

Waimakariri District

Residential Red Zone

Technical Advisory Panel
Preliminary Assessment of Land Use
Capability

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**WAIMAKARIRI DISTRICT – RESIDENTIAL RED ZONE
TECHNICAL ADVISORY PANEL
REPORT
PRELIMINARY ASSESSMENT OF LAND USE CAPABILITY**

This report was prepared by the Panel members listed below.

It provides a record of the process followed in preparing the contents of the report and represents the agreed advice of the Panel, as defined by its Terms of Reference.

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Environment Canterbury



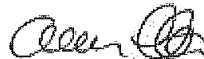
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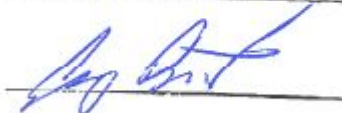
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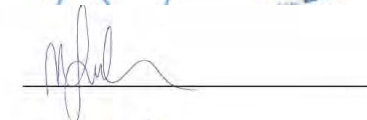
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Executive Summary

The Canterbury Earthquake Recovery Authority (CERA), in agreement with its strategic partners: Te Rūnanga o Ngāi Tahu (TRoNT), the Waimakariri District Council (WDC) and Environment Canterbury (ECan), has formed a Technical Advisory Panel (the Panel).

The purpose of this Panel is to provide expert technical advice that will assist the understanding of the physical capability of the land within the Residential Red Zones (RRZs) in the Waimakariri District.

*The scope of the Panel is to **identify at a broad geographical level, the constraints and opportunities for use of the land and to spatially identify areas suitable for broad types of land use.***

*This report is **not directive or determinative.***

*This report makes **no recommendations.***

*This report forms **only one of the inputs** to the evaluation and decision-making processes for future use options.*

*Strategic partners and the community will have the ability to input to the evaluation processes for future use of the red zone on a broad range of matters (for example social, community, economic, environmental, recreation matters) through a formalised process. **This report does not preclude or exclude the consideration of those other matters or site specific projects.***

*The report is a preliminary assessment. **It does not represent a feasibility study** of future land uses or provide a commentary on the demand for particular land uses. It is based on desk-top information only.*

*The report **does not present a long term plan** for future land use.*

The Panel was comprised of advisors in relevant areas of expertise relating to geotechnical engineering, hydrogeology, land contamination, Mana Whenua/Ngai Tahu cultural interests, ecology, archaeology and heritage values, recreation, flooding, sea level rise and WDC strategic infrastructure.

The Panel met in a workshop format to discuss and evaluate datasets relating to the physical land characteristics along with environmental, archaeological and, heritage values and Mana Whenua/Ngai Tahu cultural interests. CERA commissioned maps which provide a very preliminary indication of the remediation potential of the land in respect of its geotechnical condition, vulnerability to flooding and potential

contamination. This was supplemented by information on potential tsunami and sea level rise risks.

The Panel's evaluation records the potential suitability of a broad range of land use types as "suitable", "technically feasible", "technically feasible but not advisable" or "not feasible".

It is acknowledged that land uses of low intensity e.g., open space, planting, grazing or passive recreation activities, and which do not require any large-scale engineering improvement works to establish may be sustainable throughout the RRZ. This is subject to consideration of demand for the activity and integration and compatibility with adjoining land uses.

The Panel's summary notes that the combined and cumulative effect of the geotechnical condition of the land and its flooding vulnerability are the most significant determinants of opportunities for future use in Kaiapoi. There are two areas where it may be possible to consider more intensive or built future land uses – being Kaiapoi North and Courtenay Drive. If these possibilities were to be further considered, feasibility analyses would be required to inform the extent of the potential land use.

Any further investigation of land use options should also consider the Mahaanui Iwi Management Plan 2013.

The effect of future sea level rise significantly limits the potential for long term intensive or permanent built land use in The Pines Beach and Kairaki. The area surrounding the Waimakariri River mouth is however of regional significance for outdoor recreation.

The Panel concluded that in some cases, amalgamating remediation "sub-zones" opened up wider opportunities for future land use types. This is demonstrated in Kaiapoi North where using land south of Cass Street for mitigation of flooding may potentially enable opportunities for built outcomes on the balance area of the RRZ north of Cass Street. The built outcomes that may be possible could potentially include residential opportunities at varying densities or commercial buildings in the area adjacent to the Town Centre. The flood mitigation area itself has the potential for a range of recreation and environmental uses.



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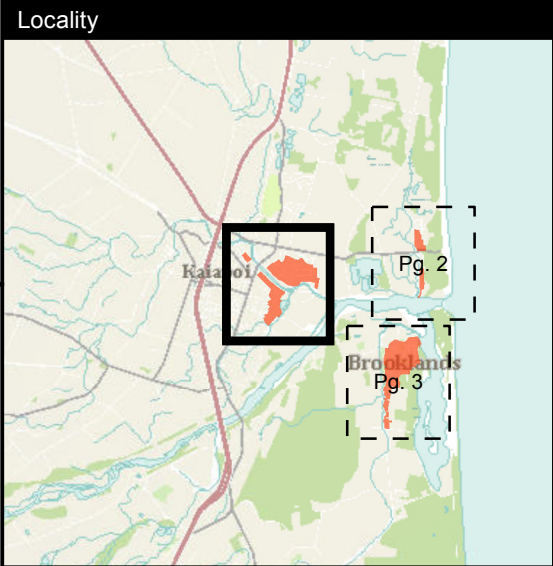
Land Check Colour Zones - December 2013

Red Zone Boundary

Indicative Landuse Opportunities

Sub-Areas Considered – Preliminary and Approximate Only

Map Purpose:
Map is a component of the Technical Theme map series produced to support the planning framework for the future use of the Residential Red Zone (FURZ).
Please note - Map supplied 'In Confidence' according to State Services Commission guidelines for more information see: <http://www.gcsb.govt.nz/newsroom/reports-publications.html>



Publication Date:
7/05/2015

Scale:
1:8,000
(Original sheet size A3)

Disclaimer
This map is a static output of depicted layers and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

Coordinate System:
NZGD 2000 New Zealand Transverse Mercator

Map Document:
6771 - FURZ Boundaries_20150507.mxd

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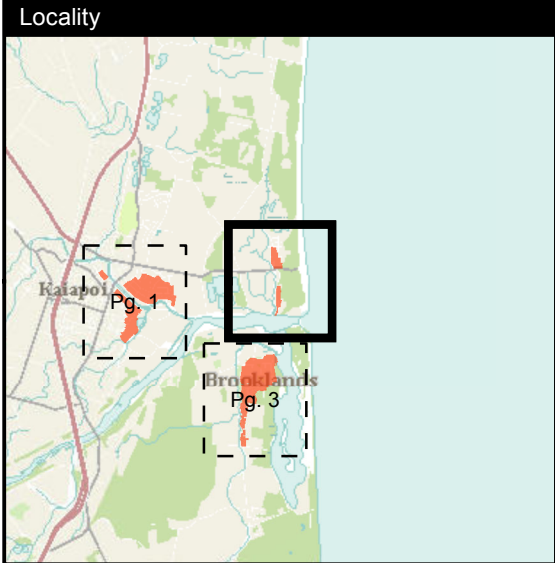
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Introduction

The Canterbury Earthquake Recovery Authority (CERA), in agreement with its strategic partners: Te Rūnanga o Ngāi Tahu (TRoNT), the Waimakariri District Council (WDC) and Environment Canterbury (ECan), has formed a Technical Advisory Panel (the Panel). The purpose of this Panel is to provide expert technical advice that will assist the understanding of the physical capability of the land within the Residential Red Zones (RRZs) in the Waimakariri District, and the range of possible types of future land use that could be sustained on that land.

It is intended that the Panel's assessment is preliminary and based on readily available sources of information on physical land characteristics. It is acknowledged that more detailed investigation on the feasibility of all future land uses would be required. This initial "filtering" of data may however assist with informing what types of investigations may be required within different parts of the RRZ.

It is noted that this report forms only one of the inputs required for the further evaluation and decision-making processes for future use options. It is understood that this information will be complemented by inputs from strategic partners, community engagement, policy, legal and regulatory considerations. Accordingly, this report is not directive or determinative and makes no recommendations.

The final decision for future use lies with the Cabinet.

Terms of Reference

Terms of Reference were developed to inform the actions and conduct of the Panel. These covered the purpose of the Panel, its membership, scope, and outputs. A copy of the Terms of Reference is attached as Appendix 1.

The Panel was briefed on the Terms of Reference on 21 January 2015. This briefing was also attended by members of the Waimakariri Working Group¹.

Scope

The scope of the Technical Advisory Panel is limited to the following tasks:

- A review of the adequacy and suitability of physical and environmental data.
- Working together in a workshop to discuss and analyse the data.
- Identifying at a broad geographical level, the constraints and opportunities for use of the land.
- Spatially identifying areas suitable for broad types of land use – as distinct from site specific activities.
- Identifying critical or fundamental technical factors that may be of assistance to persons evaluating or making decisions on future use.

¹ The Waimakariri Working Group is a forum for CERA and Strategic Partner officials to undertake collective analysis, evaluation and synthesis of advice to the Steering Group as required.

Outputs

The outputs of the Panel are to be reported directly to the Waimakariri Working Group for its consideration and use.

The outputs comprise:

- maps identifying at a broad geographical level, the areas suitable for broad types of land use.
- a compendium of maps used to inform the final overview map of land use suitability
- a short, high-level report recording the process followed by the Panel and describing the overview map of land use suitability
- a list of assumptions that may be of assistance to persons evaluating or making decisions on future use.

It is noted that this report reflects the collective view of the Panel, and where there were variations in opinion these have been recorded.

Membership of the Panel

The Panel comprised a CERA facilitator and advisors with experience and authority in relevant areas of expertise. The advisors were either in-house experts provided by one of the strategic partners or consultant experts. The number of Panel members was balanced having regard to the technical knowledge required and considerations of efficiency. The Panel for the Waimakariri RRZ encompasses the following expertise:

Geotechnical Engineering

Hydrogeology

Land Contamination

Mana Whenua/Ngāi Tahu Cultural Interests

Ecology and Natural Environment

Archaeology and Heritage

Recreation

Flooding

Sea Level Rise

Strategic Council-owned Infrastructure

The list of individual members on the Panel included:

Ian Heslop, Environment Canterbury

Davina McNickel, Environment Canterbury

Chrissie Williams, Environment Canterbury/Natural Environment Recovery Programme

Aaron Leith, Te Rūnanga o Ngāi Tahu

Chris Brown, Waimakariri District Council

Gary Boot, Waimakariri District Council
Nicola Rykers, CERA
Rob Rouse, CERA
Mike Jacka, Tonkin and Taylor, contracted by CERA
Jared Pettersson, Tonkin and Taylor, contracted by CERA
Peter Cochrane, Tonkin and Taylor, contracted by CERA
Diana Robertson, Boffa Miskell, contracted by CERA
Katharine Watson, Underground Overground Archaeology, contracted by CERA
David Allan, Global Leisure Group, contracted by CERA

Methodology

The following section describes the overall process followed by the Panel.

Geographic Data Analysis

The first step involved the collation of information and data concerning:

- the physical characteristics and condition of the land
- environmental, cultural, ecological and heritage values; and
- Waimakariri District Council's strategic assets and utilities.

This information was mapped using Geographic Information Systems (GIS), enabling the layering of different land characteristics, conditions and values along with the location and alignment of strategic, Council owned assets.

This mapping exercise was led by CERA using the datasets it had collated over the past 4 years as a starting point. This was complemented by advice and additional data from the Strategic Partners.

The Data Sets

The data sets used by the Panel are contained in a separate document titled "Waimakariri District Residential Red Zone – Data Sets". These maps included the following information and should be read in conjunction with this report:

- Red Zone Boundaries
- District Plan Zone Boundaries accompanied by planning maps
- Land Ownership
- WDC Strategic Infrastructure – shows possible options for location of infrastructure in the RRZ, as may be required to continue servicing the Green Zone.
- Natural Environment
- Archaeological Sites
- Mana Whenua/Ngāi Tahu Cultural Interests
- Contamination Remediation Feasibility

- ECan Listed Land Use Register (LLUR)
- Flood Remediation Categories
- Geotechnical Remediation Categories
- Tsunami Evacuation Zone
- Categories for vulnerability of land to climate induced Sea Level Rise
- Combined Constraints (flooding, geotechnical, contamination, tsunami, sea level rise)
- Combined Constraints and WDC Strategic Infrastructure

A number of these datasets are described in more detail as follows:

District Council Owned Strategic Infrastructure

The WDC has provided preliminary data describing the type and possible location of infrastructure for continuing service of the adjoining Green Zoned land. This includes options for roading restoration or re-alignment, stormwater and potable water pipes, stormwater management areas, pumping stations and sewer lines.

For completeness, areas of stopbank reconstruction have also been included on the infrastructure maps.

It is important to note that this infrastructure does not contemplate any built land use or any particular activities within the RRZ which may require servicing.

Natural Environment

This map shows a 30m riparian corridor around waterbodies. The width of the corridor was informed by discussion between the relevant technical experts based on experience and understanding as to where high natural values may occur in relation to waterbodies.

The map also identifies the location of protected trees.

The Tūhaitara Coastal Reserve (which is also shown on the Land Ownership map), was included on this map to inform proximity and opportunity for habitat connections.

Mana Whenua/Ngāi Tahu Cultural Interests

This map showed information provided by TRoNT. This data includes Māori Reserves, Māori archaeological sites, the Tūhaitara Coastal Reserve, waterbodies, a 30m riparian corridor, Statutory Acknowledgements located along the Coast and the Waimakariri River mouth, the Coastal Marine Area boundary, traditional travel routes (Ngā Aro Tawhito) and areas of high cultural value. TRoNT also provided additional information concerning Taonga species² and Statutory Acknowledgements as described in Schedules 97, 100 and 101 of the Ngāi Tahu Claims Settlement Act 1998.

Archaeological Sites

The data originally held and mapped by CERA is not up-to-date and, in particular, has been noted to not include sites identified during the land clearance process.

² Any future proposal on the land within the Residential Red Zones in the Waimakariri District which incorporates the planting of taonga species, must require early engagement with Mana Whenua/Ngāi Tahu.

CERA is in the process of obtaining this data from the New Zealand Archaeological Association and an up-dated map will be produced in due course.

The Archaeologist on the Panel has advised that although the number of sites recorded is not accurate, surveys and investigations during land clearance have not uncovered any sites of high archaeological significance.

Geotechnical Remediation - Categories

From a geotechnical perspective it is possible that parts of the RRZ could be remediated for built outcomes in the long term.

This however would require bespoke and high-end engineering design to achieve land stability and would need to be implemented on an area-wide basis, as distinct from an individual property basis. It is noted that in general the greater the scale of the potential ground failure mechanism (e.g., lateral spreading), the greater the land area that would need to be incorporated into a land remediation scheme i.e., large-scale land deformation generally requires large-scale engineering works to make the land suitable for built land use.

For example, in some parts of the RRZ lateral spreading is limited to an area within about 30 metres of the river edge, so a series of individual smaller-scale land remediation schemes could be feasible. In contrast, other areas of lateral spreading extend more than 200m back from the river edge, so a single much larger-scaled remediation scheme would be necessary. There is a corresponding increase in cost as the complexity and scale of the engineering intervention increases.

The level of detailed engineering required to achieve a buildable outcome in the RRZ is therefore significantly more complex compared with re-building a house on a single allotment within the Green Zone. In the Green Zone building foundation designs can generally be standardised and/or small scale ground remediation can be effective on an individual basis, within the boundaries of the property.

On the basis of this knowledge and using the geotechnical data already available CERA engaged Tonkin and Taylor to assist with the development of a high-level ranking system for "Remediation Potential" for RRZ land.

Accordingly, categories G1 to G6 were developed to reflect the remediation potential of identified areas or locales within the RRZ to achieve a minimum standard of land performance, or resilient ground condition, for "a typical standard of urban development". This is assumed to be a suburban density of approximately 500m² for an individual property. The categories are described below, noting that the scale ranges from G1 to G6. G1 requires the least intervention through to G6, which requires the greatest intervention.

G1	Moderate-scale area-wide ground improvement works would be required for buildings and infrastructure. Minimum size development of about 10,000m ² required to accommodate these area-wide works. Alternatively, specialised deformation-tolerant foundations and infrastructure may be an option, with some limitations on the types of structure.
G2	Large-scale area-wide ground improvement works would be required for buildings and infrastructure. Minimum size development of about 10,000 to 50,000m ² required to accommodate these area-wide works. Alternatively, specialised deformation-tolerant foundations and infrastructure may be an option, with some limitations on the types of structure.
G3	Large-scale area-wide ground improvement works would be required for buildings and infrastructure. Specialised deformation-tolerant foundations and infrastructure unlikely to be a feasible option without ground improvement. Minimum size development of about 10,000 to 50,000m ² required to accommodate area-wide works.

G4	Very large-scale area-wide ground improvement works would be required for buildings and infrastructure. Minimum size development of about 50,000 to 100,000m ² required to accommodate area-wide works.
G5	Large to very large-scale area-wide ground improvement works would be required for buildings and infrastructure, and these works are likely to be cost effective only for high-value development (or if they provide protection to a larger area of development).
G6	Large to very large-scale ground improvement works would be required for buildings and infrastructure, but these works are unlikely to be feasible or cost effective, or would cause significant disruption for Green Zone residents.

The categories have been informed by geotechnical investigations and data collected since the September 2010 earthquake, including case-studies of specific site conditions. They are based on a high level engineering assessment of the conditions considered typical for each area, acknowledging that there has been no detailed analysis or refinement of the locality. Variation of ground conditions can therefore be expected and the area of land within each of the categories may be larger or smaller than indicated from this high-level assessment. Tonkin and Taylor advise that where engineering feasibility is critical for decision-making then further detailed assessment would be required.

It is relevant to note that most RRZ land could be suitable for less intensive land uses (e.g., open space recreation) without large-scale ground improvement works. Such activities are still likely to require moderate earthworks to prepare the land for use.

For categories G1 and G2 it is possible that acceptable levels of remediation for “a typical standard of urban development” could be achieved either by ground improvement works or through specialised deformation-tolerant foundations. In this second scenario, a very robust foundation would be required to ensure that the building can withstand the deformation as it moves with the land. To achieve this effect would require a building of commercial purpose and/or scale in order to be feasible and would not be achievable by individual residential scaled buildings.

At category G3 and above, the degree of land deformation that would occur during an earthquake becomes too great for deformation tolerant foundations alone to work. Specialised foundations plus area wide ground improvement works are therefore required.

From category G4 and above, the high value of the engineering design required means that the end-use needs to be of higher value or of a very large scale in order to be cost-effective.

At category G6 it is assumed that it is unlikely to be feasible or cost effective to undertake engineering intervention to effectively mitigate damage to buildings arising from severe ground movement. In addition, the extent of earthwork required would be so extensive that the works could significantly affect adjoining areas subject to truck movement and other potential environmental effects.

It is relevant to note that even with area-wide ground remediation there remains the potential for future earthquake events to affect ground elevation, with variable settlement of the land. The management of possible ground settlement would require a combination of ground remediation works and specialist building foundations to be implemented, both of which should be included in any further investigation of the feasibility of built land use.

Flooding Remediation - Categories

The categories shown on the maps are based on results from a model for 100 year return period flooding used by the Earthquake Commission (EQC) and relate to extensive or large scale flooding patterns. The model is based on flooding arising from local rainfall falling onto land (rain-on-grid) with no drainage outlets. Whilst this is a conservative scenario it does not anticipate changes in precipitation or sea level rise brought about by climate change. These effects would need to be included in any further assessment of future land use opportunities.

Small-scale localised flooding may occur at shorter return periods but this is not considered to be of strategic significance when considering broad scale land use opportunities.

To supplement this information, the Panel also had regard to additional modelling undertaken by the WDC. This modelling was for the 100, 200 and 500 year return periods combined with the effect of a 1.0m sea level rise on flooding in Kaiapoi. The Panel also considered data from ECan's model for Ashley river breakouts, which similarly covered the 100, 200 and 500 year return periods.

The Panel's desktop analysis of this combined data confirmed that the categories created for this exercise reflected an appropriate scale and relativity in terms of vulnerability and risk. The Panel also noted that this modelling showed flood risk is extensive across much of Kaiapoi's Green Zone. Accordingly, the flooding issues are not specific to the RRZ and this is a matter the Panel considered further in its evaluation.

Similar to the geotechnical categories, there are six flood categories ranging from F1 through to F6, with F6 representing the most severe hazard from flooding. Categories F1 to F3 impose no or limited flood risk limitation on future land use options. Category F4 anticipates raising the land as part of any land remediation but in this situation it is anticipated that the potential for consequential drainage or inundation effects elsewhere within the catchment can be effectively managed.

Development of land in areas identified at F5 and F6 would require a wider understanding of land drainage characteristics of the catchment.

Generally, it is noted that the greater the level of fill used for remediation, the greater the cost of the remediation, and the higher the value of the end use required to be feasible.

In summary, the categories provide a very high level understanding of the relativity of flooding across the RRZ. The Panel members agreed more detailed investigation of flooding would be necessary as part of evaluating more specific future use options, and this should include the effects of modelled changes in rainfall intensity, the effects of a 1m sea level rise on levels in the Kaiapoi River and the consequential effect on the depth of floodwaters. In addition, if land settles in a future seismic event and elevation lowers further, the flood risk may potentially increase. The potential for future subsidence is therefore a matter that would require detailed assessment as part of feasibility and from a resilience and sustainability perspective

F1	The Return Period for extensive flooding > 200 years.*
F2	The Return Period for extensive flooding is > 100 years and ≤ 200 years*.
F3	The Return Period for extensive flooding is > 50 years and ≤ 100 years*.
F4	The Return Period for extensive flooding ≤ 50 years. It may be possible to demonstrate that raising the land does not adversely affect land drainage patterns and flood inundation elsewhere*.
F5	The Return Period for extensive flooding ≤ 50 years. Raising the land would be likely to worsen flood hazard in Red Zone areas, but not Green Zone areas. May be more appropriate for development that can leave land at current level and accept or mitigate flood hazard in other ways, or where effects of raising land could be offset elsewhere within the Red Zone*.
F6	The Return Period for extensive flooding ≤ 50 years. Raising the land would be likely to worsen flood hazard in Green Zone areas, or may create a safety hazard from high-velocity flow paths in Red Zone areas. Most appropriate for development that could leave land at current level and accept or mitigate flood hazard in other ways*.

* No allowance has been made for sea level rise.

Contamination Remediation - Categories

The categories for contamination are based on known data sets for contamination of existing sites. It is important to note that this data represents sites with known potential for contamination. There are likely to be other sites for which no data exists and have the potential to be contaminated or are contaminated.

The scale once again ranges from C1 to C6, with C1 representing no known ground contamination through to C6 for areas of major contamination where significant remediation would be required for most types of land use. A “pre-cautionary” category (C2) was created for areas where demolition of buildings constructed using asbestos were more likely to be located. In addition to these categories, the maps also show areas of potential or known contamination in the surrounding locality, as recorded on the ECan Listed Land Use Register (LLUR).

C1	No known ground contamination concerns.
C2	No known pre-earthquake ground contamination concerns, however asbestos is likely to be present in many buildings in this area, giving the potential for contamination due to RRZ demolition works.
C3	Minor ground contamination, some land uses may be appropriate without the need for significant remediation.
C4	Moderate ground contamination, minor to moderate remediation work may be required, depending on proposed land use.
C5	Major ground contamination, significant remediation work would be required for most proposed land uses, but remediation is likely to be feasible and cost-effective.
C6	Major ground contamination, significant remediation work would be required for most proposed land uses, and remediation is unlikely to be feasible or cost-effective.

Tsunami

Categories T1 and T2 identify whether the location is outside or within the Tsunami evacuation zone. For this preliminary stage of work, all of the RRZ within the Waimakariri District is assumed to fall within T1, the evacuation zone. It is possible that more detailed analysis could allow a T2 classification for RRZ areas in Kaiapoi. Accordingly, further assessment is recommended if the tsunami classification becomes critical for decision-making.

T1	Outside tsunami evacuation zone
T2	Within tsunami evacuation zone

Sea Level Rise

There are 3 categories to account for sea level rise projected as a result of climate change to the year 2100. At a high level these categories reflect:

- No direct impact from sea level rise.
- Inundation experienced during extreme tidal events
- Inundation due to the daily tidal cycle

These categories are based on a future sea level rise projection of 1.0m by 2115 (a 100 year planning time frame). This is generally consistent with the Ministry for the Environment (MfE) guidelines (2008) and the Royal Society of New Zealand Emerging Issues paper (RSNZ, 2010).³

S1	Outside area expected to be impacted by 1.0m sea level rise
S2	Area impacted by 1% AEP inundation event (3.3m = 1% AEP tide at 1.9m and 1.0m sea level rise with 0.4m freeboard)
S3	Area impacted by shoreline retreat due to passive inundation (2.2m = mean high water springs of 1.2m and 1.0m sea level rise)

Combined Constraints

A final map provides a summary of the combined constraints applying within each of the sub-areas e.g., in West Kaiapoi the land is categorised as G1, C2, F6, S1 and T2.

It is relevant to note that each of the categories for flooding, geotechnical, contamination and sea level rise are all colour coded e.g., the flooding layers are blue, the geotechnical layers are brown, contamination is purple and sea level rise is green. The more significant the hazard or constraint the darker the colour applied on the map e.g., F1 is light blue through to F6 which is a dark blue.

³ MfE recommend that for planning and decision timeframes out to the 2090s (2090-2099):

- 1 A base value sea-level rise of 0.5m relative to the 1980-1999 average be used, along with:
- 2 An assessment of potential consequences from a range of possible higher sea-level rise values. At the very least, all assessments should consider the consequences of a mean sea-level rise of at least 0.8m relative to the 1980-1999 average.

For longer planning and decision timeframes beyond the end of this century, it is recommended that an additional allowance be made for sea-level rise of 10mm per year beyond 2100.

It should be noted that both Christchurch City Council and the Waimakariri District Council have each adopted a sea level rise of 1.0m for future planning purposes.

If the constraints for a particular sub-area are all of the same level e.g., F2, G2, S2, T2 and C2 – the base colour is grey. However, in areas where the constraints vary in their level of significance, the most dominating constraint will be used to colour the map. For example, West Kaiapoi is blue as flooding is the dominant constraint, with G1, C2, F6, S1 and T2 noted.

It should be appreciated that a higher remediation category number for a particular constraint does not necessarily mean that this constraint would eventually govern the works required to remediate the land. For example, in one area it might be relatively simple to address the flooding issues represented by an F4 categorisation, but the specific soil profile at the site might mean that extensive engineering works are needed to address the G3 categorisation. This level of detail is beyond the scope of this preliminary assessment, so at this stage the dominant constraint has been selected as the one with the highest category number.

Areas of Analysis

The RRZ covers a total area of approximately 99.2ha within the Waimakariri District, divided between the following locations.

Kaiapoi	84.4ha
The Pines Beach	9.0ha
Kairaki	5.8ha
Total	99.2ha

The flooding, geotechnical and contamination categories identified above were applied to “sub-areas” within the RRZ. These “sub-areas” had been identified by Tonkin and Taylor as part of earlier geotechnical assessments, reflecting areas of similar observed ground performance. This offered a logical basis for consideration of remediation potential based on conditions relating to lateral spread and liquefaction. These “sub-areas” have historically been referenced as “Zones” with specific number identifiers e.g., Zone 27.1.

Briefings

Following the briefing of the Panel the CERA facilitator arranged topic based briefings with the relevant experts to review and discuss the data. These were arranged 1 to 2 weeks in advance of the Workshop. Where datasets appeared incomplete this was discussed, with further mapping commissioned or gaps recorded. Revised map sets were then hand-delivered to all Panel members in advance of the workshop.

Workshop

A workshop was held in early February to review and discuss the datasets.

The Panel spent the first half of the workshop ensuring that all members had a shared understanding of each of the maps and the data that had informed the mapping.

The second half of the workshop involved an analysis of the maps and datasets in combination for each of the geographic areas identified by Tonkin and Taylor. The panel shared opinions and analysis, applying expert judgement to the likely overall capability of the land, the significance of values and possible future types of land use. Panel members were also able to share a detailed and local understanding of general land use and the environment within Kaiapoi, The Pines Beach and Kairaki.

To assist the evaluation of the combined datasets the Panel developed a simple matrix system. The purpose of the matrix is to provide a high level summary or guidance on a possible future pattern of land use type. Accordingly, the land-use types were purposefully kept very broad, indicating land use capability and opportunity, as distinct from site specific activities.

The matrix adopted six broad land-use types (described below).

- Built – residential
- Built – commercial/industrial
- Recreation
- Environmental Enhancement
- Mana Whenua/ Ngāi Tahu cultural interests
- Rural Activities

In addition, the matrix notes the type of WDC Infrastructure proposed in particular locations.

It is emphasised that this report has been informed by desk-top information, including reports prepared on geotechnical conditions of the land and flood modelling data developed at a district level. Before confirming possible options for future land use, appropriately scoped and more detailed investigation would be required to inform the feasibility of particular activities. This should be complemented by an assessment of the Mahaanui Iwi Management Plan 2013.

It is acknowledged that particular or specific end-uses are possible that will not neatly fall within one of the categories above e.g., tourism ventures or commercial activities not requiring buildings. The categories above are not intended to exclude such opportunities, but these will require site-specific investigations.

The Panel then considered each of the above land use categories having regard to the physical characteristics and environmental values present in different parts of the RRZ and assessed if the land use type was:

Preliminary Assessment Category	Description
Preliminary Assessment Suggests Land Use Potentially Suitable	This category applies where a particular type of land use may be potentially suitable based on the land conditions and environmental values present in the locality.
Preliminary Assessment suggests Land Use May Be Technically Feasible	Preliminary assessment suggests that this type of land use may be technically feasible but requires a more detailed assessment of feasibility and wider land use suitability.
Preliminary Assessment Suggests Land Use Technically Feasible but not Advisable	This category identifies that although engineering solutions may be possible to establish an activity that: <ul style="list-style-type: none"> - the outstanding level of risk for future development remains high; and/or - while engineering works could manage the risk, the nature of these works could be considered unsustainable (e.g., raising coastal land several

	metres to mitigate sea level rise); and/or - the presence of other values which may be significant - ecological, cultural, heritage or archaeological require further evaluation; and/or - the nature of the surrounding land use makes the proposal a poor outcome from a land use planning perspective e.g., a farm in the centre of town.
Preliminary Assessment Suggests Land Use Not Technically Feasible	This category applies where a particular type of land is potentially not suitable based on the land conditions and/or environmental values present.

It is acknowledged that land uses of low intensity e.g., open space, planting, grazing or passive recreation activities, and which do not require any large-scale engineering improvement works to establish may be sustainable throughout the RRZ. This is subject to consideration of demand for the activity and integration and compatibility with adjoining land uses.

It is also relevant to note that the Panel chose not to strictly adhere to the zone or “sub-area” system created by Tonkin and Taylor for geotechnical assessment. In some cases the Panel formed the view that wider or smaller areas may create new or potentially feasible land use opportunities.

Additional Matters

The following matters are additional to the data sets and categories described above. These have been recorded to reflect the Panel’s considerations.

Recreation Levels of Service

- The recreation experts on the Panel explained the technical analysis undertaken by the WDC. This has involved a review of the level of service for all categories of recreation reserve (of which there are 9) within the district.
- The Panel has relied upon the outcomes of this analysis. It informs that there is currently no shortfall in the area of active recreation (sportsfields) relative to the short-term level of service and meeting the needs of the Kaiapoi community. This is described in the Recreation Asset Management Plan. There is an exception in respect of an area to the west of the town centre. Murphy Park, which currently operates as a recreation node and would benefit from additional land to better meet demands. This does not mean that there aren’t district level and wider recreation needs requiring attention.

Flooding

- The areas with a F6 flooding category in Kaiapoi are surrounded by land with a similar level of flood vulnerability. It is possible that in the longer term, area-wide flood protection measures may be implemented for wider Kaiapoi that would enable a wider range of built outcomes on those sites zoned as F6. This is

however a future scenario and the Panel concluded that for the purpose of this exercise (i.e., considering broad land use opportunities based on current land characteristics and values), that it could not anticipate the implementation of wider mitigation which may or may not happen at an indeterminate date in the future. Accordingly, built outcomes on F6 zoned land are considered to be limited to uses which can leave the land in its present level or are potentially economically prohibitive.

Environmental Enhancement

- The ecological and natural environment experts on the Panel advised that areas of existing indigenous vegetation and habitat for indigenous fauna on adjoining land and the presence of waterbodies are fundamental criteria when considering the suitability of RRZ land for environmental enhancement and the potential for biodiversity gain.

Archaeological Values

- The Archaeologist on the Panel advised that the significance of archaeological values is dependent on the inherent qualities of the features present, their association to historical events or the geographic context in which they are sited. There are no known sites of high archaeological value within the RRZ, although it was noted that no detailed assessment of these archaeological values has been carried out.

Ground Contamination

- The category C3 for contamination is precautionary and based on the age of the demolished housing stock. Buildings constructed up to the 1980s are more likely to have used asbestos.
- The absence of known ground contamination in Kaiapoi RRZ may not reflect its actual status. ECan has not completed a review of aerial photography to identify historic land use with potential to create contaminants.
- The NES process provides for human health. Ecological health must still be considered as part of implementing future uses.

Infrastructure

- The infrastructure options proposed by the WDC are assumed to be optimised in terms of service delivery to Green Zones.
- For the purposes of this assessment it is assumed that all stopbanks owned by ECan are retained in their current location and at their current crest level.

Sea level Rise

- Sea level rise is anticipated to cause a consequential rise in groundwater levels, which may exacerbate drainage and flooding issues in low lying areas, and may also affect horizontal infrastructure. This adds a further future environmental effect required to be managed/mitigated at The Pines Beach, Kairaki and Kaiapoi where the flow in the Kaiapoi River is closely linked to sea levels.

- Sea level rise is an issue of significance. When considered as part of the overall or combined natural hazards management that may be required for an area that is potentially severely impacted by projected sea level rise, the scale and complexity of engineering works required to enable permanent built or more intensive land use in those areas may not be sustainable.

Evaluation

The following matrices summarise the outcomes of the Panel process described above.

In some instances the previous “sub-areas” or Zones developed by Tonkin and Taylor (for the purpose of understanding the geotechnical condition of the land) have been split or merged. As a consequence the naming of the “sub-areas” or zones has been simplified to the following. These areas are shown together on the attached plan Future Land Use Types (see Appendix 2) which should be read in conjunction with this evaluation. A plan of each relevant sub-area showing a summary of potentially suitable types of uses follows each of the individual matrices, noting that these land use suggestions are not recommendations, nor are the range of future uses limited to those identified. As previously noted, less intensive activities may be possible throughout the RRZ and all future land use opportunities will require feasibility analysis:

- West Kaiapoi
- Townside
- Kaiapoi North
- Courtenay Drive
- Riverside Kaiapoi
- Riverside Courtenay
- The Pines Beach
- Kairaki

Townside (previously part of Zone 27.1 with an area of 5.7ha)**Land Area of 2.5ha** (balance of 2.7ha has been assessed in combination with Riverside Kaiapoi)**Summary of Constraints:**

Geotech Category 2 (Large-scale area wide works –minimum ranges 10,000m² to 50,000m² and/or deformation tolerant foundations)

Flooding Category 6 (Return period for extensive flooding ≤ 50 years. Suitable for land use at current level. Cannot raise without flooding green zone)

Contamination Category 1 -2 (No known contamination but potential for asbestos from demolition)

Tsunami Category 2 Within Tsunami evacuation zone

Sea Level Rise Category 1 Not directly impacted by sea level rise (note: water table rise possible)

Preliminary Assessment Only	Suitable	Technically Feasible	Technically Feasible but Not Advisable	Not Feasible	Comments
Built – residential				X	F6 category for flooding. Raising land to required level for residential redevelopment would potentially impact on the Green Zone.
Built – other e.g. commercial or industrial		✓			Could be used for an industrial building or business purpose which can tolerate flooding. Area is immediately adjacent to commercial centre. Accordingly, potential for integrated land use and high level of accessibility between activities of a business nature.
Recreation			X		A walkway is located on the top of the adjoining stopbank. The site is otherwise not currently developed or used for any other recreation facilities and the level of service analysis indicates

					limited demand for active recreation facilities in this area. Linear facilities such as a cycleway or walkway possible.
Environmental Enhancement		√			Whilst stop-banks present a constraint, opportunities for enhancement may exist immediately adjacent to the river.
Mana Whenua/Ngāi Tahu Cultural Interests			X		Whilst adjacent to river, the area is not identified as an area for mahinga kai access or of high Mana Whenua/Ngāi Tahu Cultural Interests or value.
Rural e.g., pastoral grazing, forestry, horticulture				X	Due to the location of this land parcel in the centre of Kaiapoi urban area, adjacent to the town centre, and the riparian edges of the river, rural activity is considered to represent a less efficient pattern of land use.
Infrastructure		√			Suitable for stormwater infrastructure. It was noted that Council had conducted surveys and undertaken analysis that indicated the possibility of a car park development as part of the town centre's infrastructure.

Preliminary Assessment of Land Capability and Possible Types of Future Land Use for Consideration by Decision-Makers



Legend

Land Check Colour Zones - December 2013

Red Zone Boundary

Indicative Landuse Opportunities



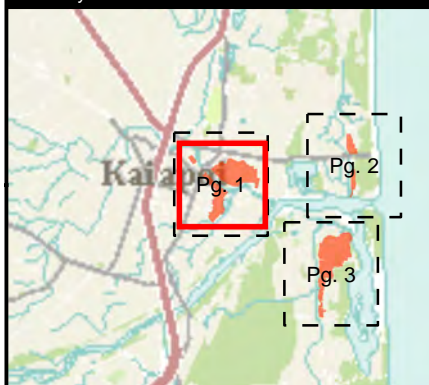
Sub-Areas Considered – Preliminary and Approximate Only



Map Purpose:

Map is a component of the Technical Theme map series produced to support the planning framework for the future use of the Residential Red Zone (FURZ).

Locality



Publication Date:
7/05/2015

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Coordinate System:
NZGD 2000 New Zealand Transverse Mercator

Map Document:
6771 - FURZ Areas - Townside.mxd
For re-prints and map production contact NorthSouth GIS:
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Riverside Kaiapoi (previously Zone 27.2 with an area of 2ha)

Land Area of approx. 5.7ha (representing 2ha from Zone 27.2 and approx. 2.7ha from Zone 17.2 – now Townside)

Summary of Constraints:

Geotech Category 3 (Large-scale area wide works only –minimum ranges 10,000m² to 50,000m²)

Flooding – Part Category 2/4 (Return period for extensive flooding varies from less than 50 years up to 200 years, raising land may be possible but requires investigation) and **Part Category 6** (Suitable for land use at current level. Cannot raise without flooding green zone)

Contamination Category 1 (No known contamination)

Tsunami 2 Within Tsunami evacuation zone

Sea Level Rise Category 1 Not directly impacted by sea level rise (note: water table rise possible)

Preliminary Assessment Only	Suitable	Technically Feasible	Technically Feasible but not Advisable	Not Feasible	Comments
Built – residential		✓ in part only excludes area of F6 land	X	X (area of F6 land only)	There was not shared agreement within the Panel that consideration of built residential development within this area was advisable. Accordingly the Table reflects that some members of the Panel considered there may be some potential for this land use (subject to further investigation as to feasibility), whilst others considered this was not advisable. The following comments record that the Panel agreed that remediation may be technically feasible (G3) requiring area wide works for lateral spread and fill for flood mitigation, but excluding the area categorised as F6. The cost of remediation works is likely to be high and will need to include mitigation to prevent flooding of the

					Green zone and may only achieve 2 rows of sections. If residential built outcomes were to be considered, further investigation would be necessary to inform feasibility.
Built – other e.g., commercial or industrial			X		Whilst a built outcome for a non-residential activity may be feasible, the area is isolated from commercial or industrial activities, with potential interface issues between business and residential activities, there is a sensitive river frontage and the area does not have a high degree of accessibility for commercial or industrial activities.
Recreation			X		A walkway is located on the top of the adjoining stopbank and rowing club facilities are present adjacent to the river. The site is otherwise not currently developed or used for any other recreation facilities and level of service analysis by Council indicates limited demand for active recreation facilities in this area. Linear recreation facilities (walkways and cycleways) possible.
Environmental Enhancement		✓			Whilst stop-banks present a constraint, the proximity of the area to the river and current regeneration of wetland vegetation indicates opportunities for riparian and biodiversity enhancement, including as part of a stormwater detention system
Mana Whenua/Ngāi Tahu Cultural Interests		✓			Close proximity to river and connectivity to the Riverside Courtenay area creates opportunities for Mana Whenua/Ngāi Tahu Cultural Interests.
Rural e.g., pastoral grazing, forestry, horticulture				X	Due to the relative small area of this land parcel and its location between residential activities and the riparian edges of the river it is considered to be a less efficient and integrated form of land use in district planning terms .

Infrastructure		√			Suitable for secondary stormwater pond, wastewater pipes, pump-station
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Preliminary Assessment of Land Capability and Possible Types of Future Land Use for Consideration by Decision-Makers



Legend

Land Check Colour Zones - December 2013

Red Zone Boundary

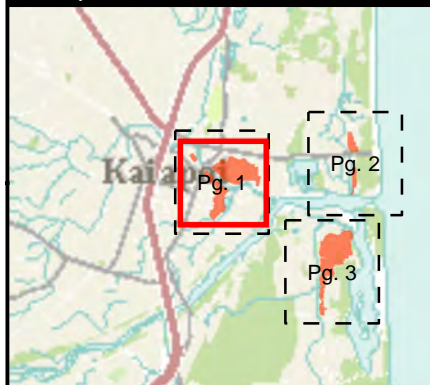
Indicative Landuse Opportunities

Sub-Areas Considered – Preliminary and Approximate Only

Map Purpose:

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Locality



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Scale:
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Coordinate System:
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Map Document:
6771 - FURZ Areas - RiversideKaiapoi.mxd
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West Kaiapoi (previously Zone 28.21)

Land Area of 2.6ha

Summary of Constraints:

Geotech Category 1 (moderate-scale area wide works –minimum 10,000m² and/or deformation tolerant foundations)

Flooding Category 6 (return period for extensive flooding ≤ 50 years. Suitable for land use at current level. Cannot raise without flooding green zone)

Contamination Category 2 (No known ground contamination but potential for asbestos contamination from demolition)

Tsunami Category 2 Within Tsunami evacuation zone

Sea Level Rise Category 1 Not directly impacted by sea level rise (note: water table rise possible)

Preliminary Assessment Only	Suitable	Technically Feasible	Technically Feasible but Not Advisable	Not Feasible	Comments
Built – residential				X	F6 category for flooding precludes this type of land use.
Built – other e.g., commercial or industrial		✓			Could be used for an industrial building or business purpose which can tolerate flooding. Area is proximate to commercial centre. Accordingly, high level of accessibility and potential for connected land use activity of a business nature.
Recreation	✓				Immediately adjacent to existing sports facilities and part of river used for rowing. Land area suitable for full-size sports field.

Environmental Enhancement		√			Location adjacent to the river presents opportunities for riparian enhancement. Note presence of archaeological values and notable tree which contribute to values and amenity of site.
Mana Whenua/Ngāi Tahu Cultural Interests			X		Adjacent to river, but site is otherwise isolated from areas of Mana Whenua/Ngāi Tahu Cultural Interests.
Rural e.g., pastoral grazing, forestry, horticulture				X	Due to the relative small area of this land parcel and its location in the centre of Kaiapoi's urban area it is considered to be a less efficient and integrated form of land use in district planning terms
Infrastructure		√			Suitable for proposed pump-station and stormwater infrastructure.

Preliminary Assessment of Land Capability and Possible Types of Future Land Use for Consideration by Decision-Makers

West Kaiapoi

- Recreation
- Commercial/Industrial activities.
where flooding mitigated/tolerated.
- Environmental Enhancement.



Legend

Land Check Colour Zones - December 2013

Red Zone Boundary

Indicative Landuse Opportunities



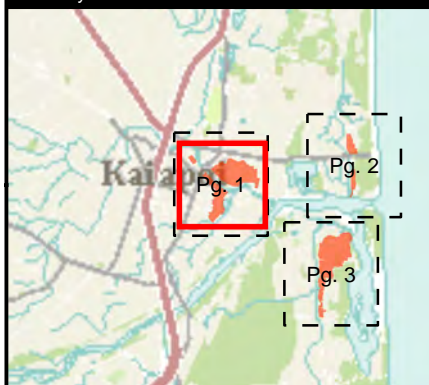
Sub-Areas Considered – Preliminary and Approximate Only



Map Purpose:

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Coordinate System:
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Map Document:
6771 - FURZ Areas - West Kaiapoi.mxd
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Kaiapoi North (previously Zone 29.41 and Zone 29.5 – these areas have been assessed as inter-dependent in terms of land use opportunity)

Land Area of 53.5ha (combined area of Zone 29.41 = 27.6ha and Zone 29.5 = 25.9ha)

Summary of Constraints:

North of Cass Street:

Geotech Category 2 (large scale area wide works –minimum ranges 10,000m² to 50,000m² and/or deformation tolerant foundations)

Flooding Category 2/4 (Return period for extensive flooding varies from less than 50 years up to 200 years, raising land may be possible but requires investigation)

Contamination Category 2 (No known ground contamination but potential for asbestos contamination from demolition)

Tsunami Category 2 Within Tsunami evacuation zone

Sea Level Rise Category 1 Not directly impacted by sea level rise (note: water table rise possible)

South of Cass Street:

Geotech Category 4 (very large scale area wide works –minimum ranges 50,000m² to 100,000m²)

Flooding Category 2/4 (Return period for extensive flooding varies from less than 50 years up to 200 years, raising land may be possible but requires investigation)

Contamination Category 2 (No known ground contamination but potential for asbestos contamination from demolition)

Tsunami Category 2 Within Tsunami evacuation zone

Sea Level Rise Category 1 Not directly impacted by sea level rise (note: water table rise possible)

Preliminary Assessment Only	Suitable	Technically Feasible	Technically Feasible but Not Advisable	Not Feasible	Comments
Built – residential		✓ (North of Cass Street, subject. Potential would be subject to further investigation of feasibility)	X (South of Cass Street)		<p>The area south of Cass Street, considered on its own, poses a lateral spread risk which is greater than the land to the north. Whilst building is potentially technically feasible, the degree of engineering intervention required along with the potential to increase flood risk in the Green zoned area to the northwest, resulted in a conclusion that a built outcome is not advisable in this location.</p> <p>The area can however potentially be considered part of a comprehensive land use solution for all of the area identified as Kaiapoi North.</p> <p>If the area north of Cass Street were to be considered for a built residential future use, it is likely to require more than 1.0m of fill as part of the engineering works to prepare the ground for use. If developed on its own, and without off-set within the catchment, raising the land would potentially impact on flooding across adjoining Green zoned land.</p> <p>The area north of Cass Street could potentially be remediated <u>provided</u> the area south of Cass Street (adjacent to the river) is used for the purpose of stormwater detention and management and the off-setting of potential flooding effects, particularly any flooding effects that potentially affect the adjoining Green zoned land. This large area could also potentially accommodate large open space recreation activities as well as provide for biodiversity enhancement.</p> <p>Considering this area as a whole therefore provides an opportunity for cut and fill to be managed for the purpose of</p>

					<p>flood off-set. This would require a comprehensive investigation as to feasibility but creates a wider range of land use opportunities. As an example, the mitigation of ground conditions may create opportunities for:</p> <ul style="list-style-type: none"> - built outcomes for residential purposes (with variable density having regard to the extent of the area and its interface with rural zoned land) and - built outcomes for large-scale commercial buildings appropriately located adjacent to the town centre - the stormwater detention area could in turn provide opportunity for wetland/biodiversity enhancement, recreational opportunities and - infrastructure such as stopbanks.
Built – other e.g., commercial or industrial		√ (in part only)			<p>Subject to same requirement for remediation for built residential outcome (above) in terms of off-setting flood mitigation. The WDC advises that land for commercial/industrial activities is not in short supply. There is however a high degree of connectivity at the <u>west end of RRZ</u> to the town centre which could support some limited business use.</p>
Recreation		√			<p>Whilst suitable for recreation activities, the area of land available is large and consideration would need to have regard to Council analysis of level of service. Analysis currently indicates low demand for recreation facilities in this location. Recreation opportunities likely to involve activities requiring large open space, walking or cycling. Area south of Cass Street does offer a high degree of connectivity to the river which may present some new recreation opportunities.</p>

Environmental Enhancement		√			<p>Although stopbanks are a constraint, location adjacent to river presents opportunities for riparian enhancement.</p> <p>Remnant trees from residential gardens contribute environmental and amenity values.</p> <p>Recorded archaeological sites are present in the area and there are also likely to be unrecorded sites. The value of these sites is not anticipated to be high.</p>
Mana Whenua/Ngāi Tahu Cultural Interests		√			<p>Mana Whenua/Ngāi Tahu Cultural interests and activities may be a possible, but the area not identified as having high cultural values. Environmental enhancements would contribute to Mana Whenua/Ngāi Tahu Cultural interests and values.</p>
Rural e.g., pastoral grazing, forestry, horticulture		√			<p>Adjacent to rural edge. Land could be amalgamated with rural land to the east.</p>
Infrastructure		√			<p>WDC infrastructure options involve the realignment of roads and installation of stormwater infrastructure. If consideration is given to other land use opportunities this infrastructure could be further investigated to assess potential for integration.</p>

Preliminary Assessment of Land Capability and Possible Types of Future Land Use for Consideration by Decision-Makers



Kaipoi North

Wide range of possible land uses. These are further widened if comprehensive approach to remediation of land is considered.


Possible options include:

- Residential at variable densities north of Cass Street. Could locate lower density (lifestyle blocks) to east.
- Large footprint commercial/industrial buildings to west.
- Integrate land extensive recreation, stormwater mitigation or environmental enhancements in area south of Cass Street.



Legend

Land Check Colour Zones - December 2013

 Red Zone Boundary

Indicative Landuse Opportunities



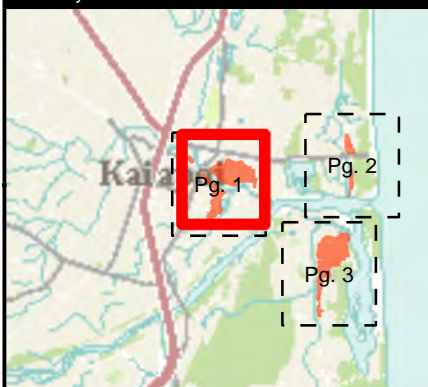
 Sub-Areas Considered – Preliminary and Approximate



Map Purpose:

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Locality



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7/05/2015

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Coordinate System:

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Map Document:

6771 - FURZ Areas - Kaipoi North.mxd

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Courtenay Drive (previously Zone 27.3 and Zone 27.42 +Upper Terrace of previous Zone 27.41 these areas are considered to be inter-dependent in terms of land use opportunity)

Land Area of approximately 10.8ha

Summary of Constraints

Geotech – Part Category 1 (Large scale area wide works –minimum ranges 10,000m² to 50,000m² and/or deformation tolerant foundations) and **Part Category 3** (Large-scale area wide works only –minimum ranges 10,000m² to 50,000m²)

Flooding Category 2/4 (Return period for extensive flooding varies from less than 50 years up to 200 years, raising land may be possible but requires investigation)

Contamination Category 1 (No known ground contamination)

Tsunami Category 2 Within Tsunami evacuation zone

Sea Level Rise Category 1 Not directly impacted by sea level rise (note: water table rise possible)

Preliminary Assessment Only	Suitable	Technically Feasible	Technically Feasible but Not advisable	Not Feasible	
Built – residential		✓ Potential would be subject to further investigation of feasibility			Location has strong connectivity with adjoining residential area and infrastructure. Combined land hazards potentially able to be effectively mitigated/managed but requires further investigation as to feasibility.

Built – other e.g., commercial or industrial			X		Whilst technically feasible to establish business activities, the area is isolated from other business activities and may not represent an efficient pattern of land use from a district plan perspective.
Recreation			X		Technical analysis of level of service indicates no local or strategic recreation benefits to be gained from locating recreation facilities in this area.
Environmental Enhancement			X		Land previously modified with fill with no pre-existing ecological values with which to connect or further develop.
Mana Whenua/Ngāi Tahu Cultural Interests			X		Land not identified as having high cultural values and has low riparian access in respect of Mana Whenua/Ngāi Tahu Cultural Interests.
Rural e.g., pastoral grazing, forestry, horticulture			X		Due to the location of this land parcel between residential activities and the riparian edges of the river rural activities are is considered to be a less efficient and integrated form of land use in district planning terms.
Infrastructure		√			WDC infrastructure options involve the realignment of roads and installation of water and stormwater infrastructure. Should consideration be given to other land use opportunities these options could be further investigated.

Preliminary Assessment of Land Capability and Possible Types of Future Land Use for Consideration by Decision-Makers



Legend

Land Check Colour Zones - December 2013

Red Zone Boundary

Indicative Landuse Opportunities

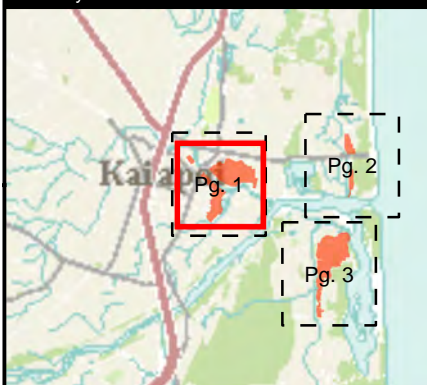


Sub-Areas Considered – Preliminary and Approximate Only

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Map Document:
6771 - FURZ Areas - CourtenayDrive.mxd
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Riverside Courtenay (previously part of Zone 27.41, excludes land at top of terrace which could be amalgamated with Courtenay Drive from a land use perspective)

Land Area of approximately 9.8ha

Summary of Constraints

Geotech Category 4 (Very large scale area wide works –minimum ranges 50,000m² to 100,000m²)

Flooding Category 2/4 (Return period for extensive flooding varies from less than 50 years up to 200 years, raising land may be possible but requires investigation)

Contamination Category 1 (No known ground contamination)

Tsunami Category 2 Within Tsunami evacuation zone

Sea Level Rise Category 1 Not directly impacted by sea level rise (note: water table rise possible)

Preliminary Assessment Only	Suitable	Technically Feasible	Technically Feasible but Not Advisable	Not Feasible	Comments
Built – residential				X	Whilst technically feasible to establish residential activities, there are significant challenges presented by mitigation of the combined hazards of geotech (G4) and flooding (F2/4).
Built – other e.g., commercial or industrial			X		Whilst technically feasible to establish business activities, there are significant challenges presented by combined geotech (G4) and flood hazard (F2/4). The area is also isolated from other business activities making it less efficient from a district planning perspective.

Recreation			X		The level of service analysis suggests limited demand for local or strategic active recreation facilities in this area. May however be suitable for linear facilities such as a cycleway or walkway.
Environmental Enhancement		√			Location adjacent to river and recreation lake provides opportunity for environmental enhancement.
Mana Whenua/Ngāi Tahu Cultural Interests	√				Area considered to be of high cultural value due to ability to enhance mahinga kai access and plant taonga species over a wider area, enhancing the extent and continuity of habitat.
Rural e.g., pastoral grazing, forestry, horticulture			X		Due to the location of this land parcel between urban development and the riparian edges of the river rural activities are considered to be a less efficient and integrated form of land use in district planning terms
Infrastructure		√			Potential to accommodate infrastructure. None currently proposed.

Preliminary Assessment of Land Capability and Possible Types of Future Land Use for Consideration by Decision-Makers



Legend

Land Check Colour Zones - December 2013

Red Zone Boundary

Indicative Landuse Opportunities



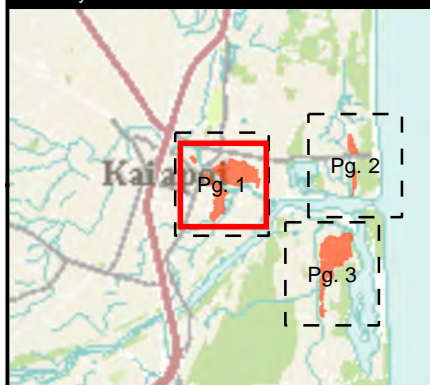
Sub-Areas Considered – Preliminary and Approximate Only



Map Purpose:

Map is a component of the Technical Theme map series produced to support the planning framework for the future use of the Residential Red Zone (FURZ).

Locality



Publication Date:
4/06/2015

Scale:
1:10,000
(Original sheet size A4)

Disclaimer:
This map is a static output of depicted layers and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

Coordinate System:
NZGD 2000 New Zealand Transverse Mercator

Map Document:
6771 - FURZ Areas - RiversideCourtenay.mxd
For re-prints and map production contact NorthSouth GIS:
Servicedesk@nsgnz.co.nz

The Pines Beach (Previously Zone 30.1)

Land Area of 9ha

Summary of Constraints

Geotech –Category 1 (moderate scale area wide works –minimum 10,000m² and/or deformation tolerant foundations)

Flooding Category 2/4 (Return period for extensive flooding varies from less than 50 years up to 200 years, raising land may be possible but requires investigation)

Contamination Category 2 (No known ground contamination but potential for asbestos from demolition)

Tsunami Category 2 Inside Tsunami evacuation zone

Sea Level Rise Category 3 Area impacted by shoreline retreat due to passive inundation

Preliminary Assessment Only	Suitable	Technically Feasible	Technically Feasible but Not Advisable	Not Feasible	Comments
Built – residential				X	S3 category for sea level rise. Permanent capital investment not sustainable. Note that geotech and flooding conditions may be slightly more favourable than Kairaki, however sea level rise will affect groundwater conditions and would require further investigation to understand how this could be effectively mitigated.
Built – other e.g., commercial or				X	F3 category for sea level rise. Permanent capital investment not sustainable.

Industrial					
Recreation		√			Contains existing reserve. Opportunity is limited to local recreation purposes. The Council's analysis of level of service indicates further investment in recreation facilities in this location unlikely.
Environmental Enhancement		√			Proximity and connectivity to Tūhaitara Coastal Reserve creates opportunity for environmental enhancements to be extended.
Mana Whenua/Ngāi Tahu Cultural Interests	√				Recognised area of high cultural values and mahinga kai access point. Presence of Statutory Acknowledgements ⁴ and the Tūhaitara Coastal Reserve creates opportunities for establishment of Taonga species
Rural e.g., pastoral grazing, forestry, horticulture		√			The western side of The Pines Beach RRZ adjoins and provides opportunity to use land for rural activities.
Infrastructure		√			Suitable for proposed pump-station

⁴ See Ngai Tahu Claims Settlement Act

Preliminary Assessment of Land Capability and Possible Types of Future Land Use for Consideration by Decision-Makers

- Rural


The Pines Beach

- Recreation
- Environmental Enhancement.
- Mana Whenua/Ngai Tahu Cultural Interests

0 100 200 400 600 Meters

Legend

Land Check Colour Zones - December 2013

 Red Zone Boundary

Indicative Landuse Opportunities



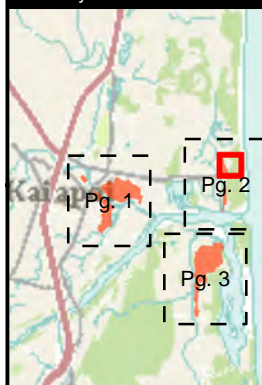
Sub-Areas Considered – Preliminary and Approximate Only



Map Purpose:

Map is a component of the Technical Theme map series produced to support the planning framework for the future use of the Residential Red Zone (FURZ).

Locality



Publication Date:

4/06/2015

Scale:

1:8,000

(Original sheet size A4)

Disclaimer:

This map is a static output of depicted layers and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

Coordinate System:

NZGD 2000 New Zealand Transverse Mercator

Map Document:

6771 - FURZ Areas - Pines.mxd

For re-prints and map production contact NorthSouth GIS:
Servicedesk@nsgnz.co.nz

Kairaki (Previously Zone 31.1)

Land Area of 5.8ha

Summary of Constraints

Geotech –Category 2 (Large scale area wide works –minimum 10,000m² - 50,000m² and/or deformation tolerant foundations)

Flooding Category 2/4 (Return period for extensive flooding varies from less than 50 years up to 200 years, raising land may be possible but requires investigation)

Contamination Category 2 (No known ground contamination but potential for asbestos from demolition)

Tsunami Category 2 Inside Tsunami evacuation zone

Sea Level Rise Category 3 Area impacted by shoreline retreat due to passive inundation

Preliminary Assessment Only	Suitable	Technically Feasible	Technically Feasible but Not Advisable	Not Feasible	Comments
Built – residential				X	S3 category for sea level rise. Permanent buildings/intensification in capital investment not sustainable.
Built – other e.g., commercial or industrial				X	S3 category for sea level rise. Intensification in built outcomes not sustainable.
Recreation	✓				Location has high/regional strategic recreation values due to proximity to Tūhaitara Coastal Reserve and access to Waimakariri River mouth. There is opportunity to strengthen recreational

					<p>values. Provides only access to the river mouth.</p> <p>Geotech conditions do not preclude the design and engineering of low value buildings related to recreation activities.</p>
Environmental Enhancement	✓				<p>High potential for ecological and biodiversity gains due to location adjacent to creek, Waimakariri River, Tūhaitara Coastal Reserve.</p> <p>River mouth acknowledged as area of potential archaeological value.</p>
Mana Whenua/Ngāi Tahu Cultural Interests	✓				<p>Recognised area of high cultural values and mahinga kai access point. Presence of Statutory Acknowledgements, Tūhaitara Coastal Reserve, opportunities for establishment of Taonga species.</p>
Rural e.g., pastoral grazing, forestry, horticulture		✓			<p>Able to be amalgamated with rural activities to the west.</p>
Infrastructure		✓			<p>Infrastructure required to support camping ground and recreation activities.</p>

Preliminary Assessment of Land Capability and Possible Types of Future Land Use for Consideration by Decision-Makers




Kairaki

- Recreation
- Environmental Enhancement.
- Mana Whenua/Ngai Tahu Cultural Interests

0 100 200 400 600 Meters

Legend

Land Check Colour Zones - December 2013

 Red Zone Boundary

Indicative Landuse Opportunities



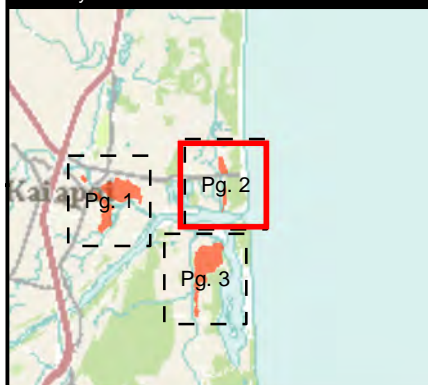
Sub-Areas Considered – Preliminary and Approximate Only



Map Purpose:

Map is a component of the Technical Theme map series produced to support the planning framework for the future use of the Residential Red Zone (FURZ).

Locality



Publication Date:

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Disclaimer:

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Coordinate System:

NZGD 2000 New Zealand Transverse Mercator

Map Document:

6771 - FURZ Areas - Kairaki.mxd

For re-prints and map production contact NorthSouth GIS:
Servicedesk@nsgnz.co.nz

Summary

The combination of mapping and expert assessment provides an overview of the varying capabilities and values of different parts of the RRZ within Waimakariri District.

The following table summarises those possible land use types that were assessed as being potentially suitable for the land conditions noting that these land use suggestions are not recommendations, nor are the range of future uses limited to those identified. As previously noted, less intensive activities may be possible throughout the RRZ and all future land use opportunities will require feasibility analysis:

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The Panel concluded that in some cases, amalgamating remediation “sub-zones” opened up wider opportunities for future land use types. For example, this is demonstrated in Kaiapoi North where the Panel noted that the more geotechnically challenging land to the south of Cass Street could be used to offset the potential effects of possible new built land use in the area north of Cass Street.

This area could accommodate a variety of residential densities (depending on feasibility of remediation potential this could range from rural-residential to more traditional suburban density) or in respect of land to the west being remediated with potential for large floor plate commercial buildings next to the town centre.

Use of the land to the south of Cass Street for stormwater management could also be combined with recreation activities and/or biodiversity enhancement.

The relationship of adjoining land uses may also create opportunities where there are particular values present (e.g., indigenous vegetation, waterbodies) or continuity with the adjoining activity may be possible e.g., rural activities.

Area of Opportunity	Area	Suitable or Technically Feasible For:
West Kaiapoi	Approx 2.6ha	Recreation Environmental Enhancement Commercial/industrial where flooding mitigated/tolerated
Townside	Approx 2.5ha	Environmental Enhancement Commercial/industrial where flooding mitigated/tolerated
Kaiapoi North	Approx 53.5ha	Mixed land use outcomes possible. Possible potential for built outcomes north of Cass Street, including residential activity at variable densities e.g., lower density residential to the east. Recreation and stormwater mitigation and associated environmental enhancement south of Cass Street. Possible area of commercial/industrial large footprint, to the west, adjacent to the town centre.
Courtenay Drive	Approx 10.8ha	Possible potential for built residential (Note that other activities are possible, but not technically as well rated in the evaluation)
Riverside Kaiapoi	Approx 5.2ha	Mana Whenua/Ngāi Tahu Cultural Interests Environmental Enhancement Possible built outcomes, excluding the area where F6 flood remediation category applies. (Note: Whilst the Panel agreed that it may be possible to remediate part of this land for built outcomes, there was variation in the view as to whether this was advisable)
Riverside Courtenay	Approx 9.8ha	Mana Whenua/Ngāi Tahu Cultural Interests Environmental Enhancement
The Pines Beach	Approx. 9.0ha	Mana Whenua/Ngāi Tahu Cultural Interests Environmental Enhancement Rural Recreation
Kairaki	Approx 5.8ha	Recreation Mana Whenua/Ngāi Tahu Cultural Interests Environmental Enhancement Rural

Statutory Considerations

Should any further or more in-depth analysis of the feasibility of the land for particular activities be undertaken, the Panel makes note of the following statutory matters which may influence feasibility and should be taken into account.

- Disturbance to an archaeological site protected by the Historic Places Act 1993/Heritage New Zealand Pouhere Taonga 2014 (i.e., a site of human occupation prior to 1900, that can be investigated by archaeological methods) requires an archaeological authority from Heritage New Zealand Pouhere Taonga.
- The process for consideration and implementation of all future land use options should anticipate the statutory requirements of the Heritage New Zealand Pouhere Taonga Act 2014 and the time and costs required for this regulatory process to be worked through.
- The process for consideration and implementation of all future land use options should anticipate the statutory requirements of the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2011 and the time required for this and other regulatory processes (i.e., regional plan requirements) to be worked through. Whilst this is unlikely to prevent a particular land use type it may add significantly to the construction costs and consenting challenges. This may affect the nature and scale of future land use options that are feasible.

Key Considerations:

The Panel has identified the following matters of importance for consideration by persons evaluating potential future use opportunities, or for consideration by decision-makers.

Kaiapoi

- The combined and cumulative effect of the geotechnical condition of the land and its flooding vulnerability are the most significant determinants of opportunities for future use in Kaiapoi.
- Within Kaiapoi, future land uses on F6 zoned land are considered to be limited to uses which can leave the land at its present level and are able to tolerate flooding.
- There are two areas where it may be possible to consider more intensive or built future land uses – being Kaiapoi North and Courtenay Drive (as shown on the attached map). At present however, there is insufficient information to understand if it would be feasible to develop these areas. A further scope of work would be required to inform this involving a land use planning and feasibility analysis undertaken by relevant experts.
- Any further investigation as to future land use suitability should include assessment in respect of the provisions of the Mahaanui Iwi Management Plan 2013.
- Investigation of future use opportunities in Kaiapoi North may be optimised by consideration of a comprehensive approach to land use as explained in the Summary above.

- Where remediation for built outcomes is technically possible, it is only likely to be economically feasible where the costs of the remediation work can be recovered by land uses of higher value or economies of scale.

Sea Level Rise Effects

- The effect of sea level rise significantly limits the potential for long term intensive land use in The Pines Beach and Kairaki. When sea level rise is considered as part of the overall or combined natural hazards management that may be required for an area that is potentially severely impacted by projected sea level rise, the scale and complexity of engineering works required to enable permanent buildings may not be sustainable.

Recreation

- The area surrounding the Waimakariri River mouth is of regional significance for outdoor recreation.

Natural Environment

- Areas of existing indigenous vegetation and habitat for indigenous fauna on adjoining land and the presence of waterbodies are fundamental criteria when considering the suitability of RRZ land for environmental enhancement and the potential for biodiversity gain.
- The NES process provides for human health. Ecological health must still be considered as part of implementing future uses.

Contamination

- Public perception of contamination may also influence land use decisions, particularly if asbestos is involved. The absence of known ground contamination in Kaiapoi RRZ may not reflect its actual status. ECan has not completed a review of aerial photography to identify historic land use with potential to create contaminants.

Appendix 1 – Technical Panel Terms of Reference

FUTURE USE OF THE RESIDENTIAL RED ZONES - WAIMAKARIRI DISTRICT

TECHNICAL ADVISORY PANEL

TERMS OF REFERENCE

Purpose of the Technical Advisory Panel

The purpose of the Technical Advisory Panel (the Panel) is to provide professional advice that will assist understanding of the physical capability of the land within the Residential Red Zones, and the range of possible types of future land use that could be sustained on that land. (Refer Appendix 1 for background).

The Panel has been formed by the Canterbury Earthquake Recovery Authority (CERA) in agreement with strategic partner organisations: Te Rūnanga o Ngāi Tahu, the Waimakariri District Council and Environment Canterbury (ECan).

Membership of the Panel

The Panel will comprise a CERA facilitator and advisors with experience and authority in relevant areas of expertise, including:

- Geotechnical engineering (CERA)
- Hydrogeology (CERA)
- Contamination (CERA and ECan)
- Cultural values (Te Rūnanga o Ngāi Tahu)
- Archaeology and heritage (CERA)
- Recreation (CERA and Waimakariri District Council)
- Flooding (CERA and ECan)
- Sea level rise (CERA and ECan)
- Strategic Council-owned infrastructure (Waimakariri District Council).

A list of the Panel members is attached as Appendix 2. In order to ensure continuity of advice, these individuals may not be represented by alternate individuals during the term of the Panel.

It is anticipated that particular environmental or strategic data sets may be more determinative of future use options (eg ability to remediate land or flood depth and vulnerability). Accordingly, particular experts may be constant members of the panel, whilst others may only be required to contribute at specific times, as appropriate. This will be determined by the Panel facilitator, having regard to the physical characteristics and features of the area of the Residential Red Zones being considered.

Scope of the Panel's Role

The Technical Advisory Panel will complete the following tasks:

- confirm the adequacy and suitability of the data shown on maps prepared in GIS by CERA for use by the Technical Advisory Panel
- work together in a workshop forum to discuss and analyse the data as shown on the GIS maps
- spatially identify areas suitable for broad types of land use – built, natural, recreation, infrastructure/utilities and commercial (non-built)
- identify, at a broad geographical level, the constraints and opportunities for use of the land
- identify critical or fundamental technical assumptions that need to be considered by decision-makers. (These assumptions may also assist the communication and understanding of fundamental constraints and opportunities in stakeholder and community engagement processes.)

The Technical Advisory Panel will not:

- undertake detailed investigation of the land
- select specific end uses or future use projects
- make any decisions relating to the future use of the Residential Red Zones.

The individual members of the Technical Advisory Panel are expected to provide an independent view that reflects their area of professional expertise.

Outputs

The outputs of the Technical Advisory Panel will comprise:

- maps identifying at a broad geographical level, the areas suitable for broad types of land use. (The number and scale of the maps will be determined by the Technical Advisory Panel.)
- a compendium of maps with the base layers that informed the final overview map of land use suitability
- a short, high-level report recording the process followed by the Panel and its final overview map of land use suitability
- a list of assumptions that should be considered by decision-makers on future use.

These outputs are for the purpose of providing integrated, technical advice and are not intended to represent the corporate view of the individual strategic partner organisations.

Panel workshops

The Technical Advisory Panel will meet as required and organised by CERA.

The role of the facilitator is to:

- Facilitate workshops
- Report to the Waimakariri Working Group and the Waimakariri Steering Group on the progress of the Technical Advisory Panel
- To provide the point of liaison with the strategic partners.

The Technical Advisory Panel will work collaboratively and in good faith to provide integrated advice in the form of the outputs identified above. The Panel will operate by consensus and voting will not take place.

Workshop attendance will be limited to the agreed Panel members. Additional attendees will not be permitted, other than at an initial briefing of the Technical Advisory Panel where members of the Waimakariri Working Group may be present.

Confidentiality

All data, discussions and analysis undertaken within workshops shall remain confidential to the strategic partners.

The outputs of the Technical Advisory Panel shall remain confidential to the strategic partners until a process of release and a communications plan is agreed by the strategic partners.

Appendix 1 - Background

The responsibility of presenting recommendations to the Minister and Cabinet on possible options for the future use of the Residential Red Zones lies with the Canterbury Earthquake Recovery Authority.

One of the workstreams associated with the Future Use of the Residential Red Zones project involves the collation and analysis of information and data concerning:

- the physical characteristics and condition of the land
- environmental, cultural, ecological and heritage values; and
- Waimakariri District Council's strategic assets and utilities.

This information will be mapped using GIS, enabling the layering of different land characteristics, conditions and values along with strategic Council owned assets. This will provide an informed and factual basis for identifying areas of constraint or opportunity and provide an overview of different parts of the Residential Red Zones. At a high level, it will provide a preliminary indication of the proportion of the land area that may be available for different types of land use.

This spatial analysis forms only one of the inputs required for the decision-making process for future use options. This spatial analysis will be complemented by inputs from strategic partner engagement, community engagement, policy, legal and regulatory considerations.

Appendix 2 - Ngāi Tahu Claims Settlement Act Extracts

Schedule 97
Taonga species
Birds

s 287

Name in Māori	Name in English	Scientific name
Hoiho	Yellow-eyed penguin	<i>Megadyptes antipodes</i>
Kāhu	Australasian harrier	<i>Circus approximans</i>
Kākā	South Island kākā	<i>Nestor meridionalis meridionalis</i>
Kākāpō	Kākāpō	<i>Strigops habroptilus</i>
Kākāriki	New Zealand parakeet	<i>Cyanoramphus</i> spp
Kakaruai	South Island robin	<i>Petroica australis australis</i>
Kakī	Black stilt	<i>Himantopus novaezelandiae</i>
Kāmana	Crested grebe	<i>Podiceps cristatus</i>
Kārearea	New Zealand falcon	<i>Falco novaeseelandiae</i>
Karoro	Black-backed gull	<i>Larus dominicanus</i>
Kea	Kea	<i>Nestor notabilis</i>
Kōau	Black shag	<i>Phalacrocorax carbo</i>
	Pied shag	<i>Phalacrocorax varius varius</i>
	Little shag	<i>Phalacrocorax melanoleucos brevirostris</i>
Koekoeā	Long-tailed cuckoo	<i>Eudynamys taitensis</i>
Kōparapara or Korimako	Bellbird	<i>Anthornis melanura melanura</i>
Kororā	Blue penguin	<i>Eudyptula minor</i>
Kōtare	Kingfisher	<i>Halcyon sancta</i>
Kōtuku	White heron	<i>Egretta alba</i>
Kōwhiowhio	Blue duck	<i>Hymenolaimus malacorhynchos</i>
Kūaka	Bar-tailed godwit	<i>Limosa lapponica</i>

Name in Māori	Name in English	Scientific name
Kūkupa/Kererū	New Zealand wood pigeon	<i>Hemiphaga novaeseelandiae</i>
Kuruwhengu/Kuruwhengi	New Zealand shoveller	<i>Anas rhynchotis</i>
Mātā	Fernbird	<i>Bowdleria punctata punctata</i> and <i>Bowdleria punctata stewartiana</i> and <i>Bowdleria punctata wilsoni</i> and <i>Bowdleria punctata candata</i>
Matuku moana	Reef heron	<i>Egretta sacra</i>
Miromiro	South Island tomtit	<i>Petroica macrocephala macrocephala</i>
Miromiro	Snares Island tomtit	<i>Petroica macrocephala dannefaerdi</i>
Mohua	Yellowhead	<i>Mohoua ochrocephala</i>
Pākura/Pūkeko	Swamp hen/Pūkeko	<i>Porphyrio porphyrio</i>
Pārera	Grey duck	<i>Anas superciliosa</i>
Pateke	Brown teal	<i>Anas aucklandica</i>
Pīhoihoi	New Zealand pipit	<i>Anthus novaeseelandiae</i>
Pipīwharauaroa	Shining cuckoo	<i>Chrysococcyx lucidus</i>
Pīwakawaka	South Island fantail	<i>Rhipidura fuliginosa fuliginosa</i>
Poaka	Pied stilt	<i>Himantopus himantopus</i>
Pokotiwaha	Snares crested penguin	<i>Eudyptes robustus</i>
Pūtakitaki	Paradise shelduck	<i>Tadorna variegata</i>
Riroriro	Grey warbler	<i>Gerygone igata</i>
Roroa	Great spotted kiwi	<i>Apteryx haastii</i>
Rowi	Ōkārito brown kiwi	<i>Apteryx mantelli</i>
Ruru koukou	Morepork	<i>Ninox novaeseelandiae</i>
Takahē	Takahē	<i>Porphyrio mantelli</i>

Name in Māori	Name in English	Scientific name
Tara	Terns	<i>Sterna</i> spp
Tawaki	Fiordland crested penguin	<i>Eudyptes pachyrhynchus</i>
Tete	Grey teal	<i>Anas gracilis</i>
Tieke	South Island saddleback	<i>Philesturnus carunculatus carunculatus</i>
Titi	Sooty shearwater/Muttonbird/Hutton's shearwater Common diving petrel South Georgian diving petrel Westland petrel Fairy prion Broad-billed prion White-faced storm petrel Cook's petrel Mottled petrel	<i>Puffinus griseus</i> and <i>Puffinus huttoni</i> and <i>Pelecanoides urinatrix</i> and <i>Pelecanoides georgicus</i> and <i>Procellaria westlandica</i> and <i>Pachyptila turtur</i> and <i>Pachyptila vittata</i> and <i>Pelagodroma marina</i> and <i>Pterodroma cookii</i> and <i>Pterodroma inexpectata</i>
Titipounamu	South Island rifleman	<i>Acanthisitta chloris chloris</i>
Tokoeka	South Island brown kiwi	<i>Apteryx australis</i>
Toroa	Albatrosses and Mollymawks	<i>Diomedea</i> spp
Toutouwai	Stewart Island robin	<i>Petroica australis rakiura</i>
Tūi	Tūi	<i>Prothemadera novaeseelandiae</i>
Tutukiwi	Snares Island snipe	<i>Coenocorypha aucklandica huegeli</i>
Weka	Western weka	<i>Gallirallus australis australis</i>

Name in Māori	Name in English	Scientific name
Weka	Stewart Island weka	<i>Gallirallus australis scotti</i>
Weka	Buff weka	<i>Gallirallus australis hectori</i>

Plants

Name in Māori	Name in English	Scientific name
Akatorotoro	White rata	<i>Metrosideros perforata</i>
Aruhe	Fernroot (bracken)	<i>Pteridium aquilinum</i> var <i>esculentum</i>
Harakeke	Flax	<i>Phormium tenax</i>
Horoeka	Lancewood	<i>Pseudopanax</i> <i>crassifolius</i>
Houhi	Mountain ribbonwood	<i>Hoheria lyalli</i> and <i>H. glabata</i>
Kahikatea	Kahikatea/White pine	<i>Dacrycarpus</i> <i>dacrydioides</i>
Kāmahi	Kāmahi	<i>Weinmannia racemosa</i>
Kānuka	Kānuka	<i>Kunzia ericoides</i>
Kāpuka	Broadleaf	<i>Griselinia littoralis</i>
Karaeopirita	Supplejack	<i>Ripogonum scandens</i>
Karaka	New Zealand laurel/Karaka	<i>Corynocarpus</i> <i>laevigata</i>
Karamū	Coprosma	<i>Coprosma robusta</i> , <i>coprosma lucida</i> , <i>coprosma foetidissima</i>
Kātote	Tree fern	<i>Cyathea smithii</i>
Kiekie	Kiekie	<i>Freycinetia baueriana</i> subsp <i>banksii</i>
Kōhia	NZ Passionfruit	<i>Passiflora tetrandia</i>
Korokio	Korokio Wire-netting bush	<i>Corokia cotoneaster</i>

Name in Māori	Name in English	Scientific name
Koromiko/Kōkōmuka	Koromiko	<i>Hebe salicifolia</i>
Kōtukutuku	Tree fuchsia	<i>Fuchsia excorticata</i>
Kōwahi Kōhai	Kōwhai	<i>Sophora microphylla</i>
Mamaku	Tree fern	<i>Cyathea medullaris</i>
Mānia	Sedge	<i>Carex flagellifera</i>
Mānuka Kahikātoa	Tea-tree	<i>Leptospermum scoparium</i>
Māpou	Red matipo	<i>Myrsine australis</i>
Mataī	Mataī/Black pine	<i>Prumnopitys taxifolia</i>
Miro	Miro/Brown pine	<i>Podocarpus ferrugineus</i>
Ngaio	Ngaio	<i>Myoporum laetum</i>
Nīkau	New Zealand palm	<i>Rhopalostylis sapida</i>
Pānako	(Species of fern)	<i>Asplenium obtusatum</i>
Pānako	(Species of fern)	<i>Botrychium australe</i> and <i>B. biforme</i>
Pātōtara	Dwarf mingimingi	<i>Leucopogon fraseri</i>
Pīngao	Pīngao	<i>Desmoschoenus spiralis</i>
Pōkākā	Pōkākā	<i>Elaeocarpus hookerianus</i>
Ponga/Poka	Tree fern	<i>Cyathea dealbata</i>
Rātā	Southern rātā	<i>Metrosideros umbellata</i>
Raupō	Bulrush	<i>Typha angustifolia</i>
Rautāwhiri/Kōhūhū	Black matipo/Māpou	<i>Pittosporum tenuifolium</i>
Rimu	Rimu/Red pine	<i>Dacrydium cypressinum</i>
Rimurapa	Bull kelp	<i>Durvillaea antarctica</i>
Taramea	Speargrass, spaniard	<i>Aciphylla</i> spp

Name in Māori	Name in English	Scientific name
Tarata	Lemonwood	<i>Pittosporum eugenioides</i>
Tawai	Beech	<i>Nothofagus</i> spp
Tētēaweke	Muttonbird scrub	<i>Olearia angustifolia</i>
Tī rākau/Tī Kōuka	Cabbage tree	<i>Cordyline australis</i>
Tikumu	Mountain daisy	<i>Celmisia spectabilis</i> and <i>C. semicordata</i>
Tītoki	New Zealand ash	<i>Alectryon excelsus</i>
Toatoa	Mountain Toatoa, Celery pine	<i>Phyllocladus alpinus</i>
Toetoe	Toetoe	<i>Cortaderia richardii</i>
Tōtara	Tōtara	<i>Podocarpus totara</i>
Tutu	Tutu	<i>Coriaria</i> spp
Wharariki	Mountain flax	<i>Phormium cookianum</i>
Whīnau	Hīnau	<i>Elaeocarpus dentatus</i>
Wī	Silver tussock	<i>Poa cita</i>
Wīwī	Rushes	<i>Juncus</i> all indigenous <i>Juncus</i> spp and <i>J. maritimus</i>

Marine mammals

Name in Māori	Name in English	Scientific name
Ihupuku	Southern elephant seal	<i>Mirounga leonina</i>
Kekeno	New Zealand fur seals	<i>Arctocephalus forsteri</i>
Paikea	Humpback whales	<i>Megaptera novaeangliae</i>
Parāoa	Sperm whale	<i>Physeter macrocephalus</i>
Rāpoka/Whakahao	New Zealand sea lion/Hooker's sea lion	<i>Phocarctos hookeri</i>
Tohorā	Southern right whale	<i>Balaena australis</i>

Schedule 100

ss 205, 312, 313

**Statutory acknowledgement for Te Tai
o Marokura (Kaikōura Coastal Marine
Area)****Statutory area**

The area to which this statutory acknowledgement applies is Te Tai o Marokura (the Kaikōura Coastal Marine Area), the Coastal Marine Area of the Kaikōura constituency of the former Nelson Marlborough region, as shown on SO 14497, Marlborough Land District, extended northwards (but not eastwards) to the Takiwā of Ngāi Tahu Whānui, such boundary determined in the same manner as for the northern boundary of the Ngāi Tahu Claim Area, as shown on Allocation Plan NT 505 (SO 19901).

Preamble

Under section 313, the Crown acknowledges Te Rūnanga o Ngāi Tahu's statement of Ngāi Tahu's cultural, spiritual, historic, and traditional association to Te Tai o Marokura as set out below.

Ngāi Tahu association with Te Tai o Marokura

The formation of the coastline of Te Wai Pounamu relates to the tradition of Te Waka o Aoraki, which foundered on a submerged reef, leaving its occupants, Aoraki and his brothers, to turn to stone. They are manifested now in the highest peaks in the Kā Tiritiri o Te Moana (the Southern Alps). The bays, inlets, estuaries and fiords which stud the coast are all the creations of Tū Te Rakiwhānoa, who took on the job of making the island suitable for human habitation.

For Ngāi Tahu, traditions such as these represent the links between the cosmological world of the gods and present generations. These histories reinforce tribal identity and solidarity, and continuity between generations, and document the events which shaped the environment of Te Wai Pounamu and Ngāi Tahu as an iwi.

The Kaikōura Coastline took its name from Tama Ki Te Rangī, an early explorer in the time of Tamatea Pōkaiwhenua, who decided to explore the South Island. On his way from the North Island, Tama ki Te Rangī stopped in the area now known as Kaikōura and ate some of the crayfish that populate the area over an open fire. From Tama Ki

Te Rangi's feast on crayfish, the area was named, Te Ahi Kaikōura a Tama ki Te Rangi—the fires where Tama Ki Te Rangi ate crayfish.

Because of its attractiveness as a place to establish permanent settlements, including pā (fortified settlements), the coastal area was visited and occupied by Waitaha, Ngāti Mamoe and Ngāi Tahu in succession, who through conflict and alliance, have merged in the whakapapa (genealogy) of the Ngāi Tahu Whānui. Battle sites, urupā and landscape features bearing the names of tūpuna (ancestors) record this history. Prominent headlands, in particular, were favoured for their defensive qualities and became the headquarters for a succession of rangatira and their followers.

One of the leading sites in Kaikōura in pre-contact times was Takahaka marae, which is still occupied by Ngāi Tahu. From the time the Ngāi Tahu leader Maru Kaitātea took Takahaka Pā for Ngāi Tahu occupation, the site acted as a staging site for Ngāi Tahu migrations further south. Other pā in the area included Pariwhakatau, Mikonui, Ōaro and Kahutara. Place names along the coast, such as the gardens of Tamanuhiri and the Waikōau River, record Ngāi Tahu history and point to the landscape features which were significant to people for a range of reasons.

The results of the struggles, alliances and marriages arising out of these migrations were the eventual emergence of a stable, organised and united series of hapū located at permanent or semi-permanent settlements along the coast, with an intricate network of mahinga kai (food gathering) rights and networks that relied to a large extent on coastal resources.

As well as the crayfish for which the area is famous, the whole of the Kaikōura area offered a bounty of mahinga kai including a range of kaimoana (sea food); sea fishing; eeling and harvesting of other freshwater fish in lagoons and rivers; marine mammals (providing whale meat and seal pups); waterfowl, sea bird egg gathering and forest birds; and a variety of plant resources including harakeke (flax), fern and tī root.

A particular feature of the Ngāi Tahu relationship with the Kaikōura coastal area is the special connection with the whales which frequent the area. This relationship has its basis in tradition. The well-known rangatira (chief) and brave warrior of the Kāti Kurī hapū of Ngāi Tahu, Te Rakaitauneke, was said to have a kaitiaki whale, named Mata mata, who dwelt in the sea opposite Te Rakaitauneke's home

in Tāhuna Tōrea (Goose Bay). Mata mata's sole duty and purpose in life was to do Te Rakaitauneke's bidding, to serve all his needs and to guard him against harm. Everywhere Te Rakaitauneke went, Mata mata went too. When Te Rakaitauneke went to Takahanga, Mata mata could be seen blowing outside the garden of memories, as close to shore as he could possibly get. Te Rakaitauneke's love for Mata mata was as great as the whale's love for him.

After Te Rakaitauneke's death, Mata mata was not seen along the Kaikōura coast for some time, and it was rumoured that he had gone away and died of sorrow at the loss of his master. There were those, however, who remembered Te Rakaitauneke's prediction that after his death Mata mata would only return when one of his descendants was facing imminent danger or death. There are many stories since that time of a Mata mata appearing to foretell the death of one of Te Rakaitauneke's descendants. It is also said that many of the descendants of Te Rakaitauneke, when faced with peril on the high seas, have been saved by the timely intervention of a whale.

The Kaikōura coast was also a major highway and trade route, particularly in areas where travel by land was difficult. Travel by sea between settlements and hapū was common, with a variety of different forms of waka, including the southern waka hunua (double-hulled canoe) and, post-contact, whale boats plying the waters continuously. Hence tauranga waka (landing places) occur up and down the coast in their hundreds and wherever a tauranga waka is located there is also likely to be a nohoanga (settlement), fishing ground, kaimoana resource and rimurapa (bull kelp), with the sea trail linked to a land trail or mahinga kai resource. The tūpuna had a huge knowledge of the coastal environment and weather patterns, passed from generation to generation. This knowledge continues to be held by whānau and hapū and is regarded as a taonga. The traditional mobile lifestyle of the people led to their dependence on the resources of the coast.

Numerous urupā are being exposed or eroded at various times along much of the coast. Water burial sites on the coast, known as wai-whakaheketūpāpaku, are also spiritually important and linked with important sites on the land. Places where kaitāngata (the eating of those defeated in battle) occurred are also wāhi tapu. Urupā are the resting places of Ngāi Tahu tūpuna and, as such, are the focus for whānau traditions. These are places holding the memories, trad-

itions, victories and defeats of Ngāi Tahu tūpuna, and are frequently protected in secret locations.

The mauri of the coastal area represents the essence that binds the physical and spiritual elements of all things together, generating and upholding all life. All elements of the natural environment possess a life force, and all forms of life are related. Mauri is a critical element of the spiritual relationship of Ngāi Tahu Whānui with the coastal area.

Purposes of statutory acknowledgement

Pursuant to section 215 and without limiting the rest of this schedule, the only purposes of this statutory acknowledgement are—

- (a) to require that consent authorities forward summaries of resource consent applications to Te Rūnanga o Ngāi Tahu as required by regulations made pursuant to section 207 (clause 12.2.3 of the deed of settlement); and
- (b) to require that consent authorities, Heritage New Zealand Pouhere Taonga, or the Environment Court, as the case may be, have regard to this statutory acknowledgement in relation to Te Tai o Marokura, as provided in sections 208 to 210 (clause 12.2.4 of the deed of settlement); and
- (c) to enable Te Rūnanga o Ngāi Tahu and any member of Ngāi Tahu Whānui to cite this statutory acknowledgement as evidence of the association of Ngāi Tahu to Te Tai o Marokura as provided in section 208 (clause 12.2.5 of the deed of settlement).

Limitations on effect of statutory acknowledgement

Except as expressly provided in sections 208 to 211, 213 and 215,—

- (a) this statutory acknowledgement does not affect, and is not to be taken into account in, the exercise of any power, duty, or function by any person or entity under any statute, regulation, or bylaw; and
- (b) without limiting paragraph (a), no person or entity, in considering any matter or making any decision or recommendation under any statute, regulation, or bylaw, may give any greater or lesser weight to Ngāi Tahu's association to Te Tai o Marokura (as described in this statutory acknowledgement) than that person or entity would give under the relevant statute, regulation,

or bylaw, if this statutory acknowledgement did not exist in respect of Te Tai o Marokura.

Except as expressly provided in this Act, this statutory acknowledgement does not affect the lawful rights or interests of any person who is not a party to the deed of settlement.

Except as expressly provided in this Act, this statutory acknowledgement does not, of itself, have the effect of granting, creating, or providing evidence of any estate or interest in, or any rights of any kind whatsoever relating to, Te Tai o Marokura.

Schedule 100: amended, on 20 May 2014, by section 107 of the Heritage New Zealand Pouhere Taonga Act 2014 (2014 No 26).

Schedule 101

ss 205, 312, 313

**Statutory acknowledgement for Te Tai
o Mahaanui (Selwyn – Banks Peninsula
Coastal Marine Area)**

Statutory area

The statutory area to which this statutory acknowledgement applies is Te Tai o Mahaanui (Selwyn – Banks Peninsula Coastal Marine Area), the Coastal Marine Area of the Selwyn – Banks Peninsula constituency of the Canterbury region, as shown on SO Plan 19407, Canterbury Land District as shown on Allocation Plan NT 505 (SO 19901).

Preamble

Under section 313, the Crown acknowledges Te Rūnanga o Ngāi Tahu's statement of Ngāi Tahu's cultural, spiritual, historic, and traditional association to Te Tai o Mahaanui as set out below.

Ngāi Tahu association with Te Tai o Mahaanui

The formation of the coastline of Te Wai Pounamu relates to the tradition of Te Waka o Aoraki, which foundered on a submerged reef, leaving its occupants, Aoraki and his brothers, to turn to stone. They are manifested now in the highest peaks in the Kā Tiritiri o Te Moana (the Southern Alps). The bays, inlets, estuaries and fiords which stud the coast are all the creations of Tū Te Rakiwhānoa, who took on the job of making the island suitable for human habitation.

The naming of various features along the coastline reflects the succession of explorers and iwi (tribes) who travelled around the coastline at various times. The first of these was Māui, who fished up the North Island, and is said to have circumnavigated Te Wai Pounamu. In some accounts the island is called Te Waka a Māui in recognition of his discovery of the new lands, with Rakiura (Stewart Island) being Te Puka a Māui (Māui's anchor stone). A number of coastal place names are attributed to Māui, particularly on the southern coast.

There are a number of traditions relating to Te Tai o Mahaanui. One of the most famous bays on the Peninsula is Akaroa, the name being a southern variation of the word "Whangaroa". The name refers to the size of the harbour. As with all other places in the South Island, Akaroa placenames recall the histories and traditions of the

three tribes which now make up Ngāi Tahu Whānui: Waitaha, Ngāti Mamoe and Ngāi Tahu.

Waitaha traditions tell that after Rakaihautu had dug the southern lakes with his *kō* (a tool similar to a spade)—Tūwhakarōria—he and his son, Rokohouia, returned to Canterbury with their people. On the return, Rakaihautu buried his *kō* (a tool similar to a spade) on a hill overlooking the Akaroa harbour. That hill was called Tuhiraki (Bossu). Rakaihautu remained in this region for the rest of his life.

For Ngāi Tahu, traditions such as these represent the links between the cosmological world of the gods and present generations. These histories reinforce tribal identity and solidarity, and continuity between generations, and document the events which shaped the environment of Te Wai Pounamu and Ngāi Tahu as an *iwi*.

Because of its attractiveness as a place to establish permanent settlements, including *pā* (fortified settlements), the coastal area was visited and occupied by Waitaha, Ngāti Mamoe and Ngāi Tahu in succession, who through conflict and alliance, have merged in the *whakapapa* (genealogy) of Ngāi Tahu Whānui. Battle sites, *urupā* and landscape features bearing the names of *tūpuna* (ancestors) record this history. Prominent headlands, in particular, were favoured for their defensive qualities and became the headquarters for a succession of *rangatira* and their followers.

Ngāi Tahu connections to Akaroa came after the settling of Kaiapoi Pa in North Canterbury. Akaroa harbour was soon allocated to a number of chiefs by Tūrākautahi of Kaiapoi. One chief, Te Ruahikihiki, settled at Whakamoa near the Akaroa Heads at the south east end of the harbour. Te Ruahikihiki fell in love with the elder sister of his wife, Hikaiti. As it was customary at that time for chiefs to have several wives, Te Ruahikihiki took the elder sister, Te Ao Taurewa, as his wife.

Hikaiti fell into a deep depression and resolved to kill herself. She arose early in the morning, combed her hair and wrapped her cloak tightly around herself. She went to the edge of the cliff where she wept and greeted the land and the people of her tribe. With her acknowledgements made, she cast herself over the cliff where she was killed on the rocks. The body remained inside the cloak she had wrapped around herself. This place became known as Te Tarere a Hikaiti (the place where Hikaiti leapt). After a long period of lamen-

tation, Te Ruahikihiki and his people moved to the south end of Banks Peninsula to Te Waihora (Lake Ellesmere).

Another one of the senior chiefs within the Akaroa harbour was Te Ake whose hapū was Ngāi Tuhaitara. Ōtokotoko was claimed by Te Ake when he staked his tokotoko (staff) at that end of the bay. Te Ake's daughter, Hine Ao, is now represented as a taniwha that dwells with another taniwha, Te Rangiorahina, in a rua (hole) off Opukutahi Reserve in the Akaroa Harbour. Hine Ao now carries the name Te Wahine Marukore. These taniwha act as (kaitiaki) guardians for local fisherman.

The results of the struggles, alliances and marriages arising out of these migrations were the eventual emergence of a stable, organised and united series of hapū located at permanent or semi-permanent settlements along the coast, with a intricate network of mahinga kai (food gathering) rights and networks that relied to a large extent on coastal resources.

The whole of the coastal area offered a bounty of mahinga kai, including a range of kaimoana (sea food); sea fishing; eeling and harvest of other freshwater fish in lagoons and rivers; marine mammals providing whale meat and seal pups; waterfowl, sea bird egg gathering and forest birds; and a variety of plant resources, including harakeke (flax), fern and tī root.

The coast was also a major highway and trade route, particularly in areas where travel by land was difficult. Travel by sea between settlements and hapū was common, with a variety of different forms of waka, including the southern waka hunua (double-hulled canoe) and, post-contact, whale boats plying the waters continuously. Hence tauranga waka occur up and down the coast in their hundreds and wherever a tauranga waka is located there is also likely to be a nohoanga (settlement), fishing ground, kaimoana resource, rimurapa (bull kelp) with the sea trail linked to a land trail or mahinga kai resource. The tūpuna had a huge knowledge of the coastal environment and weather patterns, passed from generation to generation. This knowledge continues to be held by whānau and hapū and is regarded as a taonga. The traditional mobile lifestyle of the people led to their dependence on the resources of the coast.

Numerous urupā are being exposed or eroded at various times along much of the coast. Water burial sites on the coast, known as wai-whakaheketūpāpaku, are also spiritually important and linked with

important sites on the land. Places where kaitāngata (the eating of those defeated in battle) occurred are also wāhi tapu. Urupā are the resting places of Ngāi Tahu tūpuna and, as such, are the focus for whānau traditions. These are places holding the memories, traditions, victories and defeats of Ngāi Tahu tūpuna, and are frequently protected in secret locations.

The mauri of the coastal area represents the essence that binds the physical and spiritual elements of all things together, generating and upholding all life. All elements of the natural environment possess a life force, and all forms of life are related. Mauri is a critical element of the spiritual relationship of Ngāi Tahu Whānui with the coastal area.

Purposes of statutory acknowledgement

Pursuant to section 215 and without limiting the rest of this schedule, the only purposes of this statutory acknowledgement are—

- (a) to require that consent authorities forward summaries of resource consent applications to Te Rūnanga o Ngāi Tahu as required by regulations made pursuant to section 207 (clause 12.2.3 of the deed of settlement); and
- (b) to require that consent authorities, Heritage New Zealand Pouhere Taonga, or the Environment Court, as the case may be, have regard to this statutory acknowledgement in relation to Te Tai o Mahaanui, as provided in sections 208 to 210 (clause 12.2.4 of the deed of settlement); and
- (c) to enable Te Rūnanga o Ngāi Tahu and any member of Ngāi Tahu Whānui to cite this statutory acknowledgement as evidence of the association of Ngāi Tahu to Te Tai o Mahaanui as provided in section 211 (clause 12.2.5 of the deed of settlement).

Limitations on effect of statutory acknowledgement

Except as expressly provided in sections 208 to 211, 213, and 215,—

- (a) this statutory acknowledgement does not affect, and is not to be taken into account in, the exercise of any power, duty, or function by any person or entity under any statute, regulation, or bylaws; and
- (b) without limiting paragraph (a), no person or entity, in considering any matter or making any decision or recommendation

under any statute, regulation, or bylaw, may give any greater or lesser weight to Ngāi Tahu's association to Te Tai o Mahaanui (as described in this statutory acknowledgement) than that person or entity would give under the relevant statute, regulation, or bylaw, if this statutory acknowledgement did not exist in respect of Te Tai o Mahaanui.

Except as expressly provided in this Act, this statutory acknowledgement does not affect the lawful rights or interests of any person who is not a party to the deed of settlement.

Except as expressly provided in this Act, this statutory acknowledgement does not, of itself, have the effect of granting, creating, or providing evidence of any estate or interest in, or any rights of any kind whatsoever relating to, Te Tai o Mahaanui.

Schedule 101: amended, on 20 May 2014, by section 107 of the Heritage New Zealand Pouhere Taonga Act 2014 (2014 No 26).
