site 2 has an area of approximately 11 hectares.

The WDC’s scope and objectives for this report were set out in a brief dated 6 March 2014\(^2\), the details of which are presented below.

In addition to this geotechnical assessment report, WDC commissioned Coffey to carry out an Environmental Site Assessment (ESA) the results of which were reported to Council on 22 August 2014 and are summarised under Section 5.3.

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\(^2\) Email received from WDC Resource Management Planner Tammy McMahon on 6 March 2014.
2. Objectives

The geotechnical investigation is specifically required to advise on the suitability of the land for Residential 3 activities as described above.

The objectives of the geotechnical investigation are tailored to address the WDC’s brief, and have been interpreted to include:

- Assess the ground conditions and provide a high-level geotechnical characterisation of the site;
- Assess the liquefaction hazard for the site and assess if any other geotechnical hazards are present, including from surrounding environs;
- Assess the geotechnical natural hazard risks in accordance with Section 106 of the Resource Management Act;
- Confirm the suitability of the land for Residential 3 development as defined under Section 1, and/or provide recommendations on the type of ground-works/foundations needed for the intended use; and,
- Report in line with current MBIE requirements.

\(^3\) Aerial imaging sourced from Google Earth; dated 28 February 2013.

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3. Scope of works

The following summarises our proposed scope of works developed to meet the objectives above:

1. Geotechnical desktop study including a review of:
   - Existing geotechnical reports associated with the site;
   - Published geological records;
   - EQC and GNS Science maps;
   - EQC boreholes and Piezocone Penetrometer Tests (CPTu);
   - Post-earthquake aerial photographs (if any);
   - ECan’s wellcard database for relevant borehole records in the site and environs; and,
   - Groundwater monitoring results for the area (if any).

2. Geotechnical site walkover assessment to understand the ground surface conditions and any evidence of earthquake-induced ground deformation and other possible geohazards, as well as scope appropriate testing locations and their access;

3. Verification of on-site underground services as part of our Health & Safety management procedures;

4. Staged deep ground investigation utilising CPTs and machine boreholes; and,

5. Geotechnical analyses and reporting.

4. Industry guidance

Where relevant, reporting has been conducted in accordance with the current Ministry of Business, Innovation and Employment (MBIE)\(^4\) Guidance.

Geotechnical logging of borehole core samples in accordance with the NZ Geotechnical Society Inc. (NZGS) 
*Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes* (December 2005).

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5. Existing information

For the purpose of this investigation reference have been made to relevant borehole information for 226B Tuahiwi Road located along the south eastern boundary of Site 15.

5.1. Available desk study reports

Relevant desktop study reports reviewed for the purposes of this report are noted below along with our summary comments on the report findings.

5.1.1. Geotech Consulting Ltd (Reference 2992)

Conclusions as per Section 8 of the 20 August 2012 Geotechnical Issues Letter Report for MR873 Tuahiwi Māori Reserve:

- Tuahiwi MR 873 area is underlain with predominately fine grained soils to about 8m depth under the western side and increasing to about 15m depth in the north east, with gravels below that.
- The soils do not present any significant constraint on normal residential development, except that there is a potential liquefaction hazard in the area.
- It is likely that considerable areas within MR 873 will have a liquefaction hazard and require a TC2 foundation technical category. It is possible that some small areas may fall within TC3 criteria.

5.1.2. Aurecon (Reference 234966)

Conclusions as per the Executive Summary of the 15 March 2013 Geotechnical Summary Report for Kalapol Māori Reserve 873:

- The area is underlain by highly variable superficial deposits of alluvium and beach sand or river dunes. The alluvium comprises cohesive deposits of clay, silt and peat, together with granular deposits of sand and gravel. These form the geomorphology of the site, which comprises several alluvial fans and more recent alluvial floodplains.
- The water table remains relatively high throughout the site despite significant human influence and modification, and can usually be expected to be encountered at less than 1m below ground level.
- Desk studies indicate many of the ground materials throughout the site are likely to be vulnerable to liquefaction.
- Sites will require ground investigations to confirm the anticipated ground conditions, acquire data for liquefaction analysis and foundation design.

Figure 2 shows the Tuahiwi Plan Change sites in relation to the approximate site boundary of the study area reported on by Geotech Consulting Ltd and Aurecon.

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5 BH1, Project No. 229271 – 226B Tuahiwi Road, Tuahiwi dated 2 April 2013. Reported by Aurecon to unknown project client.
5.2. ECan borehole logs

A review of the ECan online Geographic Information System (GIS)\(^6\) was undertaken to identify borehole or well records within the site boundaries. According to the records a total of 11 wells are shown within the boundaries of Site 1 and Site 2, several of which include reports of strata encountered during drilling of the hole. Due to the use of non-geotechnical terms such as “pug” which may be open to interpretation\(^7\), we have only used these records to assist with our ground model development and the logs have not been included in this report.

5.3. Coffey ESA report summary

According to Coffey Environment’s ESA report the site is considered suitable for rezoning as Residential 3. A detailed site investigation (DSI) must be carried out at several properties.

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\(^6\) [http://www.ecan.govt.nz](http://www.ecan.govt.nz)

\(^7\) As per an Extract from Section 2.6.2 of the 15 March 2013 Aurecon Geotechnical Summary Report
6. Site details

6.1. Location

The Tuahiwi Village Plan Change area is located approximately 4.5km south east of Rangiora and approximately 2km south west of Woodend. As shown on Figure 3 below, Site 1 is generally bound on its northeast side by Tuahiwi Road, its south-west side by Topito Road and remaining sides by existing residential sections and open paddocks. Site 2 is bound along its southern boundary and central western boundary by existing residential sections, and open paddocks surround the other boundaries.

The southern third of Site 2 appears to be (or previously) used as an orchard. Tuahiwi Road runs roughly north to south through Tuahiwi Village. Public facilities in Tuahiwi Village include St Stephen’s Church, Tuahiwi School, Tuahiwi Sports Facility, a cemetery and a marae (Maahunui II).

The Cam River lies approximately 480m from the western extent of Site 1.

The land use is predominantly farmland (crops and livestock) with interspersed residential dwellings and farm buildings. These areas are separated by farm tracks, fences, hedgerows and drainage ditches.

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Figure 3: Site investigation areas\(^8\) (scale as shown)

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\(^8\) Aerial imaging sourced from Google Earth; dated 26 January 2013.
6.2. Topography

The topography of the sites comprises predominantly low lying, level to very gently undulating ground which is typical of the Canterbury Plains in the region north of Christchurch (refer to Photographs 1 and 2 in Appendix A).

6.3. Surface drainage

Surface drainage has been modified by a network of shallow ditch drains across the site, many of which form paddock boundaries (refer to Photograph 3 in Appendix A).

These drainage ditches, as well as small natural water courses in the site area, tend to flow in a general southerly/south westerly direction draining into the Cam River, which in turn drains into the Kaiapoi River which is a major tributary to the Waimakariri River.

The Waimakariri River is situated approximately 6km south of the southern extent of the site, and the Ashley River lies approximately 5km north of the northern extent of the site. Both of these rivers are wide, braided gravel-bed rivers that have had a strong impact on the geology and geomorphology of the area. Both rivers flow eastwards into Pegasus Bay.

Surface flooding during the winter months is an issue for this area (refer to Photograph 4 in Appendix A). This is discussed further under Section 12.2.5 of the report.

7. Fieldwork summary

The scope of Coffey’s deep ground investigations at the site satisfies the advised testing density of MBIE Guidance Appendix D\(^4\) and comprised:

- 20 Piezocone Penetrometer Test probes (CPTu) to “effective refusal”\(^9\) at depths ranging from 3.7m (CPT9) to 13.2m (CPT8) below ground level (bgl), using a track-mounted Pagani rig.
- 5 machine boreholes using a Comacchio MC-900 track-mounted sonic drilling rig to a depth of 15.45m bgl, with Standard Penetration Tests (SPTs) at approx. 1.5m intervals.
- Geotechnical logging of borehole core samples in accordance with the NZGS’s Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes (December 2005).

Access to several residential sections and paddocks of the site was restricted during the ground investigation mostly as a result of man-made barriers (fences, gates, hedgerows, drainage ditches etc.), or boggy ground conditions due to prolonged surface water ponding at the time of the investigation.

The location of the test positions is shown in Figures 4 and 5 below.

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\(^9\) Effective refusal is the term used to describe where the cone resistance (qc) measured by the CPT rig reaches a high level and either (i) the rig operator considers further pushing would damage the equipment, and/or (ii) the rig’s down-thrust capacity is reached, and/or the (iii) loss of cone verticity exceeds acceptable limits. For items (i) and (ii) refusal typically indicates competent ground at that depth but does not indicate the thickness of the hard ground encountered.
Figure 4: Site 1 testing locations (scale as shown)

Figure 5: Site 2 testing locations (scale as shown)
No laboratory work was conducted for this high-level geotechnical overview exercise. We recognise the potential benefits of confirming fines content and plasticity in the evaluation of liquefaction susceptibility but the scale of drilling, sampling and testing required to reliably characterise these soil properties across the approximately 30ha site area was beyond the scope of the report. Laboratory testing on soil samples should be considered for the more detailed geotechnical evaluations required at subdivision/building consent design stage and/or specific engineering design stages of the land development, as appropriate.

Appendix B contains the Soil Behaviour Type profiles (SBT)\(^{10}\) derived from the CPTu data (CPT1 to CPT20), as well as the machine borehole logs (BH1 to BH5).

Appendix C contains the indicative cross section location plans (Figures C1 and C2) as well as Sections A-A’ and B-B’\(^{11}\) (Figures C3 and C4) which are cross-sections compiled using CPT and borehole records to give an overview of the soil conditions across the site area (the cross-sections pull together pairings of CPTs and boreholes to show how the cone resistance profiles correlate with the logged soil units).

**The geological cross-sections have been prepared to provide an indicative summary of the main soil types in the area and should not be relied on for any purpose other than this assessment of geotechnical properties for land rezoning purposes.**

The geological cross-sections include question marks in the stratigraphic naming of the soil layers as for engineering purposes it is not strictly important that the stratigraphic unit name be identified, but rather it is important to recognition that the soils at the site can be variable both laterally and vertically in terms of soil type, strength/density, and the relative thickness and lateral distribution of the various deposits.

Understanding the structure of the ground and the relationship of the various soil units tells us a great deal about the liquefaction susceptibility and foundation engineering properties across the site. Reference should be made to these drawings as the following section of the report relate specifically to information assembled from them.

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\(^{11}\) It should be noted that the vertical scale of the cross-sections are in metres below ground level and have been exaggerated from the horizontal scale in order for the reader to visualise the geological units. In addition, there is no expression of topography on Sections A-A’ and B-B’ as we did not have reliable elevation LiDAR data to refer to.
8. Site geology & geomorphology

8.1. Overview

According to the 1:250 000 Geological Map 16 of the Christchurch area\textsuperscript{12} the area is underlain by Holocene-age alluvial silt and older post-glacial fluvioglacial gravel, sand and silt belonging to the Springfield Formation.

Ashley Floodplain geomorphology has been mapped by McPherson and Cameron Associates\textsuperscript{13} and shows Tuahiwi Road following a tongue of the Rangiora Fan which displays a subtle surface expression of slightly higher ground with the land on either side forming part of the younger-age Ashley Fan (refer to Appendix D).

8.2. Ground models

Review of the published geological records, ECAN well records and records from the fieldwork show the study area is capped by a thin silty topsoil horizon in the order of 0.3m to 0.5m thick (Layer 1). Across the area the topsoil is predominately underlain by fine grained soils described as silts with some clay and sand components (Layer 2) containing layers of sand (Layer 3). These fine grained soils extend to approximately 4 to 8m depth across the study area. Within the fine grained soils are zones of coarse grained sand and gravels possibly marking former courses of the Ashley River, some of which are shallow as inferred in the northern portion of Site 1 (vicinity of CPT8 and CPT9) and the northern portion of Site 2 (vicinity of CPT17 and CPT18).

Below the fine grained soils, the ground is largely underlain by sandy gravel and gravel (Layer 4). The gravels generally increase in density with depth with medium dense to dense gravels becoming very dense gravels from approximately 8 to 13.5m bgl. Occasional minor sand/silt lenses were encountered within the gravel (refer to BH1 and BH2). The gravel is typically described as well-graded sandy gravel to gravel up to cobble size, and is grey in colour. The thickness of the gravel was not proven during the fieldwork.

For liquefaction hazard assessment purposes at the site the gravel is assumed as non-liquefiable i.e. it is the base above which potentially liquefiable soil of the Springfield Formation lie. However, for deep foundation engineering, for example piles that could be founded in end-bearing in the head of the gravel, proving a depth of embedment and properties of the gravel is required by additional borehole drilling (for detailed design).

The soil profile to an approximate depth 15m bgl has been interpreted from the SBTs derived from the CPTu analyses, as well as the soils recovered in the machine boreholes. The generalised subsurface conditions are presented in Tables 1 and 2 below.

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\textsuperscript{12} Forsyth, P.J. (et al). Published by the Institute of Geological and Nuclear Sciences Limited 2008.

\textsuperscript{13} McPherson and Cameron Associates, Map 4.3 Ashley River Floodplain Geomorphology (2002).
### Table 1: Ground conditions summary table for Site 1

<table>
<thead>
<tr>
<th>Layer No.</th>
<th>Description</th>
<th>Approx. depth to bottom of layer (m bgl)</th>
<th>Approx. layer thickness (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SILT: low to medium plasticity, brown (Topsoil)</td>
<td>0.3 – 0.5</td>
<td>0.3 – 0.5</td>
</tr>
<tr>
<td></td>
<td>GRAVEL (Fill from driveway surface at BH3)</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>2</td>
<td>SILT &amp; Clayey SILT: typically low to medium plasticity, grey-brown, grey and blue-grey, very soft to firm Contains thin lenses (0.1 to 0.4m) of peat (BH2 and BH3)</td>
<td>4.0 – 7.5</td>
<td>1.0 – 4.0</td>
</tr>
<tr>
<td>3</td>
<td>SAND &amp; Silty SAND: fine to medium grained, grey-brown to pale grey, very loose to medium dense Containing horizons of SAND/GRAVEL: dense to very dense (inferred from CPT8 and CPT9)</td>
<td>2.0 – 5.0</td>
<td>Variable (less than 1.0 in some areas and up to 4.0 in others)</td>
</tr>
<tr>
<td>4</td>
<td>Sandy GRAVEL to GRAVEL: medium dense to very dense Contains thin lenses of silt, gravelly silt and sand (0.3 to 1.1m thick)</td>
<td>Not proven</td>
<td>At least 8.0</td>
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### Table 2: Ground conditions summary table for Site 2

<table>
<thead>
<tr>
<th>Layer No.</th>
<th>Description</th>
<th>Approx. depth to bottom of layer (m bgl)</th>
<th>Approx. layer thickness (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SILT &amp; Sandy SILT: low plasticity, dark brown (Topsoil)</td>
<td>0.2 – 0.5</td>
<td>0.2 – 0.5</td>
</tr>
<tr>
<td>2</td>
<td>SILT &amp; Clayey SILT: typically low plasticity, grey and pale grey, very soft to firm Contains thin lenses of organic soil and peat (inferred from CPT13, CPT15 and CPT19)</td>
<td>7.5 – 8.0</td>
<td>2.0 – 7.0</td>
</tr>
<tr>
<td>3</td>
<td>SAND &amp; Silty SAND: fine to medium grained, grey-brown, very loose Containing horizons of SAND/GRAVEL: dense to very dense (inferred from CPT17 and CPT18) Less predominant across Site 2, exists as thin layers in a typically silty ground profile</td>
<td>Variable</td>
<td>0.4 – 4.0</td>
</tr>
<tr>
<td>4</td>
<td>Sandy GRAVEL to GRAVEL: medium dense to very dense</td>
<td>Not proven</td>
<td>At least 7.5</td>
</tr>
</tbody>
</table>
8.3. Fill

Large mounds of soil and waste (general household and metal fragments) are visible from Tuahiwi Road extending towards the northwest boundary of Site 2. Michael Trotter, a local archaeological consultant, has prepared a report for WDC dated 5 July 2014\(^{14}\) indicating this area forms part of borrow pits of an archaeological site referred to as M35/370 recorded in 1998, which have subsequently been filled by household and commercial rubbish randomly dumped there during the 1990s. Coffey Environments make further comment on this area in their ESA report for the Tuahiwi Village Plan Change dated 22 August 2014.

8.4. Groundwater regime

The ECan records for the boreholes drilled in Site 1 indicate a "minimum calculated groundwater level" of 1.1 to 1.8m bgl\(^{15}\), and 0.8 to 1.4m bgl\(^{16}\) for Site 2.

Groundwater was recorded during the borehole investigation conducted in July 2014 as follows:

Table 3: Groundwater data from borehole records

<table>
<thead>
<tr>
<th>BH No.</th>
<th>Depth of BH (m bgl)</th>
<th>Water level (m bgl)</th>
<th>Date recorded</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>15.45</td>
<td>1.1</td>
<td>8 July 2014</td>
</tr>
<tr>
<td>2</td>
<td>15.45</td>
<td>1.6</td>
<td>9 July 2014</td>
</tr>
<tr>
<td>3</td>
<td>15.45</td>
<td>1.4</td>
<td>11 July 2014</td>
</tr>
<tr>
<td>4</td>
<td>15.45</td>
<td>1.05</td>
<td>16 July 2014</td>
</tr>
<tr>
<td>5</td>
<td>15.45</td>
<td>2.7</td>
<td>10 July 2014</td>
</tr>
</tbody>
</table>

**Note:** (1) This investigation was carried out during a particularly wet winter.

**Note:** (2) These results should be used with a certain degree of caution as sufficient time may not have been given to allow the groundwater to reach static conditions which can take some time particularly in a cohesive ground profile. In addition, these levels are likely to have been influenced by the drilling fluid.

We also reviewed EQC event-specific groundwater surface depths and GNS Science median groundwater surface elevations but Tuahiwi Village is outside these groundwater study areas. Similarly, the site is outside the groundwater maps included in the Brown & Weeber memoirs.

Based on the available on-site groundwater information, expected seasonal fluctuations in water levels, and taking into account the low-lying nature of the ground at and in the vicinity of the site, a design groundwater level of 1.0m bgl has been adopted for the liquefaction hazard analysis.

\(^ {14}\) Archaeological Assessment for Proposed Rezoning at Tuahiwi, Canterbury prepared by Michael Trotter, 5 July 2014.

\(^ {15}\) ECan well records M35/5432, M35/6848, M35/7202, M35/7363 and M35/7167.

\(^ {16}\) ECan well records M35/6868, M35/8610, M35/7315, M35/0567, M35/4619 and M35/5676.
8.5. Site subsoil class

In accordance with NZS1170.5, Section 3.1.3, a site subsoil classification of “Class D – Deep or soft soil sites” may be assumed for this site.

9. Performance of the site

9.1. Ground motion

Using the MBIE\(^4\) and Bradley & Hughes (2012)\(^17\) procedures we have found that the site was “not sufficiently tested” to the Serviceability Limit State (SLS) level of earthquake demand during the Canterbury earthquake sequence.

In terms of engineering design standards, “small to medium sized earthquakes” correspond to a serviceability limit state (SLS) event with a nominal return period of 25 years, and “moderate to large earthquakes” correspond to an Ultimate Limit State (ULS) event with a nominal return period of 500 years\(^18\).

Considering the geological setting and the terrain at the site, and taking into account the level of “test” experienced, an assessment has been made regarding predicted earthquake-induced deformation that may occur in a design earthquake event. In this regard it is considered that SLS and ULS earthquake events may cause more damage to the land than that experienced during the Canterbury earthquake sequence.

9.2. EQC/GNS mapped observations

EQC Horizontal Ground Movements have not been given for the site, and EQC maps for Vertical Ground Movements and Observed Ground Cracks do not extend as far north as the site.

No EQC aerial photography is available for the site following the Canterbury earthquake sequence\(^19\). Similarly, information relating to liquefaction from the CGD “EQC Liquefaction and Lateral Spreading Observations”\(^20\) did not cover the site. However, an assessment of high resolution aerial photographs carried out by GNS indicates minor amounts of what may be liquefaction ejecta observed between Tuahiwi Road and the Cam River following the 4 September 2010 earthquake.

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\(^18\) Table C2.1 on page C2.2 of MBIE Guidance (December 2012).


9.3. Site walkover assessment

Coffey conducted a walkover assessment during the month of July 2014. In addition, individual accounts of building and land damage from residents of Tuahiwi Village was accumulated and the main points have been summarised below:

- No signs of earthquake-induced ground deformation were observed on the site.
- The water quality became un-potable at some well locations.
- Surface water behaviour indicates that the land did not rise or subside in Tuahiwi Village post Canterbury earthquake sequence. However, it was pointed out that approximately 3km south-east of Tuahiwi Village sections of Revells Road experienced unusual flooding after the heavy rains earlier this year.

10. CERA residential zoning

Reference to the Canterbury Earthquake Recovery Authorities' land zoning system confirms that the entire site is zoned "Green". CERA states "Green zone areas are generally considered to be suitable for residential construction"\textsuperscript{21}.

11. MBIE land zoning

The site falls in "N/A – Rural & Unmapped" category according to the MBIE residential land Technical Category map for the area. Land to the immediate east of Site 1 along Tuahiwi Road, immediately west of Site 2 either side of Tuahiwi Road, and immediately north of Site 2 are currently zoned for Residential 3 land use (refer to Figure 6).

\textsuperscript{21} http://cer.govt.nz/land-information/land-zones
12. Natural hazards

12.1. Liquefaction hazard assessment

Our report covers the geotechnical investigation requirements for plan change set out in the MBIE guidelines as follows:

“In support of both plan change applications and subdivision consent applications, appropriate geotechnical investigations shall be carried out and stand-alone geotechnical reports prepared by a Chartered Professional Engineer (CPEng) with competence in geotechnical engineering. The reports shall combine all relevant geotechnical information in both a factual and interpretive manner, provide justifiable statements about all pertinent geotechnical aspects and consider relevant RMA section 106 issues”.

The site is mapped within the ECany liquefaction assessment area map as "liquefaction assessment needed”.

Assessment of earthquake-induced ground deformation hazard at the site has generally been carried out in accordance with the latest MBIE Guidance (December 2012) and using proprietary liquefaction

---

22 Per drawing received via email from Tammy McMahon on 27 June 2014.
23 Canterbury Geotechnical Database Map C005140 - 19 Feb 2013.
Design earthquake scenarios assessed are the Serviceability Limit State (SLS) and Ultimate Limit State (ULS), using parameters provided by the MBIE for an IL2 structure and a Class D subsoil site.

Reference should be made to Appendix E for the liquefaction analysis plots for CPT1 to CPT20.

The site’s liquefaction characteristics have been assessed against the deformation limits in the latest MBIE Guidance document as summarised below in Table 16.1.

<table>
<thead>
<tr>
<th>Technical Category</th>
<th>Liquefaction deformation index limits</th>
<th>Likely implications for house foundation (subject to individual assessment)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vertical settlement</td>
<td>Lateral spread (across a house site)</td>
</tr>
<tr>
<td>TC1</td>
<td>15 mm</td>
<td>25 mm</td>
</tr>
<tr>
<td>TC2</td>
<td>50 mm</td>
<td>100 mm</td>
</tr>
<tr>
<td>TC3</td>
<td>&gt;50 mm</td>
<td>&gt;100 mm</td>
</tr>
</tbody>
</table>

Note: Certain foundation details included in NZS 3604 are precluded from use (refer to Building Code Acceptable Solution B1/AS1 at www.dbh.govt.nz/compliance-documents/br).

Indicative MBIE “free-field” settlement results and Liquefaction Potential Index risk are displayed in Tables 4 and 5 below for residential development of the site.

In summary, we have found that the thicker the silty and sandy soils units are (Layer 2 and Layer 3), the more susceptible the ground is to earthquake-induced settlement.

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24 Geologismiki Geotechnical Software, Cliq v1.7.4.34 - CPT Liquefaction Assessment Software.
25 Normal structures – single family dwellings, car parking buildings (Table 3.2 of NZS1170).
Table 4: Site 1 liquefaction hazard assessment summary

<table>
<thead>
<tr>
<th>Property description</th>
<th>CPT No.</th>
<th>Refusal depth (m)</th>
<th>Estimated liquefaction induced “free-field” ground surface settlements (mm)</th>
<th>Liquefaction Potential Index (LPI)</th>
<th>Indicative MBIE Technical Category*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>SLS 1 25 yr EQ (PGA 0.13g)</td>
<td>ULS IL2 500 yr EQ (PGA 0.35g)</td>
<td>SLS 1</td>
</tr>
<tr>
<td>119 Topito Rd</td>
<td>1</td>
<td>9.18</td>
<td>70</td>
<td>80</td>
<td>Low</td>
</tr>
<tr>
<td>113 Topito Rd</td>
<td>2</td>
<td>5.23</td>
<td>34</td>
<td>52</td>
<td>Low</td>
</tr>
<tr>
<td>115 Topito Rd</td>
<td>3</td>
<td>7.9</td>
<td>13</td>
<td>15</td>
<td>Low</td>
</tr>
<tr>
<td>235 Tuahiwi Rd</td>
<td>4</td>
<td>10.4</td>
<td>37</td>
<td>52</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>8.23</td>
<td>48</td>
<td>67</td>
<td>Low</td>
</tr>
<tr>
<td>257 Tuahiwi Rd</td>
<td>6</td>
<td>11.36</td>
<td>178</td>
<td>188</td>
<td>High</td>
</tr>
<tr>
<td>113 Topito Rd</td>
<td>7</td>
<td>5.9</td>
<td>34</td>
<td>48</td>
<td>Low</td>
</tr>
<tr>
<td>305 Tuahiwi Rd</td>
<td>8</td>
<td>13.16</td>
<td>45</td>
<td>81</td>
<td>Low</td>
</tr>
<tr>
<td>305 Tuahiwi Rd</td>
<td>9</td>
<td>3.85</td>
<td>0</td>
<td>0</td>
<td>Low</td>
</tr>
<tr>
<td>233 Tuahiwi Rd</td>
<td>10</td>
<td>7.43</td>
<td>39</td>
<td>105</td>
<td>Low</td>
</tr>
<tr>
<td>235 Tuahiwi Rd</td>
<td>11</td>
<td>8.82</td>
<td>61</td>
<td>73</td>
<td>Low</td>
</tr>
</tbody>
</table>

*Less than 10m depth of ground has been achieved by several of the CPTs before effective refusal occurred on competent ground (i.e. MBIE’s Index Value for calculated settlement). However, based on our knowledge of the ground model for the site the depth of potential liquefaction is expected to be limited to the refusal depths achieved by the CPTs.
## Table 5: Site 2 liquefaction hazard assessment summary

<table>
<thead>
<tr>
<th>Property</th>
<th>CPT No.</th>
<th>Refusal depth (m)</th>
<th>Estimated liquefaction induced “free-field” ground surface settlements (mm)</th>
<th>Liquefaction Potential Index (LPI)</th>
<th>Indicative MBIE Technical Category*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>SLS 1 25 yr EQ (PGA 0.13g)</td>
<td>ULS IL2 500 yr EQ (PGA 0.35g)</td>
<td>SLS 1</td>
</tr>
<tr>
<td>190 Tuahiwi Rd</td>
<td>12</td>
<td>11.27</td>
<td>27</td>
<td>42</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>9.6</td>
<td>194</td>
<td>203</td>
<td>High</td>
</tr>
<tr>
<td>142 Tuahiwi Rd</td>
<td>14</td>
<td>9.07</td>
<td>6</td>
<td>19</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>8.78</td>
<td>66</td>
<td>80</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>10.2</td>
<td>34</td>
<td>56</td>
<td>Low</td>
</tr>
<tr>
<td>190 Tuahiwi Rd</td>
<td>17</td>
<td>10.3</td>
<td>9</td>
<td>27</td>
<td>Low</td>
</tr>
<tr>
<td>170 Tuahiwi Rd</td>
<td>18</td>
<td>11.84</td>
<td>31</td>
<td>52</td>
<td>Low</td>
</tr>
<tr>
<td>168B Tuahiwi Rd</td>
<td>19</td>
<td>11.36</td>
<td>48</td>
<td>49</td>
<td>Low</td>
</tr>
<tr>
<td>190 Tuahiwi Rd</td>
<td>20</td>
<td>10.9</td>
<td>32</td>
<td>48</td>
<td>Low</td>
</tr>
</tbody>
</table>

* Less than 10m depth of ground has been achieved by several of the CPTs before effective refusal occurred on competent ground (i.e. MBIE’s Index Value for calculated settlement). However, based on our knowledge of the ground model for the site the depth of potential liquefaction is expected to be limited to the refusal depths achieved by the CPTs.
12.2. RMA Section 106

Resource Management Act Section 106 issues relevant to this Plan Change assessment require an evaluation of whether:

(a) *the land in respect of which a consent is sought, or any structure on the land, is or is likely to be subject to material damage by erosion, falling debris, subsidence, slippage, or inundation from any source; or*

(b) *any subsequent use that is likely to be made of the land is likely to accelerate, worsen, or result in material damage to the land, other land, or structure by erosion, falling debris, subsidence, slippage, or inundation from any source.*

12.2.1. Erosion

The potential for erosion has been assessed from the closest source, namely the Cam River. The overall erosive potential of the Cam River is expected to be nil as it is situated approximately 450m to 700m from the western boundaries of Site 1 and Site 2 respectively.

12.2.2. Falling debris

There are no geologic sources of falling debris at the site.

12.2.3. Subsidence

This report specifically addresses the identification of subsidence that may occur due to earthquake-induced ground deformation. Assessment of ground conditions for foundation design and Building Consent application purposes should be site-specific to each building. Normal investigation practices and consenting processes should apply.

12.2.4. Slippage

The closest source of slippage is the Cam River located approximately 450m to 700m west of the Site 1 and Site 2 boundaries respectively. As such, we consider the risk of slope failure or the risk to development should failure occur to be very low.

The shallow drainage ditches may induce lateral spread due to a high water table and shallow liquefiable silts and sands in certain areas of the site. As such, appropriate design consideration should be given to these features during the subdivision phase.
12.2.5. Inundation

River flooding

Refer to the full Waimakariri District Flood Hazard Management Strategy report and the Wamakariri District localised flood hazard assessment report to inform decisions on land use in this area.

According to the Waimakariri District Flood Hazard Management Strategy flood modelling maps only the western extremity of Site 1 adjacent to Topito Road is considered to be at risk of inundation from flooding of the Ashley River in 100^26, 200^27 and 500^30 year return period events.

Tsunami

The site is approximately 5km from the coast. Based on Land Information New Zealand topographical maps, the elevation of Tuahiwi Village is less than 10m above sea level.

The risk to the site with regard to a tsunami hazard falls outside of our range of expertise. It is recommended that WDC consult with institutions such as NIWA and GNS Science who respectively have prepared several recent publications for modelling coastal inundation in Canterbury and prepared updates to the tsunami hazard in New Zealand. Some of the main conclusions drawn from these publications and information available from ECAn has been summarised below:

- The most likely tsunami threat to affect the Pegasus Bay coast would be distant source tsunamis (tsunamis generated more than three hours' travel time away), which would mean tsunamis from South or Central America. Predicted water inundation depths are over a metre and can be up to 3 metres in Kairaki Beach, The Pines Beach, south of Brooklands and parts of Spencerville for the largest surge modelled from a South American tsunami reaching the shore at mean high water spring.

- Local source tsunamis are tsunamis that are generated less than one hours' travel time away from the coast, which for the Pegasus Bay coast would mean tsunamis created within Pegasus Bay. These are not thought to be big enough and would not produce enough vertical movement to create a significant tsunami that would flood large amounts of land.

- Regional source tsunamis are tsunamis that are generated one to three hours' travel time away from the coast. The most likely regional tsunami source for Pegasus Bay is the Hikurangi subduction zone fault off the Wairarapa and Hawke's Bay Coast. A tsunami from this fault is unlikely to be large for the Canterbury coast, but may flood low lying areas.

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27 Waimakariri District Localised Flood Hazard Assessment, prepared by the Project Delivery Unit, April 2014.
29 Waimakariri District Flood Hazard Management Strategy, Figures 8,9,11 and 17.
31 www.linz.govt.nz
33 GNS Science Consultancy Report 2013/131 dated August 2013.

Coffey
GENZCHR15672AA
18 September 2014
Stormwater

With regard to stormwater inundation, the design and management of stormwater should be addressed as part of the subdivision design and building design processes.

12.2.6. Subsequent use

The WDC is considering a District Plan Change within Māori Reserve 873 (MR 873) under which it is proposed to expand Tuahiwi Village by changing the zoning from Rural to Residential 3 in Site 1 and Site 2 adjacent to the present village. Residential 3 is the current zoning for the Tuahiwi Village, as such low density residential development is considered unlikely to adversely affect or worsen the site's susceptibility to material damage.

The comments above relate to the current lay of the land. Proposed changes to the land (i.e. its subsequent use) that may potentially adversely affect future land and building performance include the development of stormwater facilities that may require the construction of drains, swales and basins. These features provide a “free-face” in the land requiring attention to address the potential for lateral spread. Stormwater design should have specialist geotechnical design input at the subdivision/building consent stage of development.
13. Conclusions

A summary of this assessment is included below:

1. Our assessment has found that no part of the site is precluded from the intended rezoning to "Residential 3" land-use.

2. The liquefaction hazard assessment demonstrated that there is a liquefaction potential across the site.

3. Groundwater level varies across the area between approximately 1.0 and 2.0m bgl and is expected to fluctuate seasonally. For liquefaction hazard and bearing capacity assessment purposes a design groundwater level of 1.0m bgl has been considered. Water levels adopted for detailed design will need to take in account any earthworks changes to ground levels.

4. Lateral spread risk is considered to be low. However, the shallow drainage ditches may induce lateral spread due to a high water table and shallow liquefiable silts and sands. As such, during subdivision design appropriate design consideration should be given to these features. This could include proper infilling, buttressing, setbacks or other methods.

5. The majority of the land is likely to be TC2 with a patchwork of TC1 and TC3 equivalent land. Reference should be made to the latest MBIE Guidance for appropriate building foundations for normal residential construction. A potential construction hazard includes areas of soft compressible ground (e.g. soft silt). Awareness of this issue is very important when considering appropriate foundation engineering measures for the site. As recorded in BH2 and BH3 there are layers of peat and organic material, however these are not expected to be thick and extensive.

6. Development across the site should be cognisant of the potential for the presence of documented and undocumented fill that should be identified in the course of normal, good-practice ground investigation processes.

7. Earthworks and finished floor level requirements to mitigate the Ashley River flood risk as well as other localised flood hazard areas (if any) should be confirmed with WDC early on in the development of concepts for the site. Furthermore, inadequate surface drainage is an issue for Tuahiwi Village particularly during the winter months. The design and management of stormwater should be addressed as part of the subdivision design and building design processes.

This report being a high-level overview requires the site to be subject to specific detailed investigation and engineering evaluation at the subdivision/building consent stage to confirm the ground conditions, their indicative foundation categorisation and available bearing capacities for foundation design. Development must be undertaken with an appropriate level of investigation and evaluation in accordance with MBIE Guidance and satisfy WDC's regulatory requirements. The MBIE guidelines provide the engineering criteria and means by which the land may be developed to be Code compliant. It is a question of economics as to whether land is economically viable to develop.
14. Limitations

This report has been prepared solely for the use of our client Waimakariri District Council and their professional advisers and in relation to the specific project described herein. No liability is accepted in respect of its use for any other purpose or by any other person or entity.

The opinions, recommendations and comments given in this report result from the application of normal methods of site investigation. As factual evidence has been obtained solely from test methods that by their nature only provide information about a relatively small volume of subsoils, there may be special conditions pertaining to this site that have not been disclosed by the investigation and that have not been taken into account in the report. If variations in the subsoils occur from those described or assumed to exist, then the matter should be referred to us immediately.

Please also refer to the enclosed Important Information about Your Coffey Report.

15. Closure

If you have any queries or you require any further clarification on any aspects of this report, please contact the undersigned.

For and on behalf of Coffey

Prepared by

Bjorn Raasch
BSc (Hons)
Project Engineering Geologist

Reviewed and approved by

Nick Harwood
BEng (Hons) MSc DIC MIPENZ CPEng
Principal Geotechnical Engineer
Important information about your Coffey Report

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time.

The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Coffey Geotechnics (NZ) Limited
Important information about your Coffey Report

Interpretation by other design professionals
Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Data should not be separated from the report
The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue
Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment. Contamination can create major health, safety and environmental risks.

If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

Rely on Coffey for additional assistance
Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility
Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.
Appendix A - Site Photographs
Photograph 1: Low lying and level ground typical of the area

Photograph 2: Example of slightly undulating ground

Photograph 3: Drainage ditch between paddocks

Photograph 4: Ponding of water on the surface
Appendix B - Soil Behaviour Type profiles (SBT) based on CPTu data and borehole logs (BH1 to BH5)
**Coffey Geotechnics**

PO Box 1872
Christchurch
8140

**Project:** GENZCHR115672AA

**Location:** Tuahiwi Village Plan Change - Site 1

**CPT:** CPT2 - SLS

Total depth: 5.23 m

---

**Analysis method:** IJB (2008)

**Fines correction method:** R&W (1998)

**Points to test:** Based on IC value

**Earthquake magnitude M<sub>eq</sub>:** 7.50

**Peak ground acceleration:** 0.13

---

**Friction Ratio**

**Cone resistance**

**SBT Plot**

**Soil Behaviour Type**

- Sensible fine grained
- Clay
- Clay & silty clay
- Silty sand & sandy silt
- Clay & silty clay
- Clay
- Clay & silty clay
- Clay
- Sand & silty sand

**Apparent fines content**

---

**Use fill:** No

**Fill height:** N/A

**Fill weight:** N/A

**Trans. detect. applied:** No

**K<sub>D</sub> applied:** Yes

**Clay like behavior applied:** Sands only

**Limit depth applied:** No

**Limit depth:** N/A

**MSF method:** Method based

---

CPT-IT v.1.7.6.34 - CPTU data presentation & interpretation software - Report created on: 12/08/2014, 3:35:31 p.m.

Project file: F:\GENZ\Projects\15600\15672AA - Tuahiwi Village Plan Change\07 ANALYSES & DESIGN\Liquefaction Analysis - CPT\Site 1\15672AA - Tuahiwi Village Plan Change - Site 1.cmp
Fines correction method: RAW (1998)  
Points to test: Based on Ic value  
Earthquake magnitude $M_{eq}$: 7.50  
Peak ground acceleration: 0.13  

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
$k_a$ applied: Yes  

Clay behavior applied: Sands only  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based
CPT: CPT13 - SLS
Total depth: 9.62 m

Coffey Geotechnics
PO Box 1872
Christchurch
8140

Project: GENZCHRI15672AA
Location: Tuahwi Village Plan Change - Site 2

Cone resistance
Friction Ratio
SBT Plot
Soil Behaviour Type
Apparent fines content

Analysis method: Istituto (2008)
Fines correction method: R&W (1998)
Points to test: Based on Ic value
Earthquake magnitude M_{eq}: 7.50
Peak ground acceleration: 0.13

G.W.T. (in-situ): 1.10 m
G.W.T. (earthq.): 1.00 m
Average results interval: 3
Ic cut-off value: 2.00
Unit weight calculation: Based on SBT

Use fill: No
Fill height: N/A
Fill weight: N/A
Trans. detect. applied: No
K_s applied: Yes

Clay like behavior applied: Sands only
Limit depth applied: No
Limit depth: N/A
MSF method: Method based

SBT (Robertson et al. 1986)

CPT-TT v.1.7.6.34 - CPTU data presentation & interpretation software - Report created on: 12/08/2014, 4:35:28 p.m.
Project file: F:\GENZ\Projects\15600\15672AA - Tuahwi Village Plan Change\07 ANALYSES & DESIGN\Liquefaction Analysis - CPTu\Site 2\15672AA - Tuahwi Village Plan Change - Site 2.txt
Coffey Geotechnics
PO Box 1872
Christchurch
8140

Project: GENZCHRI15672AA
Location: Tuahiwi Village Plan Change - Site 2

CPT: CPT14 - SLS
Total depth: 9.07 m

Cone resistance

Friction Ratio

SBT Plot

Soil Behaviour Type

Apparent fines content

Analysis method: MB (2008)

Fill zone correction method: RW (1998)

Points to test:

Earthquake magnitude Mw: 7.50

Peak ground acceleration: 0.13

G.W.T. (in-situ): 1.10 m

G.W.T. (earthwork): 1.00 m

Average results interval: 3

Ic cut-off value: 2.60

Unit weight calculation: Based on SBT

Use fill: No

Fill height: N/A

Fill weight: N/A

Trans. detect. applied: No

Kp applied: Yes

Clay like behavior applied: Sands only

Limit depth applied: N/A

Limit depth: No

MSF method: Method based

SBT (Robertson et al. 1986)

FC (%)
# Engineering Log - Borehole

**client:** Waimakiriri District Council  
**principal:** -  
**project:** Tuahiwi Village Plan Change  
**location:** Tuahiwi, Canterbury

<table>
<thead>
<tr>
<th>position: E: 1570702; N: 5202097 (Datum Not Specified)</th>
<th>surface elevation: 0.00 m (Datum Not Specified)</th>
<th>angle from horizontal: 90°</th>
</tr>
</thead>
<tbody>
<tr>
<td>drill model: Comacchio MC3600, Track mounted</td>
<td>casing diameter: 200 mm</td>
<td>vane id.:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>drilling information</th>
<th>material substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>method &amp; support</td>
<td>samples &amp; field tests</td>
</tr>
<tr>
<td>AD</td>
<td>auger drilling*</td>
</tr>
<tr>
<td>AS</td>
<td>auger sampling*</td>
</tr>
<tr>
<td>HA</td>
<td>hand auger</td>
</tr>
<tr>
<td>SD</td>
<td>sonic drilling</td>
</tr>
</tbody>
</table>

*hit shown by suffix

<table>
<thead>
<tr>
<th>samples &amp; field tests</th>
<th>classification symbol &amp; soil description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>bulk disturbed sample</td>
</tr>
<tr>
<td>D</td>
<td>disturbed sample</td>
</tr>
<tr>
<td>E</td>
<td>environmental sample</td>
</tr>
<tr>
<td>SS</td>
<td>split spoon sample</td>
</tr>
<tr>
<td>L</td>
<td>undisturbed sample (length to refusal)</td>
</tr>
<tr>
<td>H*</td>
<td>hand penetration test (SPT)</td>
</tr>
<tr>
<td>N*</td>
<td>SPT - sample recovered</td>
</tr>
<tr>
<td>NC</td>
<td>SPT with solid cone</td>
</tr>
<tr>
<td>VS</td>
<td>vane shear, peak/non-peak (vpa)</td>
</tr>
<tr>
<td>R</td>
<td>refusal</td>
</tr>
<tr>
<td>HB</td>
<td>hammer bounces</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>consistency / relative density</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
</tr>
<tr>
<td>S</td>
</tr>
<tr>
<td>F</td>
</tr>
<tr>
<td>St</td>
</tr>
<tr>
<td>VS</td>
</tr>
<tr>
<td>H</td>
</tr>
<tr>
<td>Fh</td>
</tr>
<tr>
<td>VL</td>
</tr>
<tr>
<td>L</td>
</tr>
<tr>
<td>MD</td>
</tr>
<tr>
<td>D</td>
</tr>
<tr>
<td>ND</td>
</tr>
</tbody>
</table>

### Material Substance

**ML**
- SILT: low to medium plasticity, brown, with trace roots and rootlets, moist.

**MH**
- SILT: medium to high plasticity, grey, with brown mottles, with trace clay, moist to saturated, very soft.
  - at 1.2m: clay absent, with some fine sand

**SP**
- SAND: fine to medium grained, grey-beige, with some silt, saturated, very loose

**ML**
- SILT: low to medium plasticity, grey-brown, saturated, very soft.
  - at 2.2m: with trace fine to medium grained, sub-rounded to sub-angular gravel
  - at 2.9m: becoming grey, gravel absent
  - at 3.8m: with some tree and bark pieces

**MH**
- SILT: medium to high plasticity, grey-green, with some clay and tree fragments, saturated, very soft.

**GW**
- Sandy GRAVEL: fine to coarse grained, well graded, rounded to sub-angular, grey, with trace mottles, sub-rounded, sand is fine to coarse grained, trace cobbles, saturated, medium dense to dense.

**ML**
- Gravely SILT: low to medium plasticity, grey, gravels are fine to coarse grained, rounded to sub-angular, saturated, very stiff to hard.
## Engineering Log - Borehole BH1

**client:** Waimakariri District Council  
**principal:** -  
**project:** Tuahiwi Village Plan Change  
**location:** Tuahiwi, Canterbury

<table>
<thead>
<tr>
<th>position: E: 1570702; N: 5202097 (Datum Not Specified)</th>
<th>surface elevation: 0.00 m (Datum Not Specified)</th>
<th>angle from horizontal: 90°</th>
</tr>
</thead>
<tbody>
<tr>
<td>drill model: Comacchio MC900, Track mounted</td>
<td>casing diameter: 200 mm</td>
<td>vane id:</td>
</tr>
</tbody>
</table>

### Drilling Information

<table>
<thead>
<tr>
<th>method &amp; support</th>
<th>penetration</th>
<th>samples &amp; field tests</th>
<th>RL (m)</th>
<th>material substance</th>
<th>material description</th>
</tr>
</thead>
<tbody>
<tr>
<td>method &amp; support</td>
<td>penetration</td>
<td>samples &amp; field tests</td>
<td>RL (m)</td>
<td>material substance</td>
<td>material description</td>
</tr>
<tr>
<td>N</td>
<td>N</td>
<td>N</td>
<td>12.0</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>N</td>
<td>N</td>
<td>N</td>
<td>14.0</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>N</td>
<td>N</td>
<td>N</td>
<td>15.0</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

**SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components

**SILIT:** medium to high plasticity, pale brown, with some fine to coarse grained, rounded to angular gravels, saturated, dense to very dense. Sandy GRAVEL: fine to coarse grained, well graded, rounded to sub-angular, pale brown, sand is fine to coarse grained, with some silt, trace cobbles, saturated, dense to very dense.

Borehole BH1 terminated at 15.45 m Target depth

### Classification Symbol & Soil Description

<table>
<thead>
<tr>
<th>classification symbol</th>
<th>soil description</th>
</tr>
</thead>
</table>

**VS** very soft  
**S** soft  
**St** stiff  
**VR** very stiff  
**H** hard  
**F** firm  
**VL** very loose  
**L** loose  
**MD** medium dense  
**D** dense  

### Moisture

<table>
<thead>
<tr>
<th>moisture</th>
<th>density</th>
</tr>
</thead>
</table>

**D** dry  
**M** moist  
**W** wet  
**S** saturated  
**WP** plastic limit  
**WI** liquid limit

**Hammer Bounding**

### Vane Shear

<table>
<thead>
<tr>
<th>vane shear</th>
<th>vane</th>
<th>vane refusal</th>
</tr>
</thead>
</table>

**V** very soft

### SPT

<table>
<thead>
<tr>
<th>SPT</th>
<th>SPT refusal</th>
</tr>
</thead>
</table>

**SPT** Standard Penetration Test

**SPT refusal** SPT with solid cone
### Engineering Log - Borehole

**client:** Waimakariri District Council  
**principal:** -  
**project:** Tuahwai Village Plan Change  
**location:** Tuahwai, Canterbury

**position:** E: 1570775, N: 5202197 (Datum Not Specified)  
**surface elevation:** 0.00 m (Datum Not Specified)  
**angle from horizontal:** 90°

**drilling information**

<table>
<thead>
<tr>
<th>Drilled &amp; Support</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPT</strong> 0.1, 0.0, 0.0 N=0</td>
<td>ML</td>
</tr>
<tr>
<td><strong>SPT</strong> 0.1, 0.1, 0.1 N=0</td>
<td>ML</td>
</tr>
<tr>
<td><strong>SPT</strong> 3.5, 7.7, 9.9 N=33</td>
<td>S</td>
</tr>
<tr>
<td><strong>SPT</strong> 4.3, 4.4, 3.8 N=17</td>
<td>GP</td>
</tr>
<tr>
<td><strong>SPT</strong> 5.7, 6.7, 11.1 N=35</td>
<td>D</td>
</tr>
</tbody>
</table>

**material description**

- **SOIL TYPE:** plasticity or particle characteristic, colour, secondary and minor components
- **vane shear:** M to W
- **structure and additional observations:** TOPSOIL, Consistency of silt inferred SPRINGSTON FORMATION

**samples & field tests**

- **B:** bulk disturbed sample
- **M:** moist
- **N:** natural
- **D:** disturbed sample
- **E:** environmental sample
- **SS:** split spoon sample
- **HP:** hand penetrometer (kPa)
- **N:** standard penetration test (SPT)
- **N:** sample recovered
- **NC:** not collected
- **SB:** saturated
- **V:** vane shear, peak remoulded (kPa)
- **R:** refusal
- **HB:** hammer bounces

**classification symbol & soil description based on Unified Classification System**

- **VD:** very dense
- **C:** stiff
- **VS:** very stiff
- **S:** soft
- **VL:** very loose
- **ML:** medium dense
- **D:** dense
- **H:** hard
- **W:** wet
- **M:** moist
- **B:** blocky
- **W:** liquid limit
- **G:** gravel
- **D:** clay

**compliance with relative density**

- **VS:** very stiff
- **V:** stiff
- **S:** saturated
- **M:** moist
- **D:** dry
## Engineering Log - Borehole

**client:** Waimakariri District Council  
**principal:** -  
**project:** Tuahiwi Village Plan Change  
**location:** Tuahiwi, Canterbury

<table>
<thead>
<tr>
<th>Borehole ID:</th>
<th>BH2</th>
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<tbody>
<tr>
<td>sheet:</td>
<td>2 of 2</td>
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<tr>
<td>project no.</td>
<td>GENZCHR15872AA</td>
</tr>
<tr>
<td>date started:</td>
<td>09 Jul 2014</td>
</tr>
<tr>
<td>date completed:</td>
<td>09 Jul 2014</td>
</tr>
<tr>
<td>logged by:</td>
<td>J. Byron-Joyce</td>
</tr>
<tr>
<td>checked by:</td>
<td>B. Raasch</td>
</tr>
</tbody>
</table>

**position:** E: 1570775, N: 5202197 (Datum Not Specified)  
**surface elevation:** 0.00 m (Datum Not Specified)  
**angle from horizontal:** 90°

**drilling information**

| SPT | 8, 13, 12, 13, 12, 13.800m N=50 | 9.00m |
| GP | at 7.9m: becoming pale brown-grey |
| SP | Gravely SAND: fine to coarse grained, grey-brown, saturated, medium dense. SAND: fine to coarse grained, grey-brown, saturated, medium dense. |
| OP | Sandy GRAVEL: fine to medium grained, sub-rounded to sub-angular, pale brown-grey, sand is fine to coarse grained, saturated, medium dense to very dense. at 9.6m: gravel becoming fine to coarse grained |
| From: 10.5-10.95m: becoming pale brown and from ~11.5m becoming stained orange |

**material substance**

<table>
<thead>
<tr>
<th>soil description</th>
<th>S</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPRINGSTON FORMATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative density inferred</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**method & support**

<table>
<thead>
<tr>
<th>method</th>
<th>auger drilling*</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>auger drilling*</td>
</tr>
</tbody>
</table>

**samples & field tests**

| LS | undisturbed sample #8mm diameter |
| HP | hand penetrometer (kPa) |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| NC | SPT with solid cone |
| VS | vane shear, peak/reduced (kPa) |
| R | refusal |
| HB | hammer bounding |

**classification symbol & soil description**

Based on Unified Classification System

<table>
<thead>
<tr>
<th>moisture</th>
<th>D</th>
<th>dry</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>moist</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>wet</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>saturated</td>
<td></td>
</tr>
<tr>
<td>Wp</td>
<td>plastic limit</td>
<td></td>
</tr>
<tr>
<td>Wi</td>
<td>liquid limit</td>
<td></td>
</tr>
</tbody>
</table>

**consistency / relative density**

| VS | very soft |
| S | soft |
| F | firm |
| St | stiff |
| VR | very stiff |
| Hv | hard |
| Ef | feeble |
| VL | very loose |
| L | loose |
| MD | medium dense |
| D | dense |
| VD | very dense |

Borehole BH-2 terminated at 15.45 m  
Target depth
# Engineering Log - Borehole

**client:** Waimakariri District Council  
**principal:** -  
**project:** Tuahiwi Village Plan Change  
**location:** Tuahiwi, Canterbury

<table>
<thead>
<tr>
<th>Position E: 1571130; N: 5202532 (Datum Not Specified)</th>
<th>Surface Elevation: 0.00 m (Datum Not Specified)</th>
<th>Angle from horizontal: 90°</th>
<th>Hole Diameter: 100 mm</th>
<th>Vane ID:</th>
</tr>
</thead>
</table>

**Drilling Information**

<table>
<thead>
<tr>
<th>Drilled &amp; Sampled</th>
<th>Penetration</th>
<th>Samples &amp; Field Tests</th>
<th>Material Substance</th>
<th>Material Description</th>
<th>Measure</th>
<th>Consistency</th>
<th>Vane Shear</th>
<th>Additional Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>GW</td>
<td>GRAVEL: medium to coarse grained, rounded to angular, grey, wet.</td>
<td>W</td>
<td>F - St</td>
<td></td>
<td>SPRING FORMATION</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MH</td>
<td>Clayey SILT: low to medium plasticity, pale blue-grey, with trace orange mottling, with minor gravel, wet to saturated, firm to stiff.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>at 1.0 m: becoming pale grey, with some sand</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SP</td>
<td>SAND: fine grained, pale grey, with some silt, saturated, very loose to loose.</td>
<td>S</td>
<td>VL - L</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>at 1.6 m: 55 mm layer of fibrous peat</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>at 1.95 m: with trace silt and organics</td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>at 3.1 m: thin layer of organics</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>MH</td>
<td>Clayey SILT: low to medium plasticity, grey, with minor organics (black wood fragments), saturated, very soft.</td>
<td>VS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PI</td>
<td>PEAT: fibrous, with minor silt, saturated, very soft.</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PI</td>
<td>SILT: low plasticity, grey, with some pockets of organics, saturated, very soft.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PI</td>
<td>PEAT: fibrous, with minor silt, saturated, very soft.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MH</td>
<td>Clayey SILT: low to medium plasticity, pale grey, with trace organics, saturated, very soft.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SP</td>
<td>SAND: fine grained, pale blue-grey, with trace pockets of organics, with trace silt, saturated, very soft.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PEAT: fibrous, saturated, very soft.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MH</td>
<td>Clayey SILT: medium to high plasticity, pale blue-grey, with trace organics (wood fibers), saturated, very soft.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>at 7.0 m: with minor organics (roots, rootlets)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>at 7.2 m: root (250 mm long, 8 mm diameter)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SP</td>
<td>Gravely SAND: fine to medium grained, pale blue-grey, gravel is rounded to sub-rounded, saturated, medium dense to dense.</td>
<td>MD</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Method**
- AD: Auger drilling
- AS: Auger sampling
- HA: Hand auger
- W: Washbore
- SD: Sonic drilling
- TL: Tricone

**Support**
- M: Mud
- N: Nil

**Samples & Field Tests**
- B: Bulk disturbed sample
- D: Disturbed sample
- E: Environmental sample
- SS: Split spoon sample

**Classification Symbol & Soil Descriptions**
- VS: Very Soft
- S: Soft
- F: Firm
- St: Stiff
- VR: Very stiff
- H: Hard
- Ph: Plastic
- VL: Very loose
- L: Loose
- MD: Medium dense
- D: Dense
- VD: Very Dense
### Engineering Log - Borehole BH3

**Client:** Waimakariri District Council  
**Principal:** -  
**Project:** Tuahiw Village Plan Change  
**Location:** Tuahwi, Canterbury

**Position:** E: 1571130; N: 5202532  
**Surface Elevation:** 0.00 m  
**Angle from Horizontal:** 90°  
**Drill Model:** Comacchino MC3000, Track mounted  
**Hole Diameter:** 100 mm  
**Vane ID:** -

<table>
<thead>
<tr>
<th>Drilling Information</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td>Support</td>
</tr>
<tr>
<td>ADT</td>
<td>M mud</td>
</tr>
</tbody>
</table>

**Material Description:**
- **GW GRAVEL:** fine to coarse grained, rounded to sub-rounded, grey, with trace sand, saturated, dense to very dense.

**Observations:**
- From 10.2-10.5m: with some pockets of sandy silt
- From 11.5-11.8m: with some orange staining
- At 13.0m: becoming stained pale orange
- From 14.6-14.8m: pocket of pale orange silt

**Classification Symbol & Soil Description:**

**Consistency / Relative Density:**

- **Moisture:**
  - D dry
  - M moist
  - W wet
- **Saturation:**
  - S saturated
- **Plastic Limit:**
  - Wp plastic limit
- **Liquid Limit:**
  - Wl liquid limit

**Borehole BH3 terminated at 15.45 m  
Target Depth: 15.45 m
**Engineering Log - Borehole**

**client:** Waimakariri District Council  
**principal:** -  
**project:** Tuahiwi Village Plan Change  
**location:** Tuahiwi, Canterbury

**position:** E: 1571269; N: 5209179 (Datum Not Specified)  
**surface elevation:** 0.00 m (Datum Not Specified)  
**angle from horizontal:** 90°  
**drill model:** Comacchio MC3000, Track mounted

<table>
<thead>
<tr>
<th>Drilling Information</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method &amp; Penetration</td>
<td>Classification Symbol</td>
</tr>
<tr>
<td>ML</td>
<td>SILT: low plasticity, dark brown, with trace rootlets and wood fragments, moist.</td>
</tr>
<tr>
<td></td>
<td>at 0.4m: orange motting present</td>
</tr>
<tr>
<td>ML</td>
<td>SILT: low plasticity, brown with orange motting, with minor fine grained sand, and roots, moist to wet.</td>
</tr>
<tr>
<td></td>
<td>at 0.7m: becoming sandy</td>
</tr>
<tr>
<td>SC-SC</td>
<td>Silty SAND: fine grained, grey-brown with orange staining, with trace wood fragments, saturated, very loose.</td>
</tr>
<tr>
<td>SP</td>
<td>SAND: fine to medium grained, grey-brown with orange staining, saturated, very loose.</td>
</tr>
<tr>
<td>ML</td>
<td>SILT: low plasticity, grey, with trace fine grained sand, rootlets and wood fragments, wet, very soft.</td>
</tr>
<tr>
<td></td>
<td>at 4.4m: 50mm lens of silt</td>
</tr>
<tr>
<td>ML</td>
<td>SILT: low plasticity, grey, with trace fine grained sand, and minor rootlets and wood fragments, wet, very soft to dense.</td>
</tr>
<tr>
<td></td>
<td>at 5.0m: 30-60mm dia. wood fragments</td>
</tr>
<tr>
<td></td>
<td>at 5.3m: 25mm dark organic layer with wood fragments</td>
</tr>
<tr>
<td></td>
<td>at 5.8m: becoming organic silt with wood fragments, dark brown</td>
</tr>
<tr>
<td></td>
<td>at 5.9m: 60mm dia. wood fragment</td>
</tr>
<tr>
<td></td>
<td>at 6.3m: dark organics absent, grey</td>
</tr>
<tr>
<td></td>
<td>at 7.45m: becoming sandy</td>
</tr>
<tr>
<td></td>
<td>Sandy GRAVEL: fine to coarse, round to sub-rounded, sand is fine to coarse grained, grey, with</td>
</tr>
</tbody>
</table>

**Support & Field Tests**

- **samples & field tests**
  - B: bulk disturbed sample
  - D: disturbed sample
  - E: environmental sample
  - SS: split spoon sample
  - HP: hand penetrometer (kPa)
  - N: standard penetration test (SPT)
  - No: SPT with solid cone
  - Vs: vane shear; peak/remoulded (kPa)
  - R: refusal
  - HB: hammer bounching

**Classification Symbol & Soil Description**

- **classification symbol**
- **soil description**

**Consistency / Relative Density**

- **moisture**
  - D: dry
  - M: moist
  - W: wet
  - S: saturated
- **RP:** plastic limit
  - Wp: plastic limit
  - WI: liquid limit

- **consistency / relative density**
  - VS: very stiff
  - B: stiff
  - F: firm
  - E: very hard
  - H: hard
  - P: plastic
  - VL: very loose
  - MD: medium dense
  - D: dense
  - VO: very dense
**Engineering Log - Borehole**

**client:** Waimakariri District Council  
**principal:**  
**project:** Tuahiwi Village Plan Change  
**location:** Tuahiwi, Canterbury  
**position:** E: 1571269; N: 5201576 (Datum Not Specified)  
**surface elevation:** 0.00 m (Datum Not Specified)  
**angle from horizontal:** 90°  
**drill model:** Comacchio MC900, Track mounted  
**casing diameter:** 100 mm  
**vane id.:**  

<table>
<thead>
<tr>
<th>Drilling Information</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td>Support</td>
</tr>
<tr>
<td>AD</td>
<td>auger drilling*</td>
</tr>
<tr>
<td>AD</td>
<td>auger drilling*</td>
</tr>
<tr>
<td>HA</td>
<td>hand auger</td>
</tr>
<tr>
<td>HA</td>
<td>hand auger</td>
</tr>
<tr>
<td>SD</td>
<td>sonic drilling</td>
</tr>
<tr>
<td>* bit shown by suffix</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Samples &amp; Field Tests</td>
<td>Material Description</td>
</tr>
<tr>
<td>GW</td>
<td>some silty, dense</td>
</tr>
<tr>
<td>at 7.95m: silty sand</td>
<td></td>
</tr>
<tr>
<td>at 9.45m: with some silt</td>
<td></td>
</tr>
<tr>
<td>Sandy GRAVEL: fine to coarse, round to sub-round, sand is fine to coarse grained, grey, with some silt, dense, (continued)</td>
<td></td>
</tr>
<tr>
<td>GW</td>
<td>GRAVEL: fine to coarse, round to sub-round, grey, with some sand, dense.</td>
</tr>
<tr>
<td>at 13.95m: with trace silt, brown</td>
<td></td>
</tr>
<tr>
<td>Sandy GRAVEL: fine to coarse, round to sub-round, sand is fine to coarse grained, grey, dense to very dense.</td>
<td></td>
</tr>
<tr>
<td>Borehole BH4 terminated at 15.45 m</td>
<td></td>
</tr>
<tr>
<td>Target Depth</td>
<td></td>
</tr>
</tbody>
</table>

*BH4*  
**Date Started:** 16 Jul 2014  
**Date Completed:** 16 Jul 2014  
**Logged by:** C. Scott  
**Checked by:** B. Raasch  
**Borehole ID:** BH4  
**Sheet:** 2 of 2  
**Project No:** GENZCHRI15672AA
## Engineering Log - Borehole

- **Client:** Waimakariri District Council
- **Principal:**
- **Project:** Tuahiwi Village Plan Change
- **Location:** Tuahiwi, Canterbury

### Drilling Information

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT 0, 0, 0, 0, 0 N=0</td>
<td>Sandy SILT: low plasticity, dark brown, with minor pebbles and trace fine to medium gravel. Sand is fine to medium grained, moist, Silty SAND: fine to medium grained, pale brown, with trace rootlets, moist, very loose.</td>
</tr>
<tr>
<td>SPT 0, 0, 0, 0, 0 N=0</td>
<td>Sandy SILT: low plasticity, pale grey, sand is fine grained, saturated, very soft.</td>
</tr>
<tr>
<td>SPT 0, 0, 0, 0, 0 N=0</td>
<td>Silty SAND: fine to medium grained, pale grey, saturated, very loose.</td>
</tr>
<tr>
<td>SPT 2, 3, 2, 1, 2 N=7</td>
<td>Silt: low plasticity, pale grey, saturated, soft. at 4.2m: becoming high plasticity</td>
</tr>
</tbody>
</table>

### Additional Observations
- **Angle from horizontal:** 90°
- **Casing diameter:** 200 mm
- **Consistency:**
  - VS, VL: very stiff
  - M, S: medium dense
  - D: dense
- **Reliability:**
  - F: firm
  - V: very loose

### Classification Symbol & Soil Description
- **Soil Type:** Plasticity or particle characteristic, colour, secondary and minor components
- **Classification:**
  - VS: very soft
  - LF: firm
  - VL: very loose
  - VS: very stiff
  - ML: medium dense
  - D: dense

### Moisture
- **Moisture:**
  - VS: very soft
  - LF: firm
  - VL: very loose
  - VS: very stiff

### Vane Shear
- **Vane shear:**
  - VS: very soft
  - LF: firm
  - VL: very loose
  - VS: very stiff
# Engineering Log - Borehole

**client:** Waimakiriri District Council  
**principal:** -  
**project:** Tuahiwi Village Plan Change  
**location:** Tuahiwi, Canterbury

<table>
<thead>
<tr>
<th>position: E: 1571211; N: 5201914 (Datum Not Specified)</th>
<th>surface elevation: 0.00 m (Datum Not Specified)</th>
<th>angle from horizontal: 90°</th>
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<tr>
<td>drill model: Comacchio MC900, Track mounted</td>
<td>casing diameter: 200 mm</td>
<td>vane ID:</td>
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## Drilling Information

<table>
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<tr>
<th>Method &amp; Support</th>
<th>Sampler &amp; field tests</th>
<th>Soil type</th>
<th>Material substance</th>
<th>Material description</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>GM</td>
<td>Silty GRAVEL: fine to coarse grained, sub-rounded to sub-angular, pale brown, with some fine to medium grained sand, saturated, medium dense.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>GW</td>
<td>Silty GRAVEL: fine to coarse grained, sub-rounded to sub-angular, pale brown, with some fine to medium grained sand, saturated, medium dense. (continued)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sandy GRAVEL: fine to coarse grained, sub-rounded to sub-angular, pale brown, sand is fine to medium grained, saturated, dense to very dense.</td>
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</tr>
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</table>

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Material substance</th>
<th>Vane shear &amp; Penetrometer (kPa)</th>
<th>Consistency / Relative Density</th>
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<tr>
<td>9.0</td>
<td>GM</td>
<td>S</td>
<td>MD</td>
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<tr>
<td>10.0</td>
<td>GW</td>
<td>D</td>
<td>SPRINGSTON FORMATION</td>
</tr>
<tr>
<td>11.0</td>
<td>GM</td>
<td>VD</td>
<td></td>
</tr>
</tbody>
</table>

at 11.4m: becoming pale grey-brown  
at 12.4m: becoming pale grey  
at 13.0m: becoming pale brown

## Classification Symbol & Soil Description

<table>
<thead>
<tr>
<th>Moisture</th>
<th>Type</th>
<th>Classification</th>
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<tr>
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<tr>
<td>moist</td>
<td>M</td>
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</tr>
<tr>
<td>wet</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>saturated</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>plastic limit</td>
<td>Pl</td>
<td></td>
</tr>
<tr>
<td>liquid limit</td>
<td>Ll</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consistency / Relative Density</th>
<th>VS</th>
<th>VS</th>
<th>S</th>
<th>Si</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very stiff</td>
<td>VS</td>
<td>very stiff</td>
<td>stiff</td>
<td>firm</td>
</tr>
<tr>
<td>Hard</td>
<td>H</td>
<td>hard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastic</td>
<td>PL</td>
<td>plastic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very loose</td>
<td>VL</td>
<td>very loose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loose</td>
<td>L</td>
<td>loose</td>
<td></td>
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</tr>
<tr>
<td>Medium dense</td>
<td>MD</td>
<td>medium dense</td>
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<tr>
<td>Dense</td>
<td>D</td>
<td>dense</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very dense</td>
<td>VD</td>
<td>very dense</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Borehole BH5 terminated at 15.45 m Target depth
Appendix C - Indicative cross section location plans (Figures C1 and C2) and inferred geological cross-sections A-A' and B-B' (Figures C3 and C4)
SOIL BEHAVIOUR TYPE (Robertson 1990):

- 1 - Sensitive, fine grained
- 2 - Organic soil - peats
- 3 - Clays - clay to silty clay
- 4 - Silt mixtures - clayey silt to silty clay
- 5 - Sand mixtures - silty sand to sandy silt
- 6 - Sands - clean sand to silty sand
- 7 - Gravelly sand to sand
- 8 - Very stiff sand to clayey sand
- 9 - Very stiff fine grained

POTENTIALLY LIQUEFIABLE SOIL LAYERS:

- SLS seismic load
- ULS seismic load

STRATIGRAPHY:

- Layer 1 - Silty topsoil (and fill where present)
- Layer 2 - Silt and clayey silt with thin peat lenses (very soft to firm)

been drawn between known data points to assist in the geological
1 to represent actual boundaries which may vary from these lines
SOIL BEHAVIOUR TYPE (Robertson 1980):

- 1 - Sensitive, fine grained
- 2 - Organic soil - peats
- 3 - Clays - clay to silty clay
- 4 - Silt mixtures - clayey silt to silty clay
- 5 - Sand mixtures - silty sand to sandy silt
- 6 - Sands - clean sand to silty sand
- 7 - Gravely sand to sand
- 8 - Very stiff sand to clayey sand
- 9 - Very stiff fine grained

POTENTIALLY LIQUEFIABLE SOIL LAYERS:

- SLS seismic load
- ULS seismic load

STRATIGRAPHY:
- Layer 1 - Silty topsoil (and fill where present).
- Layer 2 - Silt and clayey silt with thin peat lenses (very soft to firm).

been drawn between known data points to assist in the geological
it to represent actual boundaries which may vary from these lines
Appendix D - Site geomorphology plan
Tuahiw Plan Change Sites

Site 1

Site 2

Rangiora Fan

Ashley Fan

Excerpt from Figure 1A - 2992 of the August 2012 Geotech Consulting Ltd report (McPherson and Cameron Associates, 2002, Map 4.3).
Appendix E - Liquefaction analyses (CPT1 to CPT20)
Input parameters and analysis data

Fines correction method: R&W (1996)
Points to test: Based on Ic value
Earthquake magnitude Mw: 7.50
Peak ground acceleration: 0.13
Depth to water table (mRL): 1.10 m
Depth to GWT (ert.thq.): 1.00 m
Average results interval: 3 m
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT
Use fill: No
Fill height: N/A
Fill weight: N/A
Transition detect. applied: No
Kp applied: Yes
Clay liquefaction behavior applied: Sands only
Limit depth applied: No
Limit depth: N/A

F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlikely to liquefy
- Almost certain it will not liquefy

LPI color scheme
- Very high risk
- High risk
- Medium risk
- Low risk

Liquefaction analysis overall plots

CRR plot

FS Plot

LPI

Vertical settlements

Lateral displacements

Depth (m)

Factor of safety

Liquefaction potential

Settlement (cm)

Displacement (cm)

Input parameters and analysis data


Fines correction method: R&W (1998)

Points to test: Based on Ic value

Earthquake magnitude Mw: 7.50

Peak ground acceleration: 0.13

Depth to water table (m): 1.90 m

Depth to GWT (m): 1.00 m

Average results interval: 3

Ic cut-off value: 2.60

Unit weight calculation: Based on SBT

Use fill: No

Fill height: N/A

Fill weight: N/A

Transition det. applied: No

Ku applied: Yes

Clay like behavior applied: Sands only

Limit depth applied: No

Limit depth: N/A

F.S. color scheme

Almost certain it will liquefy

Very likely to liquefy

Liquefaction and no Iq. are equally likely

Unlike to liquefy

Almost certain it will not liquefy

LPI color scheme

Very high risk

High risk

Low risk

Project file: F:\GENZ\Projects\156700\15672AA - Tuahiwi Village Plan Change\07 ANALYSES & DESIGN\Liquefaction Analysis - CPT\Tu\Site 1\15672AA - Tuahiwi Village Plan Change - Site 1.cpk
Liquefaction analysis overall plots

Input parameters and analysis data

Analysis method: I&O (2008)
Fines correction method: Z&O (1998)
Points to test: Based on Ic value
Earthquake magnitude Mw: 7.50
Peak ground acceleration: 0.13
Depth to water table (in situ): 1.30 m

Depth to GWT (eqv.): 1.00 m
Average results Interval: 3
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT
Use fill: No
Fill height: N/A
Fill weight: N/A
Transition detect. applied: No
Ks applied: Yes
Clay like behavior applied: Sands only
Limit depth applied: No
Limit depth: N/A

F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlikely to liquefy
- Almost certain it will not liquefy

LPI color scheme
- Very high risk
- High risk
- Low risk
- Very small risk

CLiq v.1.7.6.34 - CPT Liquefaction Assessment Software - Report created on: 12/08/2016, 3:47:34 p.m.
Project file: F:\GENZ\Projects\15600\15672AA - Tuahiwi Village Plan Change\07 ANALYSES & DESIGN\Liquefaction Analysis - CPT\Site 1\15672AA - Tuahiwi Village Plan Change - Site 1.ck
**Liquefaction analysis overall plots**

- **CRR plot**
- **FS Plot**
- **LPI**
- **Vertical settlements**
- **Lateral displacements**

### Input parameters and analysis data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis method:</td>
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<tr>
<td>Pines correction method:</td>
<td>R&amp;W (1998)</td>
</tr>
<tr>
<td>Points to test:</td>
<td>Based on IC value</td>
</tr>
<tr>
<td>Earthquake magnitude $M_0$:</td>
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</tr>
<tr>
<td>Peak ground acceleration:</td>
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</tr>
<tr>
<td>Depth to water table (m ref):</td>
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</tr>
<tr>
<td>Depth to GWT (m):</td>
<td>1.00 m</td>
</tr>
<tr>
<td>Average results interval:</td>
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<td>IC cut-off value:</td>
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<td>Unit weight calculation:</td>
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<td>Clay like behavior applied:</td>
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<tr>
<td>Limit depth:</td>
<td>No</td>
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<tr>
<td>Limit depth:</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

### LPI color scheme
- Very high risk
- High risk
- Low risk
Liquefaction analysis overall plots

Input parameters and analysis data

- Fines correction method: R&W (1998)
- Points to test: Depth to GWT (ortho): 1.00 m
- Earthquake magnitude (Mw): 7.50
- Peak ground acceleration: 0.35
- Depth to water table (in situ): 1.30 m
- Fill weight: N/A
- Transition detect. applied: No
- Clay like behavior applied: No
- Limit depth applied: Sand only
- Limit depth: N/A
- F.S. color scheme:
  - Almost certain it will liquify
  - Very likely to liquify
  - Liquefaction and no liq. are equally likely
  - Unlikely to liquify
  - Almost certain it will not liquify

F.S. color scheme

LPI color scheme

Project file: F:\GENZ\Projects\15600\15672AA - Tuhiri Village Plan Change\07 ANALYSES & DESIGN\Liquefaction Analysis - CPTu\Site 1\15672AA - Tuhiri Village Plan Change - Site 1.ck
Liquefaction analysis overall plots

Input parameters and analysis data

- **Analysis method:** IBB (2008)
- **Pipes correction method:** R&W (1998)
- **Points to test:** Based on Ic value
- **Earthquake magnitude (M):** 7.50
- **Peak ground acceleration:** 0.35
- **Depth to water table (m):** 1.90 m
- **Depth to GWT (m):** 1.00 m
- **Average results interval:** 3
- **Ic cut-off value:** 2.60
- **Unit weight calculation:** Based on SBT
- **Use fill:** No
- **Fill weight:** N/A
- **Transition detect. applied:** No
- **K_c applied:** Yes
- **Clay like behavior applied:** Sands only
- **Limit depth applied:** No
- **Limit depth:** N/A

F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liquefaction are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme
- Very high risk
- High risk
- Low risk

CLiq v.1.7.6.34 - CPT Liquefaction Assessment Software - Report created on: 12/08/2014, 3:48:02 p.m.,
Project file: F:\GENZ\Projects\15660\15672AA - Tuahiwi Village Plan Change\07 ANALYSES & DESIGN\Liquefaction Analysis - CPT\(Site 1\)15672AA - Tuahiwi Village Plan Change - Site 1.clt
Liquefaction analysis overall plots

Input parameters and analysis data

- Fines correction method: R&W (1998)
- Points to test: Based on ic value
- Earthquake magnitude Mw: 7.50
- Peak ground acceleration: 0.13
- Depth to water table (insitu): 1.10 m
- Depth to GWT (eqthq): 1.00 m
- Average results interval: 3
- Ic cut-off value: 2.60
- Unit weight calculation: Based on SBT
- Use fill: No
- Fill height: N/A
- Fill weight: N/A
- Transition detect, applied: No
- Kp applied: Yes
- Clay like behavior applied: Sands only
- Limit depth applied: No
- Limit depth: N/A

F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme
- Very high risk
- High risk
- Low risk

CLiq v.1.7.6.34 - CPT Liquefaction Assessment Software - Report created on: 12/08/2014, 4:47:17 p.m.
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Liquefaction analysis overall plots

Input parameters and analysis data

- Fines correction method: R&W (1998)
- Points to test: Based on IC value
- Earthquake magnitude M_w: 7.50
- Peak ground acceleration: 0.13
- Depth to water table (insitu): 1.10 m
- Depth to GWT (ethqa): 1.00 m
- Average results interval: 3
- Ic cut-off value: 2.60
- Unit weight calculation: Based on SBT
- Use fill: N/A
- Fill height: N/A
- Transition detect. applied: No
- K_s applied: No
- Clay like behavior applied: No
- Limit depth applied: No
- Limit depth: N/A
- Almost certain it will liquefy
- Very likely to liquefy
- Likely to liquefy
- Low likelihood
- Liquefaction and no, are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy
- Very high risk
- High risk
- Medium risk
- Low risk

CPT name: CPT14 - SLS
Liquefaction analysis overall plots

Input parameters and analysis data

Analysis method: IS8 (2008)
Fines correction method: R&B (1998)
Points to test: Based on IC value
Earthquake magnitude Mw: 7.50
Peak ground acceleration: 0.13
Depth to water table (m): 1.10 m

Depth to GWT (m): 1.00 m
Average results interval: 3
IC cut-off value: 2.60
Unit weight calculation: Based on SBT
Fill fill: No
Fill height: N/A
Fill weight: N/A
Transition detect. applied: No
K0 applied: Yes
Clay like behavior applied: Sands only
Limit depth applied: No
Limit depth: N/A

F.S. color scheme
Almost certain it will liquify
Very likely to liquify
Liquefaction and no liq. are equally likely
Unlike to liquify
Almost certain it will not liquify

LPI color scheme
Very high risk
High risk
Low risk
Liquefaction analysis overall plots

Input parameters and analysis data

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<th>Value</th>
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</tr>
<tr>
<td>Peak ground acceleration</td>
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<td>Average results interval</td>
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F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liquefaction equally likely
- Almost certain it will not liquefy

LPI color scheme
- Very high risk
- High risk
- Low risk

CPT name: CPT17 - SLS
Liquefaction analysis overall plots

Input parameters and analysis data
- Pines correction method: R&W (1998)
- Points to test: Based on lc value
- Earthquake magnitude Mw: 7.50
- Peak ground acceleration: 0.13
- Depth to water table (in situ): 1.10 m

Depth to GWT (in situ): 1.00 m
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Lc cut-off value: 2.66
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Fill weight: N/A
Transition detect. applied: No
Ks applied: Yes
Clay like behavior applied: Sands only
Limit depth applied: No
Limit depth: N/A

F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no eq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme
- Very high risk
- High risk
- Low risk

CPT name: CPT18 - SLS

Project file: F:\GEN2\Projects\15600,15672AA - Tuahiwi Village Plan Change\07 ANALYSES & DESIGN\Liquefaction Analysis - CPT\Site 2\15672AA - Tuahiwi Village Plan Change - Site 2.clt
Liquefaction analysis overall plots

Input parameters and analysis data

- Fines correction method: RLW (1998)
- Points to test: Based on Fc value
- Earthquake magnitude Mw: 7.50
- Peak ground acceleration: 0.13
- Depth to water table (mRL): 1.10 m
- Depth to GWT (ortho): 1.00 m
- Average results interval: 3
- Ic cut-off value: 2.60
- Unit weight calculation: Based on SBT
- Use fill: No
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- Transition detect. applied: No
- Kp applied: Yes
- Clay like behavior applied: Sands only
- Limit depth applied: No
- Limit depth: N/A
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

F.S. color scheme

LPI color scheme

Very high risk
High risk
Low risk
**Liquefaction analysis overall plots**

**Input parameters and analysis data**

- **Analysis method:** IAB (2008)
- **Fines correction method:** RL&W (1998)
- **Points to test:** Based on Ic value
- **Earthquake magnitude M_w:** 7.50
- **Peak ground acceleration:** 0.35 m/s²
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**F.S. color scheme**
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no Iq, are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**
- Very high risk
- High risk
- Low risk

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**CPT name:** CPT15 - ULS

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Input parameters and analysis data

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- Finer correction method: \( B & B \) (1998)
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- Limit depth: N/A
- F.S. color scheme:
  - Almost certain it will liquefy
  - Very likely to liquefy
  - Liquefaction and no loss, are equally likely
  - Unlikely to liquify
  - Almost certain it will not liquify
- LPI color scheme:
  - Very high risk
  - High risk
  - Low risk

Vertical settlements

Lateral displacements

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Waimakariri District Council
Environmental Site Assessment
Plan Change for Tuahiwi Village, Canterbury
22 August 2014
22 August 2014

Waimakariri District Council
Private Bag 1005
Rangiora 7440

Attention: Tammy McMahon

Dear Tammy

Coffey Project No: GENZCHRI5672AA

RE: Environmental Site Assessment for Plan Change for Tuahiwi Village

Please find attached our report presenting the findings of an Environmental Site Assessment carried out to support the proposed Tuahiwi Village land use change from 'Rural' to 'Residential 3'. This assessment was conducted in accordance with our proposal, dated 14 March 2014.

If you have any queries or you require further clarification on any aspects of this report, please contact the undersigned.

For and on behalf of Coffey

Anne Hellie
Christchurch Environmental Team Leader

Coffey Geotechnics (NZ) Limited
Environmental Site Assessment

Prepared for
Waimakariri District Council

Prepared by
Coffey Geotechnics (NZ) Limited
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Christchurch, 8024, New Zealand
t: +64 3 374 9600
f: +64 3 374 9601

Project Director: Erika McDonald
Environments Team Leader

Project Manager: Anne Hellie
Environmental Engineer

Prepared By: Nicole Morgan
Environmental Engineer

22 August 2014
GENZCHR15672AA

Quality information

Revision history

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Executive Summary

The Waimakariri District Council contacted Coffey to conduct an Environmental Site Assessment (ESA) and a geotechnical assessment for the properties included in the Tuahiwi Village Plan change (Sites 1 and 2). We understand that the investigations are being undertaken to confirm the suitability of the site for a land use change from ‘Rural’ to ‘Residential 3’.

Based on Coffey’s review of background information and information collected via site interviews and a site visit, the historical and current potential HAIL activities identified at the site include persistent pesticide bulk storage or use (i.e. associated with historical market gardens at the site) and waste disposal to land (both surficial waste and known areas of buried waste).

Coffey collected forty-five shallow soil characterisation samples (0.1 to 0.2 meters below ground level (mbgl)) from across sites 1 and 2. All of the forty-five samples collected were submitted for laboratory analysis for heavy metals and organochlorine pesticides (OCPs) and, two of the samples were also analysed for polycyclic aromatic hydrocarbons (PAHs). Sample concentrations were compared to human health based criteria and to established background concentrations for the Canterbury region.

Arsenic was detected at concentrations exceeding the human health standard (20 mg/kg) in samples S5 (170 Tuahiwi Road), S26 (115/119 Topito Road), S31 (229 Tuahiwi Road), S40 (37 Topito Road) and S41 (257 Tuahiwi Road). No other heavy metal results exceeded human health criteria. Properties 115 and 119 Topito Road and 170 Tuahiwi Road were identified in a 2012 environmental investigation as being high risk for HAIL activities. Several other metals were detected above the adopted background levels at various properties. Generally, more metals were above background concentrations at the properties within Site 1. No PAHs or OCPs were detected in any samples.

The site investigation encountered limited contamination in the soil. However given the exceedance of the human health criterion for arsenic at one location at each of the five different properties mentioned above and the identification of likely HAIL activities across several additional properties at the site, further investigation should be conducted prior to developing properties for single-family residential use to determine the extent of any impacted soils.

In summary, Coffey considers the site suitable for rezoning as Residential 3 provided that the elevated arsenic levels in soil and waste material is appropriately managed. As such, rezoning consent could be granted with a condition to further investigate and manage arsenic contamination and buried waste prior to, or as part of, the site development works.

Based on the results of this ESA, Coffey recommend the following additional investigation works:

- additional sampling comprising a detailed site investigation (DSI) at 170, 229 and 257 Tuahiwi Road and at 37, 115 and 119 Topito Road due to the arsenic contamination identified on these properties above human screening criteria;

- a DSI at 142, 235 and 239 Tuahiwi Road to more thoroughly address potential HAIL activities at these properties; and

- Boreholes/trenching in the areas of buried waste to confirm the lateral and vertical extent of this material.

A DSI report should be prepared summarising the results of the above investigation works; this report can be used to support the consent for site redevelopment activities.

The results of the DSI would also support preparation of a remedial action plan (RAP) detailing management requirements for elevated contaminants in soil (including arsenic), as well as procedures for the removal of buried and surface waste, followed by validation of the underlying soils. The RAP would also include measures for investigating and managing unexpected contamination encountered during redevelopment works.

Coffey Geotechnics (NZ) Limited
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Appendices

Appendix A: Field Notes
Appendix B: Site Photographs
Appendix C: Historic Aerial Photographs
Appendix D: Previous Reports
Appendix E: Laboratory Report
## Abbreviations

<table>
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<tr>
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<th>Description</th>
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<tr>
<td>bgl</td>
<td>below ground level</td>
</tr>
<tr>
<td>CCC</td>
<td>Christchurch City Council</td>
</tr>
<tr>
<td>ΣDDT</td>
<td>Sum of all DDT (dichlorodiphenyltrichloroethane) isomers and related compounds</td>
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<tr>
<td>DSI</td>
<td>Detailed Site Investigation</td>
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<td>ECan</td>
<td>Environment Canterbury</td>
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<tr>
<td>Ha</td>
<td>Hectares</td>
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<tr>
<td>HAIL</td>
<td>Hazardous Activities and Industries List</td>
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<tr>
<td>IANZ</td>
<td>International Accreditation New Zealand</td>
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<td>LLUR</td>
<td>Listed Land Use Register</td>
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<tr>
<td>LOR</td>
<td>Limit of Reporting</td>
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<td>mg/kg</td>
<td>milligrams per kilogram</td>
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<td>NES</td>
<td>Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011</td>
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<tr>
<td>NRRP</td>
<td>Natural Resources Regional Plan</td>
</tr>
<tr>
<td>OCPs</td>
<td>Organochlorine Pesticide</td>
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<tr>
<td>PID</td>
<td>Photoionisation Detector</td>
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<tr>
<td>ppmv</td>
<td>parts per million by volume</td>
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<tr>
<td>PCL&amp;WRP</td>
<td>Proposed Canterbury Land &amp; Water Regional Plan</td>
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<tr>
<td>QA</td>
<td>Quality Assurance</td>
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<tr>
<td>QC</td>
<td>Quality Control</td>
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<tr>
<td>SCS</td>
<td>Soil Contaminant Standard (as referenced in the NES)</td>
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<td>SQEP</td>
<td>Suitably Qualified and Experienced Practitioner</td>
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1. Introduction

Coffey Geotechnics (NZ) Limited (Coffey) was commissioned by Waimakariri District Council (WDC) to conduct an Environmental Site Assessment (ESA) and a geotechnical assessment for the properties included in the Tuahiwi Village Plan change. This report summarises the ESA. The results of the geotechnical assessment will be reported separately. This assessment was conducted in accordance with our proposal, dated 14 March 2014.

Tuahiwi Village lies between Kaiapoi, Woodend and Rangiora, approximately 25km north of Christchurch. The properties included in the Tuahiwi Village Plan change are split into two areas identified as Site 1 (the northern parcel of properties) and Site 2 (the southern parcel of properties). A site location plan is provided as Figure 1; property addresses within each of the sites are shown in Figures 2 and 3, and summarised below.

Site 1 (Northern Section)
- 37, 45, 113, 115 and 119 Topito Road
- 229, 233, 235, 239, 257, 283 and 305 Tuahiwi Road

Site 2 (Southern Section)
- 142, 168B, 170 and 190 Tuahiwi Road

1.1. Background

We understand that the investigations are being undertaken to confirm the suitability of the site for a land use change from ‘Rural’ to ‘Residential 3’. According to the WDC District Plan (WDC 2013), ‘Residential 3’ characteristics include:

- predominant activity is living;
- detached dwellings including a number of baches;
- high proportion of smaller dwellings;
- diverse styles and ages of dwellings;
- range of housing options, including comprehensive housing development focussed around village areas at Tuahiwi;
- settlements are significantly smaller than other main towns;
- wide range of lot sizes;
- reduced size and nature of individual lots within Tuahiwi;
- a rural outlook and setting;
- access to public open space including the coastal environment
- easy access to walking and cycling opportunities;
- churches, local shops, reserves and camping grounds are important activities within the zone;
- provision of a mixed use centre at Tuahiwi focusing on community facilities, convenience retail, recreational and business opportunities;
- limited advertising;
- intimate and informal streetscapes;
- the streets are areas of community interaction;
- limited footpaths;
- minimal kerb and channels;
- low noise levels;
- low traffic volumes on side streets;
- significant traffic levels on main roads, and during holidays; and
- limited services and utility capacities in most zones
This investigation was conducted in general accordance with the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES), which applies to all sites where an activity or industry on the Ministry for the Environments (MfE’s) Hazardous Activities and Industrial List (HAIL) is, has or is more likely than not to have occurred (MfE 2011a). A brief review of the publicly available historical aerial photographs provided on the Environment Canterbury (ECan) GIS database, suggests that some areas of the site may have been used for market gardening, orchard activities and landfilling.

The fieldwork has been managed by a Suitably Qualified and Experienced Practitioner (SQEP) and the report has been reviewed by a SQEP, as required by the NES.

1.2. Objectives

The objectives of this ESA were to:

- Summarise the potentially contaminating activities or potential sources of contamination that might have occurred or exist at the site;
- Identify the extent and concentrations of contaminants at the site (if any) that may pose a risk to human health or the environment; and
- Confirm the suitability of the land for Residential 3 use and provide recommendations regarding any additional investigation required prior to development of any individual property within the site.

1.3. Scope of Works

The following scope of works was undertaken:

- Inspection of historical aerial photographs for information related to the historical use of the site and any potentially relevant HAIL activities.
- Summary of environmental and archeological reports recently prepared for the site.
- Review of ECan’s listed land use register (LLUR) statement for the site.
- Notification to ECan of the proposed site investigation in order to meet the requirement of their Natural Resources Regional Plan (NRRP) Rule WQL 46.
- A site walkover to consider land contamination indicators (e.g. visual evidence of waste dumping/material spills, chemical storage and/or usage areas, sheep dip activities, anomalous die-back in vegetation, ground staining, market gardening and orchards).
- Interview with available current property owners to understand the type of farming and potential for agrichemical contamination.
- Attendance at site for the collection of forty-five shallow ground soil samples from locations across sites 1 and 2.
- Screening of soil samples for volatile hydrocarbons using a photoionisation detector (PID).
- Analysis of samples at an independent laboratory for organochlorine pesticide (OCPs) and heavy metals (including mercury). Two samples located close to an identified landfill area were tested for polycyclic aromatic hydrocarbons (PAHs) rather than OCPs.
- Preparation of this report, including presentation and interpretation of results in accordance with the requirements of the NES.
2. Site Information

2.1. Site Condition

The site layout is shown on Figures 2 and 3, and photographs of the site are presented in Appendix B (Photographs 1 to 20). The site is situated approximately 23km north of Christchurch City centre and 5.4km northwest of Kaiapoi Township. The site consists of multiple land plots connecting off Tuahiwi road and Topito road (Figure 2). Site 1 covers an area of approximately 18.6 hectares and Site 2 covers an area of approximately 11.9 hectares. Both sites are irregularly shaped and are currently subdivided into several individual properties.

Coffey staff conducted a site walkover on 8 July 2014. Site 1 is currently used for grazing. Site 2 currently accommodates grazing, orchards and a paddock that includes some stockpiled waste material. Site observations are discussed further in Section 2.4.

2.2. Surrounding Environment

2.2.1. Land Use

Site 1 is bound by paddocks and Topito Road on the north, west and southwest, by paddocks and a residential property on the south and by residential properties and Tuahiwi Road on the east. Site 2 is bound by residential properties, paddocks and Tuahiwi Road on the west, by Tuahiwi Primary school and paddock to the north and by paddocks, rural residences and farmland to the east and south.

The wider area surrounding the site is used for a mixture of rural, lifestyle block residential and standard residential land. Three main townships exists between 2 to 5km from the site with Rangiora located northwest, Kaiapoi located southeast and Woodend to the northeast. Orchard activities exist on the southern half of Site 2. Livestock grazing is the main form of land use in the majority of the Tuahiwi Village plan area.

2.2.2. Topography

The topographic map (Figure 4) shows that the sites are located in a generally flat area. The sites themselves are also generally level.

2.2.3. Geology and Hydrogeology

The geological map of the area (Forsyth, P.J., 2008) indicates that the area is underlain by Holocene-age alluvial silt and older post-glacial fluvial gravel, sand and silt belonging to the Springfield Formation.

There are no groundwater levels for the region presented in the Canterbury Geotechnical Database “GNS Science Median Groundwater Surface Elevations” Map Layer for Google Earth (GNS 2014). No information was available regarding likely groundwater flow direction directly beneath the site. The nearest water body is the Cam River, approximately 400 metres west of the site.

As previously discussed, Coffey is also conducting a geotechnical investigation comprised of multiple Cone Penetration Tests and boreholes. In these, shallow sand, silt and gravel was encountered during sampling. The ground water table was encountered between 0.1 mbgl and 2.6 mbgl. Note that, during the environmental investigation, much of Site 2 was flooded due to recent high rainfall.
2.3. Site History

The following sections summarise the historical activities undertaken within or in the immediate vicinity of the site, as determined from the information sources reviewed during this ESA.

2.3.1. Environment Canterbury (ECan)

Neither the site nor the surrounding area are registered on ECan’s Listed Land Use Register (LLUR). This is likely due to the rural location of the site as the LLUR search for HAIL sites within the Canterbury region has, to date, focused on more density populated areas.

A search of resource consents issued by ECan in relation to the site and surrounding land was undertaken using ECan’s GIS portal. Multiple resource consents were identified. The relevant four consents related to installation of boreholes for horticultural/irrigation purposes are detailed below:

- CRC930228: located at 115 Topito Road, which commenced 31 May 1993 and expired 30 April 1995. This resource consent was for a 75mm bore hole for domestic and horticulture use.
- CRC981252: located at 233 Tuahwii Road, which commenced 20 February 1998 and expired 19 February 2001. The resource consent allows the property owner to install bore M35/7906 for irrigation purposes and domestic supply.
- CRC000858: located at 170 Tuahwii Road, which commenced 24 Nov 1999 and expired 22 Nov 2002. The resource consent allows the land owner to install bore M35/8610 for irrigation purposes.
- NCY880306: located at 142 Tuahwii Road, commenced 5 Aug 1988 and expired 30 April 1999. The resource consent allowed the property owner to take up to 181 m³/day of water at 2.8 L/s for 18 hr/day from bore M35/5876 for microsprinkler and drip irrigation of fruit trees and shelter.

2.3.2. Historical Aerial Photographs

ECan holds a collection of historical aerial photographs for the greater Christchurch area. Historical aerial photographs are included in Appendix C.

Photographs of the area from 1941, 1979, 1984, 1985, 1994 and 1995 were reviewed. The primary historical use of Site 1 appears to be grazing. In 1994, it appears that a small patch of crops were planted on the northwestern portion of 257 Tuahwii Road. In general, some wide-spread growing of hay or cereal crops may have occurred; however, such activities are difficult to distinguish from grazing land given the quality of the historical aerial photographs.

In the 1941 aerial photograph of Site 2, gravel excavation pits are present on 170 and 190 Tuahwii Road and are still present in the 1979 aerial photograph. According to the local archaeological report, locals excavated these gravel to use in their kumara gardens (Trotter 2014). The location of the gardens is unknown as is the time frame for relocation of gravel to the gardens. In 1984, the fields over most of Site 2 had been cleared and planted with what appears to be hay or cereal crops. In 1994, orchards are present at 142 Tuahwii Road, as they are currently.

2.3.3. Previous Site Investigations

Archaeological Assessment

An Archaeological Assessment Report for Proposed Rezoning at Tuahwii, Canterbury was completed by Mike Trotter in July 2014 (Trotter 2014). The Waimakariri District Council (council) asked for an archaeological assessment of the areas that would be affected if rezoning goes ahead, noting that one archaeological site has been recorded there.
A known archaeological site is present on 170 and 190 Tuahiwi Road; namely, a gravel borrow pit observed in the historical aerial photographs (discussed above). According to Trotter, this and another pit in the area have been filled in with soil and rubbish that has been dumped there. During the 1990s, a great deal of rubbish including vehicle bodies and soil was dumped in the area. Trotter’s report concluded that any development, particularly house foundations, roading, and services installation, could adversely affect the archaeological site. According to Trotter, excavation of the rubbish would inevitably destroy the contours of the pits, and hence their values, particularly their potential to provide information on the activities that produced them.

The gravel that was once mined from these borrow pits would have been spread on the ground as part of the cultivation process for growing kumaras, and although the areas that were used for gardening must have been close to the pits, they have not been identified. Such ground should be discernable in any location that has had little or no European cultivation. Trotter noted that this evidence could also be destroyed by development of the land in the vicinity of the archaeological site.

The report concluded that to comply with the requirements of the Heritage New Zealand Pouhere Taonga Act, an Authority will need to be obtained from Heritage New Zealand before any earthworks on or in the vicinity of the archaeological site are undertaken. It was recommended that as a condition of the Authority, the pits should be mapped before they are further disturbed. In addition, periodic checks for archaeological evidence should be made of any major excavation and any evidence found investigated. In addition, if human remains are encountered, work should cease in the area and the police, Tuahiwi runanga and Heritage New Zealand should be notified.

Stage 1 Environmental Assessment

Pattie Delamore Partners (PDP) completed a preliminary environmental assessment of the Tuahiwi Maori Reserve 873 for Waimakariri District Council (WDC) (PDP 2012). The Reserve is a large portion of land that contains Sites 1 and 2. A number of HAIL activities were identified, including agrichemical storage and/or use associated with intensive agriculture such as broad-scale cropping; orchard and market gardens; industry; unlicensed tipping (landfills or offal pits); sheep dips; cemeteries; hazardous substance storage (petroleum or agrichemical); and workshop/private refuelling facilities.

Properties were identified as having low, moderate or high risk of contamination from potential HAIL activities. Properties within Sites 1 and 2 were all identified as either low or high risk. The high risk properties included 115 and 119 Topito Road and 142, 168B and 170 Tuahiwi Road. High risk properties were those areas expected to contain market gardens, orchards, industry, workshop/private refuelling facilities, livestock dips, wood storage, and/or unlicensed tipping.

2.4. Site walkover

Coffey conducted a site walkover on 8 July 2014. Efforts were made to coordinate with property owners to obtain access to all areas of the site. However, access to some of the properties included in the investigation was limited due to locked fences, flooding and dogs. During this site visit, the following information regarding the site was recorded (refer to field notes in Appendix A and photographs in Appendix B):

- 142 Tuahiwi Road contains the apple orchard present in the 1994 aerial photograph. During the site walkover it was observed that the irrigation piping was damaged. The property is currently being used as evidenced by tire tracks and a cleared driving path around perimeter of the property, however it is not known whether the trees are still being utilised for market gardening.
- From the paddocks that could be accessed and seen, all the areas except 142 Tuahiwi Road are currently being used for grazing or rural residences.
- No evidence of current or historical sheep dips was observed.
- The owners from 233 Tuahiwi Road own a painting business. Storage of large quantities of paint can be seen in storage sheds on their property. The storage shed appears on aerial
photographs between 2006 and 2009 and was in good condition during the site investigation. The area of the property containing the shed was not accessible during the environmental investigation due to a locked gate. However, the portion of the interior of the shed that could be seen contained paints stored in an orderly manner with no leaking or spilled containers visible. In addition, it appeared the shed contains a concrete floor in reasonable condition.

- Multiple sheds and barns used for storage of hay were noted on 170, 233 and 257 Tuahiwi Road. None of the sheds and barns showed potential for HAIL activities (such as storage of chemicals and vehicle/equipment maintenance) to be occurring.

- Dumped material containing concrete, wire, household waste, metal drums and old cars is present on the southwestern corner of 190 Tuahiwi Road, through the centre portion of 170 Tuahiwi Road and onto the western portion of 168B Tuahiwi Road. This material forms approximately meter high mounds which have been partially grown over with grass. The waste piles also extend onto the property immediately west of 190 Tuahiwi Road.

- Areas within 142 and 170 Tuahiwi Road were submerged under water at the time of the environmental investigation due to seasonal flooding issues.

- A tipped over rusty car was observed on the south-western corner of 142 Tuahiwi Road

- Rusty water tanks and metal containers found in the centre back paddock of 119 Topito Road.

- A pile of green waste next to a pile of metal rubbish on 113 Topito Road was also observed near the paddock entrance.

- No visible signs of underground services or underground tanks were observed.

2.5. Interviews

Interviews were conducted with property owners that were available during the completion of field work, which occurred between 10 July 2014 and 16 July 2014. The interviews with the property owners are summarised below:

- A conversation was held with Mike Trotter, the owner of 170 and 168b Tuahiwi Road on 10 July 2014. In this conversation he disclosed that over the last 20 to 25 years of owning this property, the only use of the land has been grazing land for cows and goats. No sheep dips or chemical containers were observed on the property. Mr Trotter also noted that on the northwestern side of his property, extensive amounts of gravel had been excavated between 1970 and 1990 by the locals in the area. During this time, gravel excavations were refilled with household rubbish by locals. Mr Trotter has a small paddock on his property at 170 Tuahiwi Road that is fenced off as it is near the area reported to be landfilled. Mr Trotter was advised by the previous owner not to go near the landfill area. He was informed that the area contains hospital waste. The area reported by Mr Trotter to have been landfilled is low lying and during the time of field work, the area was submerged under an ephemeral pond.

- On 11 July 2014, Shirley, the owner of 235 Tuahiwi Road indicated that while she has owned the property, the only land use of the property was for grazing for horses, sheep and llamas. She also mentioned that prior to her owning the land, the community associated with the local Marae had used this area for market gardening but she was not sure on the time frames.

- The owner of 239 Tuahiwi Road, noted his land was previously used for market gardening by the Marae community and that the property has been used for horse grazing since he purchased it.

A visit to the local Marae was completed on the 14 July 2014 to confirm the positioning of former market gardening reported by current residents and to determine whether any historical records were available for review. The staff present at the time were not aware of any relevant information held by the organisation.
3. Site characterisation

3.1. Potential HAIL activities and contaminants of concern

The information obtained as part of this ESA indicates that the site has generally been used for a mixture of rural residential, agricultural grazing land and market gardening. Between 1941 and the present day, fill, including household waste and (reportedly) hospital waste, has been placed within the old gravel excavation pits on 170 and 190 Tuahiwi Road. During the 1980s and 1990s, farming was present on 37 Topito Road and 257 and 305 Tuahiwi Road. The orchard that is still present at 142 Tuahiwi Road is first seen in the 1994 aerial photograph.

On the basis of the background information reviewed, Coffey has identified several potential HAIL activities to have occurred on-site (Table 1).

Table 1: Potential HAIL Activities at the Site.

<table>
<thead>
<tr>
<th>Potential HAIL Activities</th>
<th>Location</th>
<th>Land Use</th>
<th>Information Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persistent pesticide bulk storage or use (item A10 of HAIL)</td>
<td>142 Tuahiwi Road</td>
<td>Historical and current orchard</td>
<td>Site walkover observations, historical aerial photographs and potentially linked to historical resource consent for irrigation</td>
</tr>
<tr>
<td></td>
<td>235 Tuahiwi Road</td>
<td>Historical market garden</td>
<td>Site owner interview</td>
</tr>
<tr>
<td></td>
<td>239 Tuahiwi Road</td>
<td>Historical market garden</td>
<td>Site owner interview</td>
</tr>
<tr>
<td></td>
<td>257 Tuahiwi Road</td>
<td>Historical market garden</td>
<td>Potentially present in historical aerial photograph</td>
</tr>
<tr>
<td></td>
<td>115 Topito Road</td>
<td>Historical horticulture</td>
<td>Historical resource consent for irrigation of horticulture</td>
</tr>
<tr>
<td>Waste disposal to land (item G5 of HAIL)</td>
<td>119 Topito Road</td>
<td>Surface rubbish</td>
<td>Site walkover observations</td>
</tr>
<tr>
<td></td>
<td>142 Tuahiwi Road</td>
<td>Surface rubbish</td>
<td>Site walkover observations</td>
</tr>
<tr>
<td></td>
<td>1688 Tuahiwi Road</td>
<td>Buried and stockpiled rubbish</td>
<td>Site walkover observations and owner interview</td>
</tr>
<tr>
<td></td>
<td>170 Tuahiwi Road</td>
<td>Buried and stockpiled rubbish</td>
<td>Site walkover observations, owner interview and archaeological report</td>
</tr>
<tr>
<td></td>
<td>190 Tuahiwi Road</td>
<td>Buried and stockpiled rubbish</td>
<td>Site walkover observations, owner interview and archaeological report</td>
</tr>
</tbody>
</table>

According to the MfE’s HAIL, hazardous substances associated with waste disposal to land include metals, polycyclic aromatic hydrocarbons (PAHs), semivolatile organic compounds and solvents.

Coffey
GENZCHRI15672AA
22 August 2014
Hazardous substances associated with pesticide storage or use include heavy metals and a wide range of organic compounds including acidic herbicides, organophosphate pesticides and organochlorines pesticides (OCPs).

For the purposes of this investigation, the primary contaminants of potential concern were identified to be heavy metals (including mercury), OCPs and PAHs.

3.2. Relevant Receptors

The site walkover and review of site history information indicates the following key potential receptors that may be relevant to the site:

- Earthworks contractors who may come into contact with potentially contaminated soil during any proposed development works; and
- Future occupiers of the residential properties at the site.

No significant ecological receptors (e.g. sensitive water bodies) are located on or in the immediate vicinity of the site.
4. Soil Investigation Programme

4.1. Soil Sampling Programme

The sample locations were selected to provide overall coverage of the site that is being rezoned. For the purposes of this assessment, Coffey collected forty-seven surface samples, including forty-five primary samples and two quality assurance samples. A portion of the sample locations were selected to target areas where potential HAIL activities were identified, and the remaining sample locations were spread throughout the investigation area. The soil sampling investigation was conducted between 10 July 2014 and 14 July 2014.

Approximate sample locations are shown on Figure 5 and Figure 6. The majority of samples were collected from sand and silty sand. Samples 1 to 15 and samples 18, 20 and 23 were collected from gravels.

Photographs taken during the investigation are presented in Appendix B.

4.2. Soil Sampling Procedure

Soil samples were collected using a shovel and the soil type at each sample location was recorded in general accordance with standard Coffey procedures (based on the New Zealand Geotechnical Society Field Description of Soil and Rock, NZGS 2005). All samples were collected from 0.1 to 0.2 mbgs. Field notes are presented in Appendix A.

As discussed in Section 2.2.3, no fill was encountered during the geotechnical investigation or during environmental sampling. However, fill was observed in the vicinity of the old gravel pits on properties 168B, 170 and 190 Tuahiwi Road. Fill from these areas was not tested as it was comprised of debris and rubbish that will require removal prior to development of the land. Soil beneath the filled areas was not accessible for sampling.

During sampling, ground conditions were observed for evidence of staining and odours and samples were screened in the field with a PID for the presence of volatile ionisable compounds.

The following procedures were adopted during investigation works:

- All fieldwork was carried out in compliance with a project specific Health, Safety, Security and Environment (HSSE) Plan prepared for the site works.
- All works were conducted by trained Coffey staff with precautions including implementation of procedures for the appropriate handling of potentially contaminated material.
- Prior to sampling, and between sample locations, sampling equipment was cleaned by washing with deionised water, followed by a decontamination solution, and rinsing with deionised water. Soil samples were collected using a clean pair of nitrile gloves for each sample and then placed into laboratory supplied sample containers.
- Each soil sample was screened for the presence of ionisable volatile organic compounds (VOCs) using a portable Photoionisation Detector (PID). This was undertaken by placing a portion of sample into a zip lock plastic bag and allowing time for it to volatilise into the headspace of the bag. Measurement of volatile ionisable compounds was then conducted by piercing the plastic bag with the PID intake pipe. The concentration measurement was monitored for approximately one minute and the maximum concentration recorded.
- Following collection into jars, all samples were placed directly into chilled storage and then packaged for transport to the laboratory via Toll New Zealand, under standard Coffey chain of custody procedures. Samples were analysed by Eurofins Laboratory in Victoria, Australia.
- At each sample location, any remaining soil that was not collected into sample jars was placed back into the hole, ensuring a clean site following completion of the sampling.
4.3. Laboratory Analysis

Following receipt at the laboratory, forty-three soil samples were analysed for heavy metals and OCPs and two samples were also tested for PAHs.

4.4. Quality Assurance/Quality Control

Soil samples were collected by suitably qualified staff under standard Coffey operating procedures. A duplicate sample was collected from two soil sample locations to determine the reproducibility and consistency in sampling methodology. Duplicates are two samples taken from the same source, digested, distilled or otherwise processed, and then analyzed identically. The acceptable level of variation for metals and pesticides in soils is 50% (MFE 2011). Relative percentage difference calculations for samples and duplicates are shown in Table 3. Relative percentage difference calculations for both samples pairs were acceptable. Additional quality assurance/quality control (QA/QC) procedures employed during Coffey’s intrusive investigation works are summarised in the following sections.

4.4.1. Use of Accredited Laboratory

Eurofins is an independent National Association of Testing Laboratories (NATA) accredited laboratory and, as such, is expected to comply with the accreditation requirements, which include confirmation of the validity and suitability of results. Any such breaches in laboratory quality control would be notified at the time of release of the analytical results. There were no analyst’s notes included in the laboratory reports.

4.4.2. Sample Handling and Holding Times

The chain of custody records show that the samples were sent to Eurofins on 21 July 2014 and registered by the lab on 25 July 2014. Analysis was completed and reported on 25 July 2014. This is slightly outside the holding time of 14 days for PAHs and OCPs for samples collected on 10 July 2014. However, this is not expected to impact the outcome of this assessment as all samples were kept in chilled storage and out of direct sunlight. As such, the concentrations of OCPs and PAHs is not expected to have degraded prior to sample analysis.
5. Applicable Soil Contaminant Standards

5.1. Background Concentrations

According to Regulation 5(9) of the NES, the NES regulations do not apply if contaminants are at, or below, background concentrations. Regional background concentrations for metals and PAHs published by ECAn (2007) have been used to assist in making this assessment. Adopted background criteria are presented in Table 2. It should be noted that the detection limits for mercury, cadmium and seven of the sixteen tested PAHs were slightly above the adopted background concentrations.

Background levels for OCPs, including ΣDDT (sum of DDT isomers and related compounds), have not been adopted by ECAn. It is understood that CCC consider any DDT concentration above the laboratory limit of reporting (LOR) to be above background. However we note that in 1995, the MfE commenced a national Organochlorines Programme to characterise the extent of contamination of the New Zealand Environment by selected organochlorine contaminants. The programme reported ambient concentrations of DDT residues including DDT degradation products in metropolitan Christchurch soils taken from six locations across the city (MfE 1998). DDT residues were detected at all locations with total residue concentrations ranging from 0.21 to 0.86 mg/kg. DDT residue concentrations were found to be consistently higher in the Christchurch metropolitan area than at sampling sites in Auckland and other provincial areas.

Adopted background criteria are presented in Table 2.

5.2. Priority Contaminants: Soil Contaminant Standards

The MfE's User's Guide: National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (MfE 2012) details Soil Contaminant Standards (SCSs) for seven inorganic substances and five organic compounds (or groups of compounds). SCSs are available for these substances and compounds when present in land used for five land use scenarios. The contaminants analysed at this site for which SCSs are available are arsenic, cadmium, chromium, copper, lead, and mercury. For this site, a residential scenario was adopted, as well as the following source/pathway/receptor assumptions:

- SCSs developed for residential land use will also be protective of site workers during the rebuild works.
- The selected residential SCSs assume 10% of produce consumed will be grown on-site.
- It has been assumed that the soil pH is 5, and that all lead is present in inorganic form.
- As a conservative starting point, it has been assumed that chromium may be present in its hexavalent form.

Adopted SCSs are presented in Table 2.

5.3. Other Applicable Human Health Standards

For contaminants of concern that are not priority contaminants, the NES references the hierarchy defined in the MfE Contaminated Land Management Guideline No.2 – Hierarchy and Application in New Zealand of Environmental Guideline Values (MfE, 2011b). Below is a summary of the contaminant standards referenced from this MfE hierarchy.

- For two heavy metals (nickel and zinc), the Australian National Environmental Protection Measure (NEPM) 2013 have been adopted for screening assessment purposes. Values for residential land use have been selected in accordance with the proposed end use of the site and as a conservative estimate to protect site workers during the redevelopment work. Residential A criteria are described in the NEPM as "Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools..."
and primary schools" (NEPM 1999). Adopted NEPM health screening criteria are presented in Table 2.

- For several PAHs, the MfE Guidelines for Assessing and Managing Contaminated Gasworks sites in New Zealand – Module 4 Soil Acceptance Criteria, have been selected (MfE 1997). Health risk based acceptance criteria for standard residential site use (10% produce consumed) have been selected and values for produce are being used as they are the most conservative of the values provided.

- For naphthalene, pyrene and benzo-a-pyrene (BAP) equivalent, the MfE Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Revised 2011): Module 4 – Tier 1 soil Screening Criteria have been selected (MfE 1999). Tier 1 soil acceptance criteria for TPH (1.3.5.6) Residential use, All Pathways, Sandy silt, <1.0 depth have been used.
6. Results

Forty-five distinct surface soil locations across the two sites were sampled. Specific areas where potential HAIL activities were identified were targeted for sampling with the remaining sample locations spread throughout the investigation area.

PID results were all below anticipated background levels, indicating an absence of ionisable volatile organic compounds in the samples collected. Stockpiled waste was observed on the southwest corner of 190 Tuahiwi Road and extending onto 168B and 170 Tuahiwi Road during the site walkover. No other visual evidence of contamination was observed in the soil sampled during the investigation (refer to the field notes in Appendix A).

Summarised analytical results are presented in Table 2, and the laboratory analytical reports are included in Appendix E.

In summary:

- No OCPs were detected in any of the samples above the laboratory detection limits.
- PAHs results for the two samples analysed (S3 and S9) were below laboratory detection limits. Note that, detection limits for several PAHs were slightly above the adopted background concentrations (namely acenaphthene, acenaphthylene, benzo[a]pyrene, benzo[b]fluoranthene + benzo[j]fluoranthene, chrysene, fluoranthene, phenanthrene and pyrene). Detection limits were well below the adopted residential health criteria for all PAHs.
- Arsenic was detected at concentrations exceeding the NES residential SCS in samples S5 (170 Tuahiwi Road), S26 (115/119 Topito Road), S31 (229 Tuahiwi Road), S40 (37 Topito Road) and S41 (257 Tuahiwi Road). No other metals were present at concentrations above the NES residential SCSs.
- Sample S5 and samples S24 through S45 all contained various metals above adopted background concentrations.
7. Summary and Conclusions

WDC contacted Coffey to conduct an ESA and a geotechnical assessment for the properties included in the Tuahiwi Village Plan change (Sites 1 and 2). We understand that the investigations are being undertaken to confirm the suitability of the site for a land use change from 'Rural' to 'Residential 3'.

A 2012 environmental assessment of the two sites identified the following properties at high risk of contamination from HAIL activities: 115 and 119 Topito Road and 142, 168B and 170 Tuahiwi Road. High risk properties were those areas expected to contain market gardens, orchards, industry, workshop/private refuelling facilities, livestock dips, wood storage, and/or unlicensed tipping.

Site 1 is currently used for grazing. Site 2 currently accommodates grazing, orchards and a paddock that includes some stockpiled waste material. The sites have historically been used for grazing, growing of cereal crops and likely other market gardening/horticultural activities. Currently, there is an apple orchard on 142 Tuahiwi Road, which was established on this property sometime between 1984 and 1999. In addition, an archaeological investigation of the area identified an archaeological site on 170 and 190 Tuahiwi Road that is a gravel borrow pit. The pit was excavated pre-1941 and has since been backfilled with soil and rubbish.

During Coffey’s site walkover, dumped material containing concrete, wire, household waste, metal drums and old cars was present on the southwestern corner of 190 Tuahiwi Road. This material forms approximately meter high mounds, which have been partially grown over with grass. The dumped piles extend onto 170 and 168B Tuahiwi, and onto the property immediately west of 190 Tuahiwi Road.

On the basis of the information reviewed and collected, Coffey has identified several potential HAIL activities to have occurred on-site. These activities identified by property are summarised below:

**Persistant pesticide bulk storage or use (HAIL activity A10)**
- 142 Tuahiwi Road (historical and current market gardens based on site walkover, historical aerial photographs and potentially based on historical resource consent)
- 235 Tuahiwi Road (historical based on interview with current owner)
- 239 Tuahiwi Road (historical based on interview with current owner)
- 115 Topito Road (potential based on historical resource consent for irrigation of horticulture)

**Waste disposal to land (HAIL activity G5)**
- 119 Topito Road (potential based on observed rubbish on paddock during site walkover)
- 142 Tuahiwi Road (potential based on observed rubbish on paddock during site walkover)
- 168B Tuahiwi Road (historical based on site walkover observations and owner interview)
- 170 Tuahiwi Road (historical based on site walkover observations and owner interview)
- 190 Tuahiwi Road (historical based on site walkover observations and owner interview)

To investigate potential soil contamination at the site, Coffey collected shallow soil samples (0.1 to 0.2 mbgl) from forty-five locations across the sites. All of the forty-five samples collected (plus two duplicate QC samples) were submitted for laboratory analysis for heavy metals and OCPs and two of the samples were also analysed for PAHs.

Arsenic was detected at concentrations exceeding the NES residential SCS (20 mg/kg) in samples S5 (170 Tuahiwi Road), S26 (115/119 Topito Road), S31 (229 Tuahiwi Road), S40 (37 Topito Road) and S41 (257 Tuahiwi Road). No other heavy metal results exceeded the adopted NES human health criteria. Several other metals were detected above the adopted ECAn background levels at various properties. Generally, more metals were above background concentrations at the properties within Site 1. No PAHs or OCPs were detected in any samples.

The site investigation encountered limited contamination in the soil. However, given the exceedance of the human health criterion for arsenic at one location at each of the five different properties mentioned above and the identification of potential HAIL activities at several of the properties at the
site, further investigation should be conducted prior to redeveloping properties for single-family residential use to determine the extent of any impacted soils.
8. Recommendations

Coffey considers the site suitable for rezoning as Residential 3 provided that the elevated arsenic levels in soil and buried waste is appropriately managed. As such, rezoning consent could be granted with a condition to further investigate and manage arsenic contamination and buried waste prior to or as part of the site development works.

Based on the results of this ESA, Coffey recommend the following additional investigation works:

- additional sampling comprising a detailed site investigation (DSI) at 170, 229 and 257 Tuahiwi Road and at 37, 115 and 119 Topito Road due to the arsenic contamination identified on these properties above human health screening criteria;
- a DSI at 142, 235 and 239 Tuahiwi Road to more thoroughly address potential HAIL activities at these properties; and
- Boreholes/trenching in the areas of buried waste to confirm the lateral and vertical extent of this material.

A DSI report should be prepared summarising the results of the above investigation works; this report can be used to support the consent for site redevelopment activities.

The results of the DSI would also support preparation of a remedial action plan (RAP) detailing management requirements for elevated contaminants in soil (including arsenic), as well as procedures for the removal of buried and surface waste, followed by validation of the underlying soils. The RAP would also include measures for investigating and managing unexpected contamination encountered during redevelopment works.
9. Limitations

The findings of this report should be read together with “Important Information About Your Coffey Environmental Report” attached to this report.
10. References


National Environmental Protection Measure (Assessment of Site Contamination) 1999, updated 2013 Schedule B1, Health Investigation Levels (HiL) for soil contaminants based on residential land use (Class A).

Pattle Delamore Partners (PDP) (2012). Tuahiwi Maori Reserve 873, Stage 1 Environmental Assessment (Desktop) – Aerial Photograph Review. 19 December 2012

Resource Management (national Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES).


Limitations
Introduction
This report has been prepared by Coffey for you, as Coffey's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice.

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Coffey may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Coffey has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

Your report has been written for a specific purpose

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination pose in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

Limitations of the Report

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Coffey should be kept appraised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statues and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

Interpretation of factual data

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can reveal what is hidden by earth, rock or changed through time.

The actual interface between different materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but
steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Coffey would be pleased to assist with any investigation or advice in such circumstances.

Recommendations in this report

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

Report for benefit of client

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

Coffey assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report.

To avoid misuse of the information presented in your report, we recommend that Coffey be consulted before the report is provided to another party who may not be familiar with the background and the purpose of the report. In particular, an environmental disclosure report for a property vendor may not be suitable for satisfying the needs of that property’s purchaser. This report should not be applied for any purpose other than that stated in the report.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Coffey prepared the report and has familiarity with the site, Coffey is well placed to provide such assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Coffey disowns any responsibility for such misinterpretation.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

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Responsibility

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.
Tables
<table>
<thead>
<tr>
<th>Property address</th>
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**Notes:**
- Underlined text indicates level is above background concentrations.
- (ppm) = parts per million
- (mg/kg) = milligrams per kilogram
- (R)-phenylen = indicates criteria are not available or the chemical was not analysed
- NA = indicates contaminant not limiting as estimated health-based criteria is significantly higher than that likely to be encountered on site.
- * = criteria for these compounds are addressed using the Benzo[a]pyrene equivalence calculations provided in the NES (refer to Note 1).
- LOR = Level of reporting

**Footnotes:**
1. Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES)
3. National Environmental Protection Measure (Assessment of Site Contamination) 1999, updated 2013 Schedule 81, Health Investigation Levels (HIL) for soil contaminants based on residential land use (Class A).
5. Environment Canterbury Level 1 Background Concentrations for metals are taken from ECAN 2007. Background concentrations for Canterbury Regional Recent soil have been used for this assessment.
6. Benzo[a]pyrene equivalent concentration calculated as the sum of the carcinogenic PAHs in accordance with the methodology published in the NES. Where a PAH was not detected, the concentration was conservatively assumed to equal the laboratory limit of reporting.
7. Criteria presented are for Chromium (VI).
9. TDD calculated as the sum of the common DDT isomers including DDE and DDT.
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<th>S11 10-Jul-2014 (mg/kg)</th>
<th>S12 19-Jul-2014 (mg/kg)</th>
<th>S13 10-Jul-2014 (mg/kg)</th>
<th>S14 14-Jul-2014 (mg/kg)</th>
<th>S15 14-Jul-2014 (mg/kg)</th>
<th>S16 14-Jul-2014 (mg/kg)</th>
<th>S17 14-Jul-2014 (mg/kg)</th>
<th>S18 14-Jul-2014 (mg/kg)</th>
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**Notes:**

- Underlying text indicates levels are above background concentrations.
- [mg/kg] = milligrams per kilogram.
- (np) = indicates criteria are not available or the chemical was not analysed.
- NA = indicates contaminant not limiting: an estimated health-based criterion is significantly higher than that likely to be encountered on site.
- * = criteria for these compounds are addressed using the Benzo[a]pyrene equivalence calculations provided in the NES (refer to Note 1).
- LOR = Level of reporting.

**Footnotes:**

3. National Environmental Protection Measure (Assessment of Soil Contamination) 1999, updated 2013 Schedule B1 Health Investigation Levels (HIL) for soil contaminants based on residential land use (Class A).
5. Environment Canterbury Level 1 Background Concentrations for metals are taken from ECAn 2007. Background concentrations for Canterbury Regional Recent soil have been used for this assessment.
6. Benzo[a]pyrene equivalent concentration calculated as the sum of the carcinogenic PAHs in accordance with the methodology published in the NES. Where a PAH was not detected, the concentration was conservatively assumed to equal the laboratory limit of reporting.
7. Chromium levels measured for chromium (VI).
8. Environment Canterbury's Background Levels for PAHs in Christchurch urban soils, ECAn 2007b.
9. DD'T calculated as the sum of the common DD'T isomers including DDE and DDT.
Table 2: Summary of Soil Analytical Results

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<th>Analyte</th>
<th>NES SCSs for Protection of Human Health based on a Residential Land-use (10%) produces (mg/kg)</th>
<th>Environment Canterbury’s Background Concentrations (mg/kg)</th>
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<th>S22 16-Jul-2014 (mg/kg)</th>
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<th>S29 16-Jul-2014 (mg/kg)</th>
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</table>

Notes:
- Underlined text indicates level is above background concentrations.
- mg/kg = milligrams per kilogram
- (Hyphen) indicates criteria are not available or the chemical was not analysed.
- \* = indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site
- \# = criteria for these compounds are addressed using the Benz[a]pyrene equivalent calculations provided in the NES (refer to Note 1)
- LOR = Level of reporting

Footnotes:
3. National Environmental Protection Measure (Assessment of Site Contamination) 1998, updated 2013 Schedule B1, Health Investigation Levels (HIL) for soil contaminants based on residential land use (Class A).
5. Environment Canterbury Level 1 Background Concentrations for metals are taken from ECAn 2007. Background concentrations for Canterbury Regional Recreational soil have been used for this assessment.
6. Benz[a]pyrene equivalent concentration calculated as the sum of the carcinogenic PAHs in accordance with the methodology published in the NES. Where a PAH was not detected, the concentration was conservatively assumed to equal the laboratory limit of detection.
7. Criteria presented are for Chromium (VI).
8. Environment Canterbury’s Background Levels for PAHs in Chisholm urban soils, ECAn 2007b.
9. ZDDT calculated as the sum of the common DTIs, including DDE and DDD.
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<tr>
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<tr>
<td>Dibenz(a,h)anthracene</td>
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<td>0.112</td>
<td>0.112</td>
<td>0.112</td>
<td>0.112</td>
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<td>0.135</td>
<td>0.135</td>
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<td>0.135</td>
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<tr>
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<tr>
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<tr>
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<td>1.203</td>
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<td>1.203</td>
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<td></td>
</tr>
</tbody>
</table>

Notes:
- Underlined text = data indicates level is above background concentrations.
- mg/kg = milligrams per kilogram
- *(Hyphen) = indicates criteria are not available or the chemical was not analysed.
- NA = indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site.
- # = criteria for these compounds are addressed using the Benzo(a)pyrene equivalence calculations provided in the NES (refer to Note 1).
- LOR = Level of reporting.

Footnotes:
5. Environment Canterbury: Level 1 Background Concentrations for metals are taken from ECAN 2007. Background concentrations for Canterbury Regional Recent soil have been used for this assessment.
6. Benzo(a)pyrene equivalent concentration calculated as the sum of the carcinogenic PAHs in accordance with the methodology published in the NES. Where a PAH was not detected, the concentration was conservatively assumed to equal the laboratory limit of detection.
7. Criteria presented are for Chromium (VI).
9. ZODT calculated as the sum of the common ZODT isomers including DDE and DDT.
## Table 2: Summary of Soil Analytical Results

<table>
<thead>
<tr>
<th>Analyte</th>
<th>NES SCSIs for Protection of Human Health based on a Residential Land-use (10%) Production (mg/kg)&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Environment Canterbury’s Background Concentrations (mg/kg)</th>
<th>S41 11-Jul-2014 (mg/kg)</th>
<th>S42 11-Jul-2014 (mg/kg)</th>
<th>S43 11-Jul-2014 (mg/kg)</th>
<th>S44 16-Jul-2014 (mg/kg)</th>
<th>S45 16-Jul-2014 (mg/kg)</th>
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<tr>
<td>Arsenic</td>
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<td>9.9</td>
<td>9.9</td>
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<td>&lt;0.1</td>
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<tr>
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<tr>
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<td>&lt;0.15</td>
<td>&lt;0.15</td>
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<tr>
<td>Benzo[a]pyrene+Dibenzo[a,h]anthracene</td>
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<td>&lt;0.15</td>
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Notes:  
- Underlined text indicates level is above background concentrations  
- (mg/kg) = milligrams per kilogram  
- [Footnotes](#footnotes)  
- NA = indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site  
- # = criteria for these compounds are addressed using the Benzo[a]pyrene equivalence calculations provided in the NES (refer to Note 1)  
- LOR = Level of reporting

Footnotes:  
3. National Environmental Protection Measure (Assessment of Site Contamination) 1999, updated 2013 Schedule 81, Health Investigation Levels (HIL) for soil contaminants based on residential land use (Class A).  
5. Environment Canterbury Level 1 Background Concentrations for metals are taken from EC2007 Background concentrations for Canterbury Regional Recent soil have been used for this assessment.  
6. Benzo[a]pyrene equivalent concentration calculated as the sum of the carcinogenic PAHs in accordance with the methodology published in the NES. Where a PAH was not detected, the concentration was recorded as 0.  
7. Criteria presented are for Chromium (VI).  
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<th>Analyte</th>
<th>QC1</th>
<th>S14 0.2 mbgl 10-Jul-2014 (mg/kg)</th>
<th>Relative Percentage Difference</th>
<th>QC3</th>
<th>S17 0.2 mbgl 14-Jul-2014 (mg/kg)</th>
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Figures
Figure 1: Plan showing site locations in relation to Rangiora and Kaiapoi Townships.
Figure 2: Property addresses within Site 1 and potential current or historical HAIL activities.

Legend
- Market gardening
- Domestic waste
Figure 3: Property addresses within Site 2 and potential current or historic HAIL activities.

Legend
- Stockpiled waste
  - Domestic waste
  - Hospital waste
- Orchards
- Domestic Waste
Figure 4: Topographic map of the site and wider area.
Figure 5: Site investigation plan showing sampling locations within Site 2 (S1 through S25).
Figure 6: Site investigation plan showing sampling locations within Site 1 (S26 through S45).
Appendix A – Field Notes
Innovation is finding answers to questions no one has asked.
Preliminary Site Inspection Checklist
Report Date:
Report Ref: ENNZAUCK
INSPECTED BY:

Site Details: (Name and Address)

Two large areas of rural land that is being proposed for a new
residential subdivision, house x number attached.

Prepared for: (Client)

· Trainham proposed development plan

Inspected By: A. Helle & N. Morgan