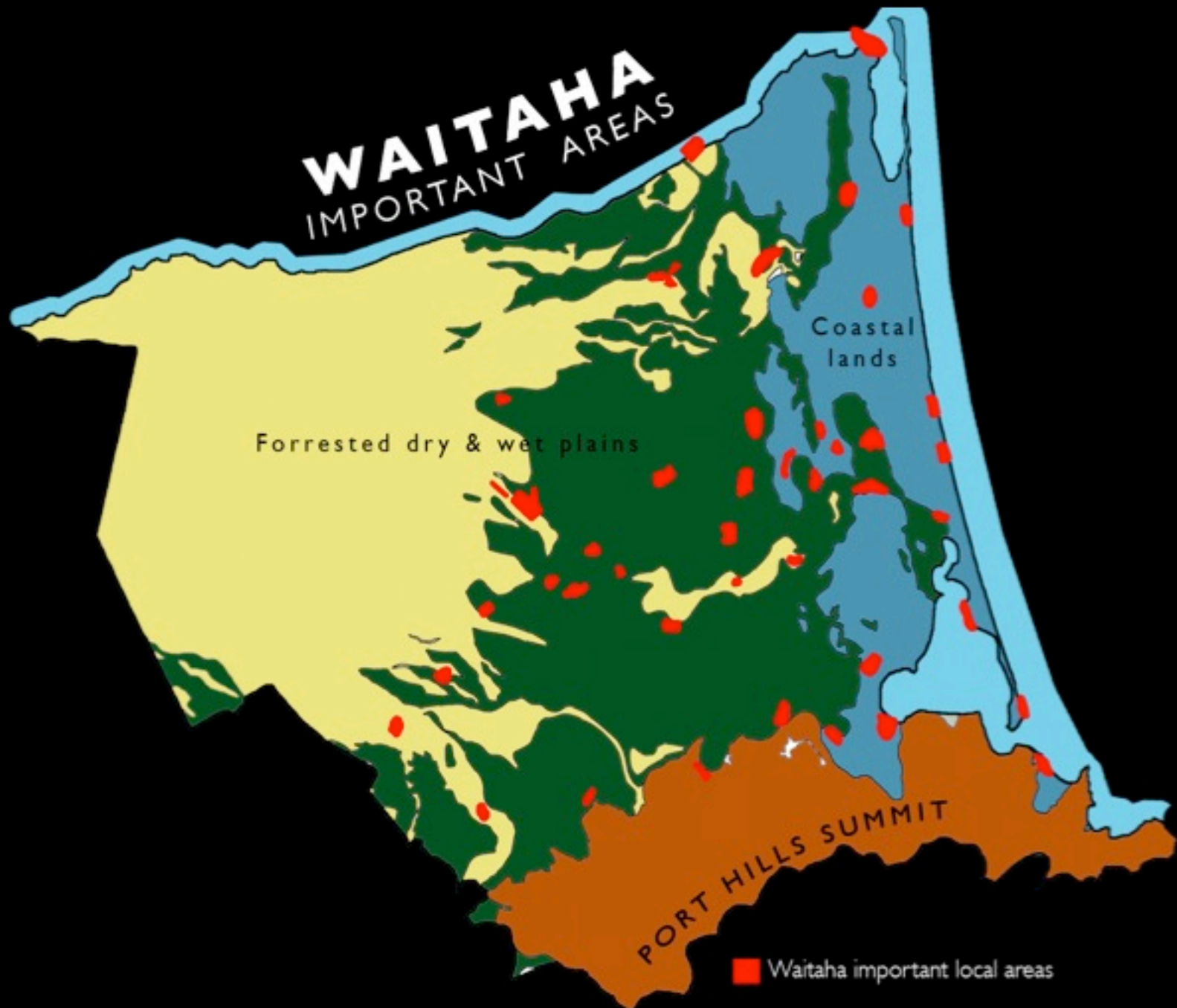


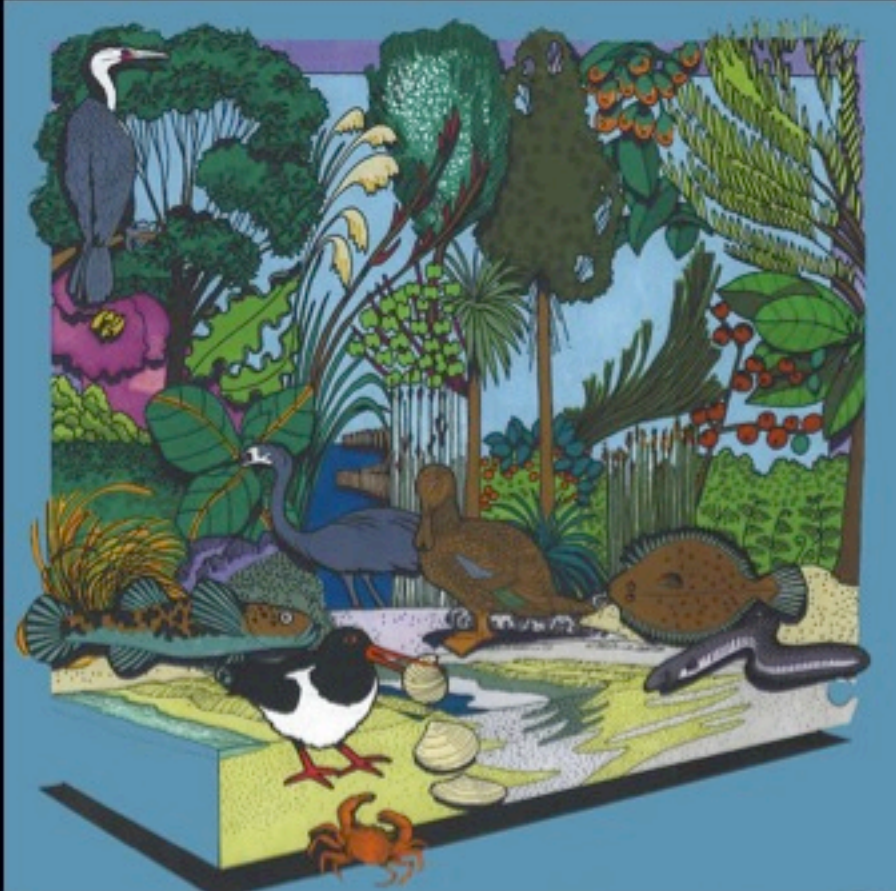
C H A N G E in Eastern L a n d s c a p e s

Di Lucas, Landscape Architect

WAITAHA IMPORTANT AREAS



Coastal Plains Ecosystem



THE COAST

- | | |
|------------------------------------|--------------------------------|
| 1 tunnelling mud crab | <i>Helice crassa</i> |
| 2 South Island pied oystercatcher | <i>Haematopus finschi</i> |
| 3 common bully | |
| 4 penguin | <i>Deinotomus spiralis</i> |
| 5 sand coprosma | <i>Coprosma acerosa</i> |
| 6 marsh ribbonwood | <i>Plagianthus divaricatus</i> |
| 7 taupata leaves | <i>Coprosma repens</i> |
| 8 taupata hedge | |
| 9 tauhinu | <i>Orothamnus leptophylla</i> |
| 10 poroporo | <i>Solanum laciniatum</i> |
| 11 akiraho or golden akeake leaves | <i>Olearia paniculata</i> |
| 12 pied shag/cormorant | <i>Phalacrocorax varius</i> |
| 13 ngaio | <i>Myoporum laetum</i> |
| 14 toetoe flowers | <i>Cortaderia richardii</i> |
| 15 manuka | <i>Leptospermum scoparium</i> |
| 16 harakeke or flax flowers | <i>Phormium tenax</i> |
| 17 scrambling pohutukawa leaves | <i>Muaellenbeckia complexa</i> |
| 18 oioi or jointed wire rush | <i>Leptocarpus similis</i> |
| 19 white faced heron | <i>Ardea novaehollandiae</i> |
| 20 hono or NZ shoveller | <i>Anas rhynchotis</i> |
| 21 tuangi/baiki or cockle | <i>Austrovenus stutchburyi</i> |
| 22 pipi | <i>Paphies australis</i> |
| 23 kakaha or bush flax | <i>Astelia fragrans</i> |
| 24 karame leaves and fruit | <i>Coprosma robusta</i> |
| 25 ti kouka or cabbage tree | <i>Cordyline australis</i> |
| 26 manatu or lowland ribbonwood | <i>Plagianthus regius</i> |
| 27 karaka leaves and fruit | <i>Corynocarpus laevigatus</i> |
| 28 NZ broom | <i>Carmichaelia australis</i> |
| 29 wisi or giant rush | <i>Juncus pallidus</i> |
| 30 patiki or sand flounder | <i>Rhombosolea plebia</i> |
| 31 tana heke or short finned eel | <i>Anguilla australis</i> |
| 32 rahurahu or bracken fern | <i>Pteridium esculentum</i> |
| 33 thick-leaved mikimiki | <i>Coprosma crassifolia</i> |
| 34 red fruited karame | <i>Coprosma rhamnoides</i> |
| 35 kapuka or broadleaf leaves | <i>Griselinia littoralis</i> |
| 36 akeake | <i>Dodonaea viscosa</i> |

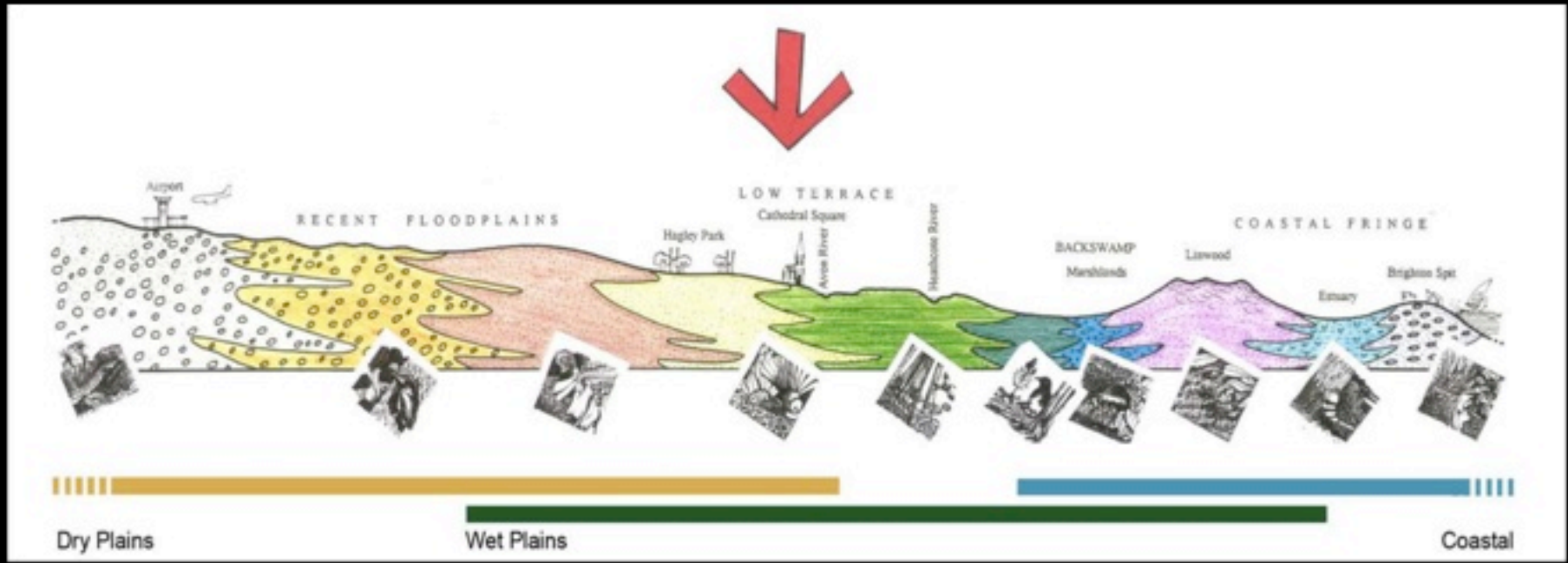
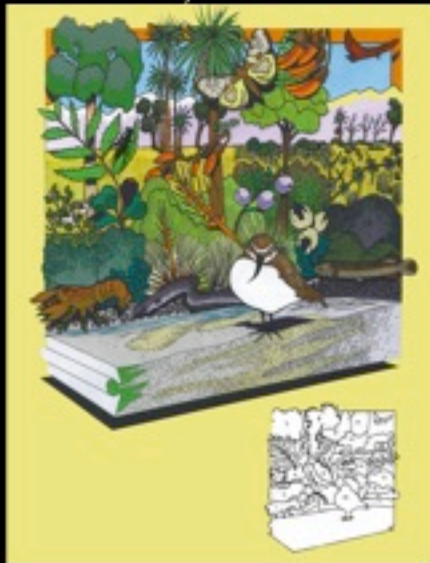


Dry Plains

Wet Plains

Coastal

Port Hills



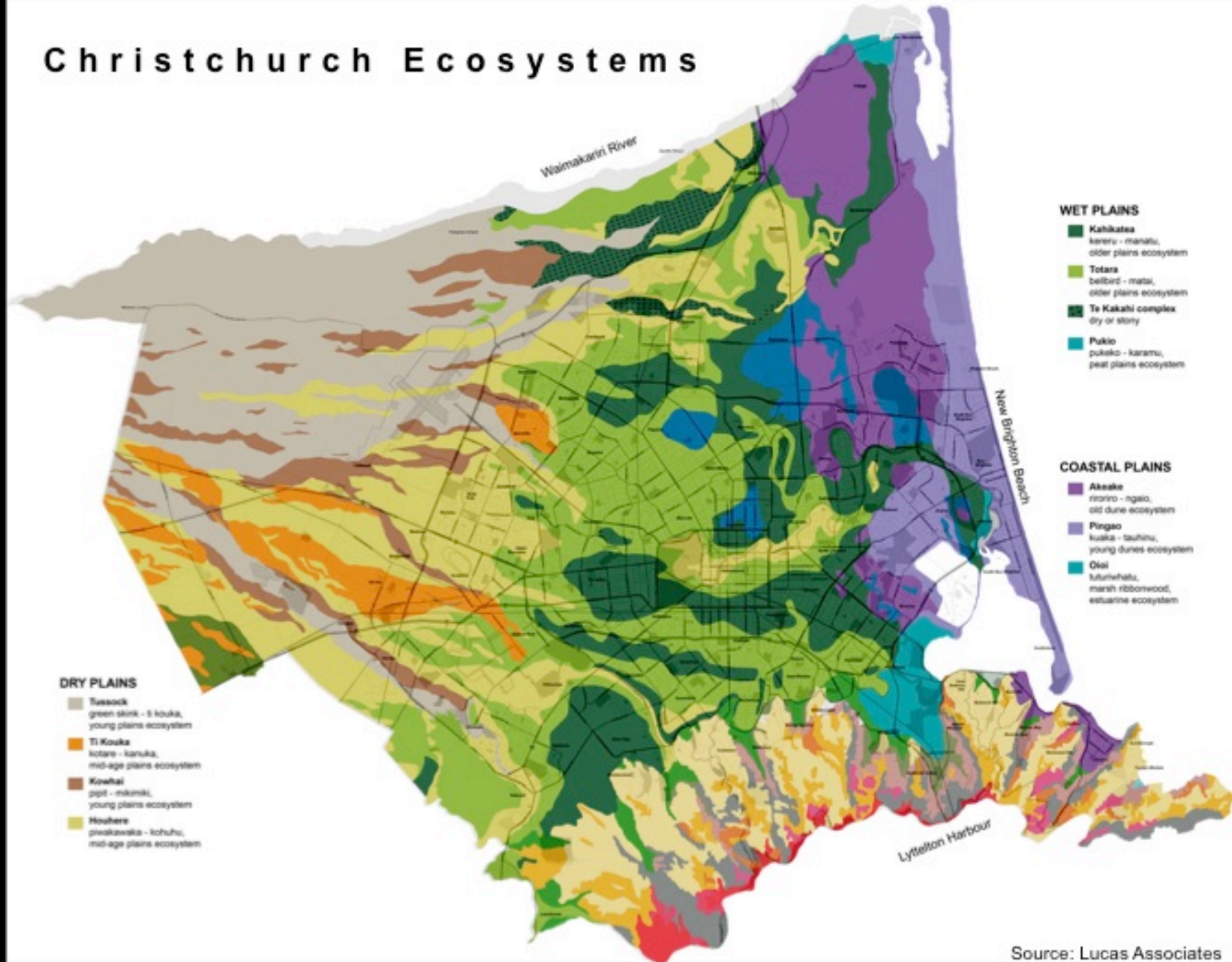
Native Plant Guide

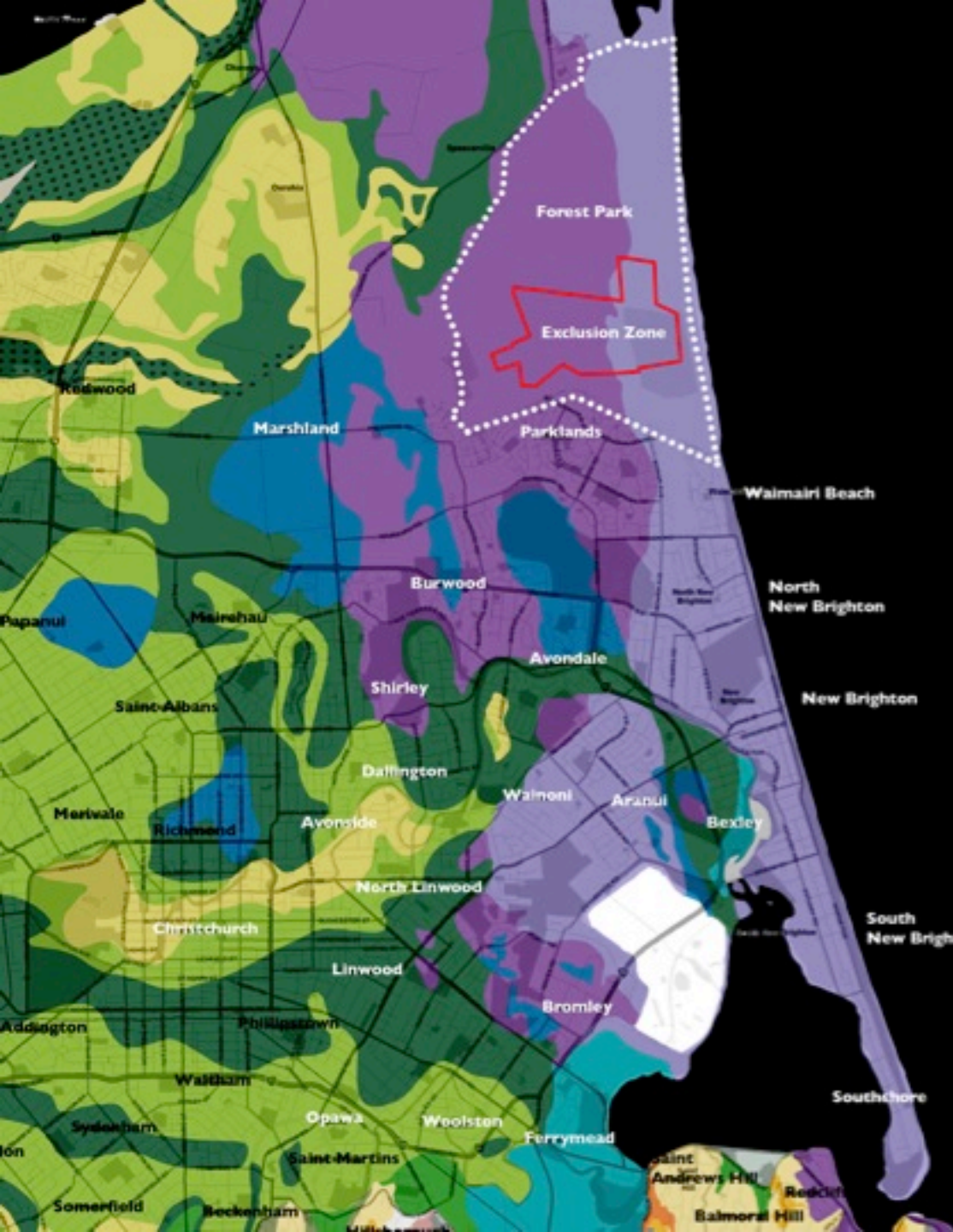
The coastal plains of
Hagley-Ferrymead &
Burwood-Pegasus

INDIGENOUS ECOSYSTEMS OF OTAUTAHI CHRISTCHURCH



Christchurch Ecosystems





WET PLAINS

- **Kahikatea**
kareru - manatu,
older plains ecosystem
- **Totara**
belbird - matai,
older plains ecosystem
- **Te Kakahi complex**
dry or stony
- **Pukio**
pukeko - karamu,
peat plains ecosystem

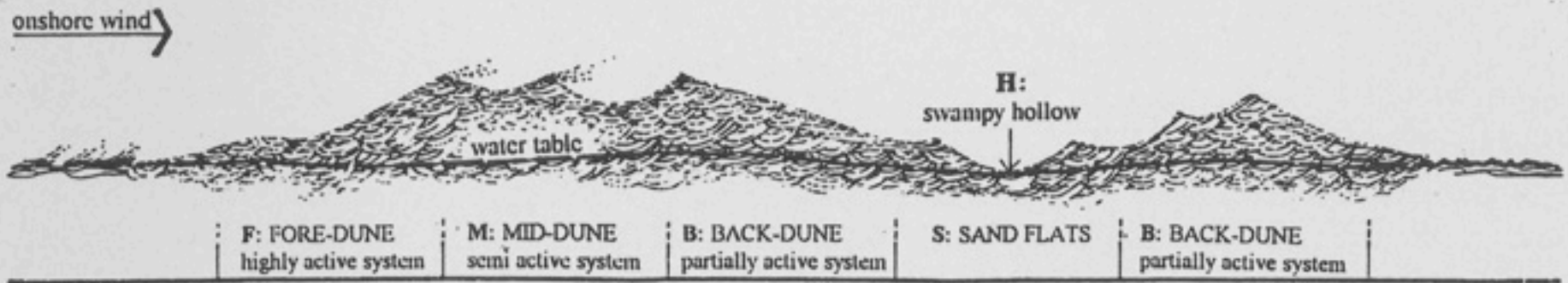
Wet Plains:
 Marshland
 Dallington
 Avonside
 Avondale
 Linwood
 Phillipstown
 Opawa
 Woolston
 Bexley

COASTAL PLAINS

- **Akeake**
riroriro - ngaio,
old dune ecosystem
- **Pingao**
kuaka - tauhinu,
young dunes ecosystem
- **Oioi**
tuturiwhatu,
marsh ribbonwood,
estuarine ecosystem

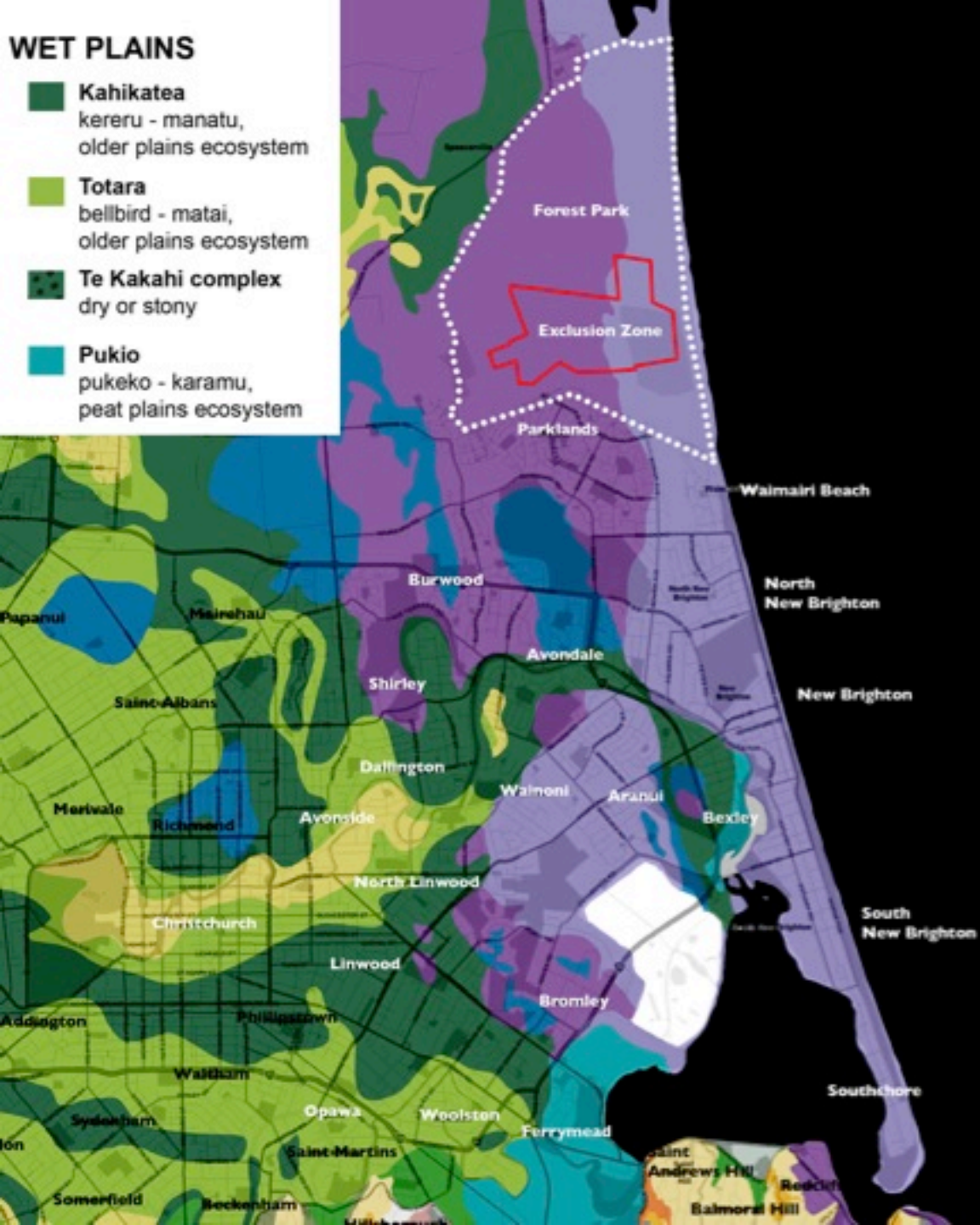
Coastal Plains:
 Parklands
 Burwood
 Shirley
 Waimairi Beach
 North New Brighton
 New Brighton
 South New Brighton
 Wainoni
 Aranui
 Bromley
 Southshore
 Ferrymead

Fore, mid & back-dunes (e.g. Brighton) & inter-dune sand flat (e.g. Aranui)



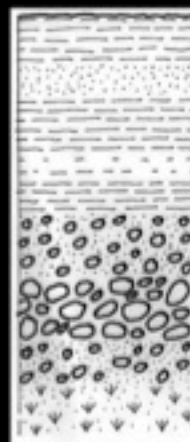
WET PLAINS

- Kahikatea**
kereru - manatu,
older plains ecosystem
- Totara**
bellbird - matai,
older plains ecosystem
- Te Kakahi complex**
dry or stony
- Pukio**
pukeko - karamu,
peat plains ecosystem



Wet Plains Soils

K a h i k a t e a



Underlayers: Clay & sand alternating on silt over greywacke river stones (2-100mm rounded) with some peat.

T o t a r a



Underlayers: Alternating silt, sand & clay on greywacke river stones (2-100mm rounded).

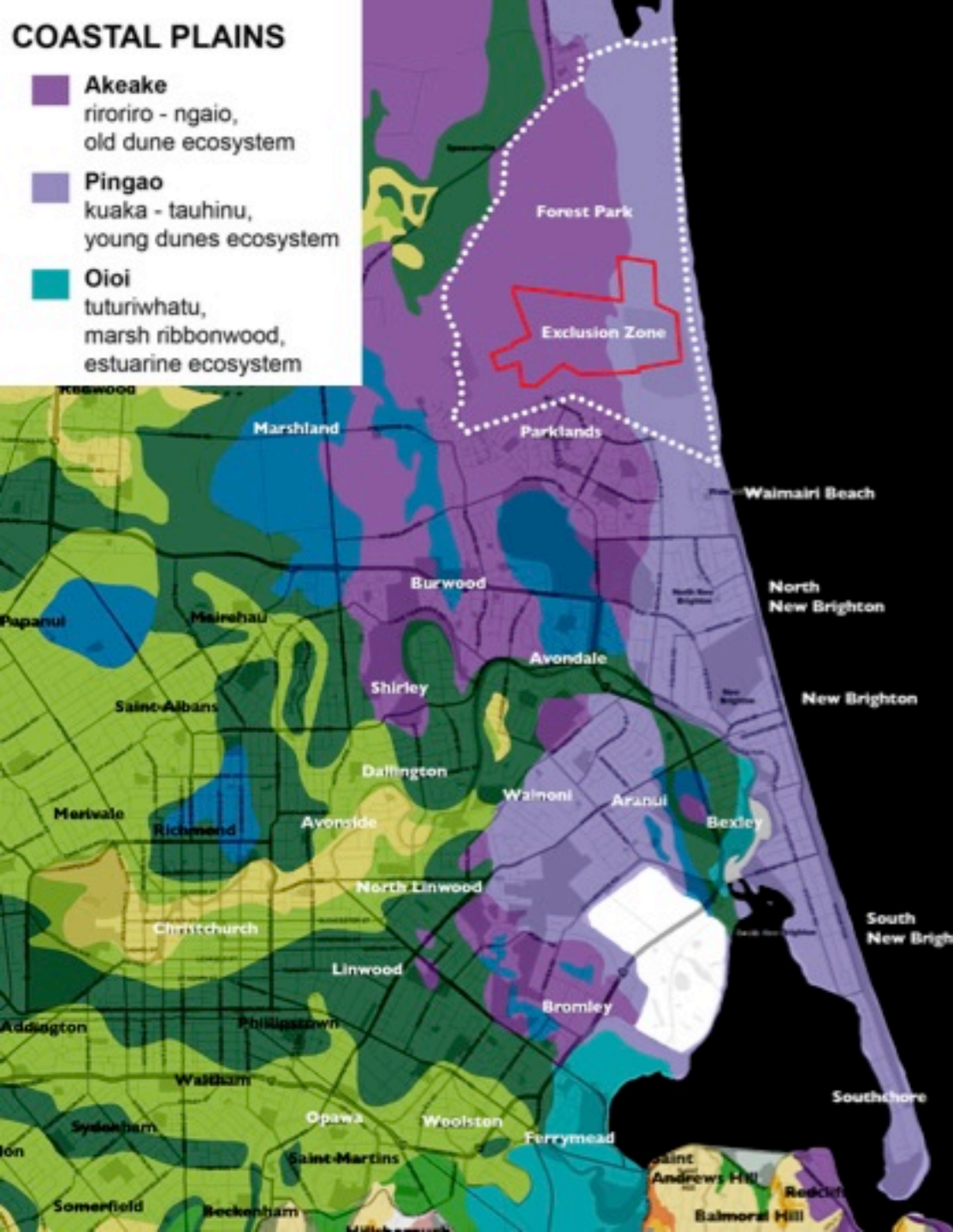
P u k i o



Underlayers: Alternating peat with logs & clay/sand. This overlies clay/sand & beach-worn greywacke stones (discoid) & shell beds.

COASTAL PLAINS

- Akeake**
riroriro - ngaio,
old dune ecosystem
- Pingao**
kuaka - tauhinu,
young dunes ecosystem
- Oioi**
tuturiwhatu,
marsh ribbonwood,
estuarine ecosystem



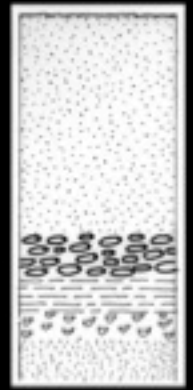
Coastal Plains Soils

A k e a k e



Underlayers: Sand on silt/ clay on peat on sand on beach-worn greywacke stones (2-100mm discoid) on sand with some shells.

P i n g a o



Underlayers: Sand on beach-worn greywacke stones (2-100mm discoid) on clay on shells on sand.

O i o i



Underlayers: Alternating silt & clay with shells. No greywacke stones but some small pieces of wood.

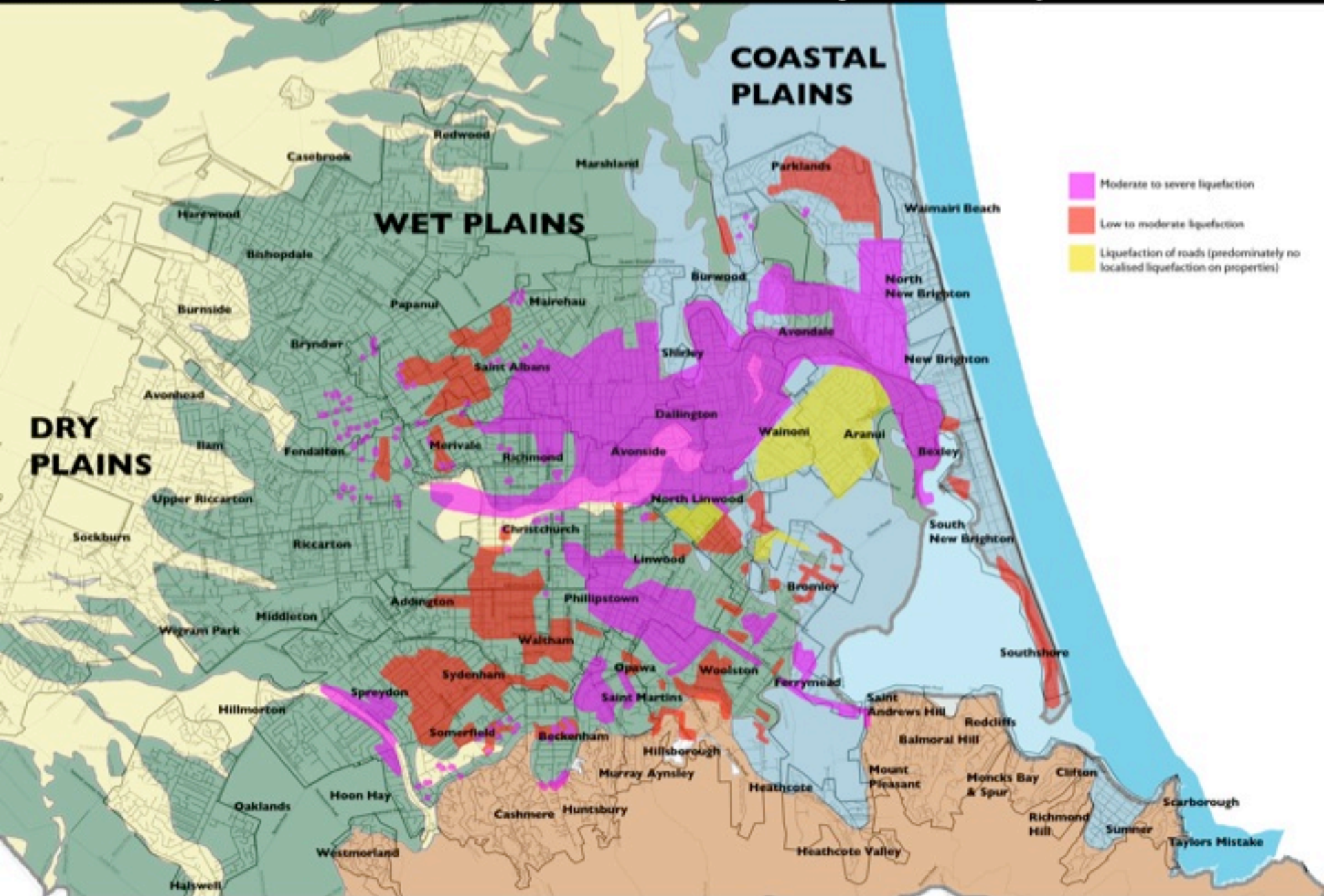
The Avon-Heathcote
Estuary in the 1800s



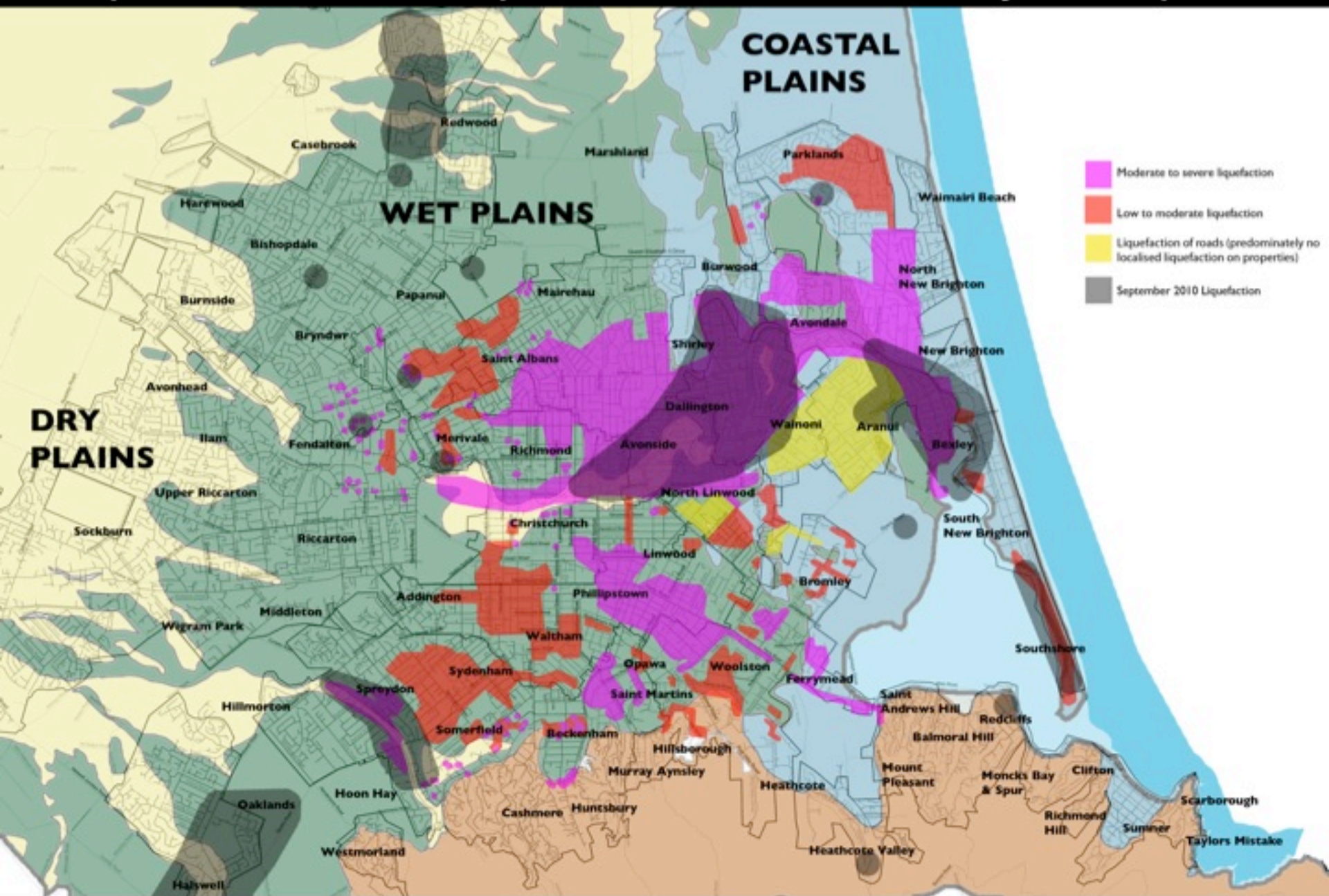
The Avon-Heathcote
Estuary Now



Liquefaction from February 2011 quake



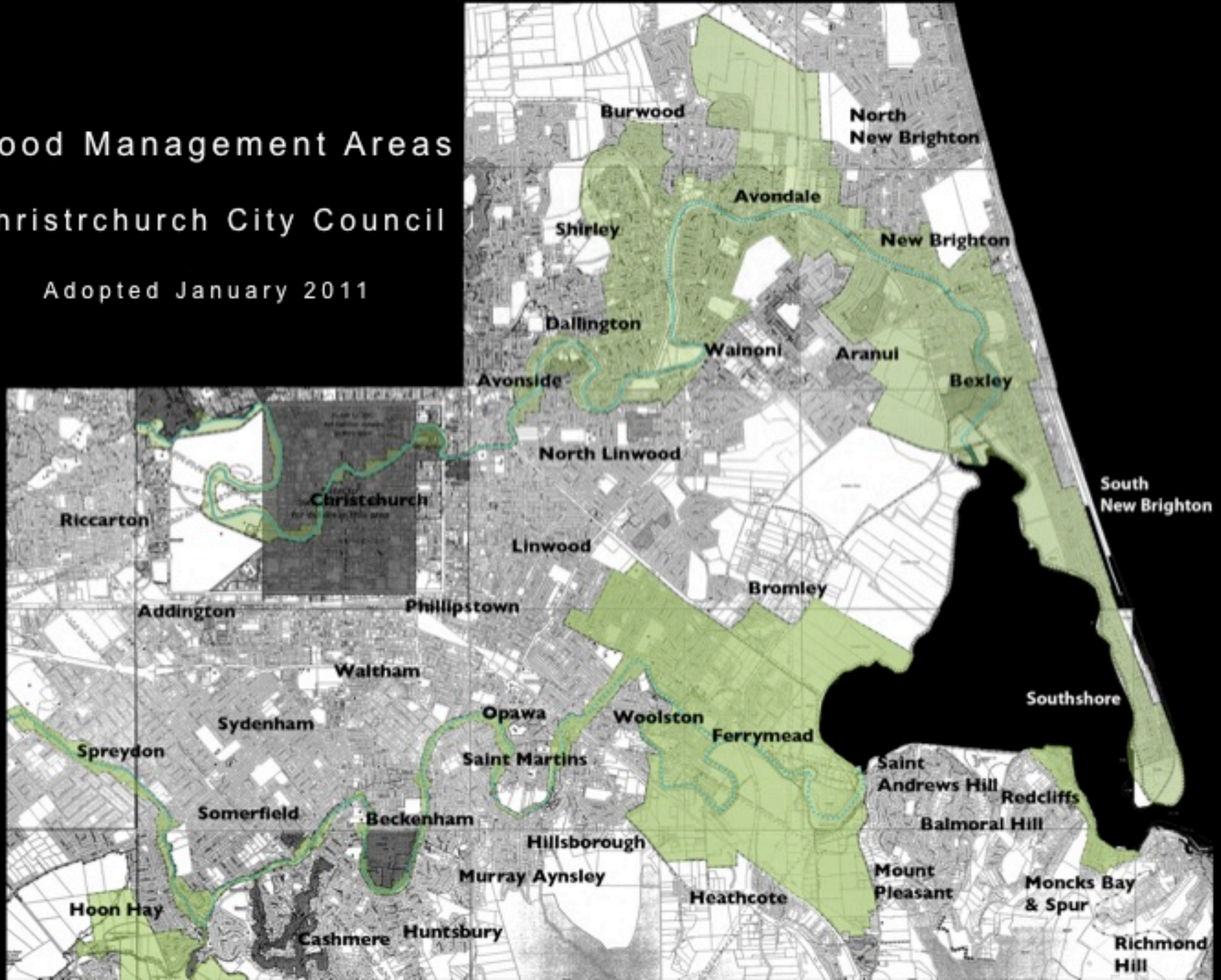
Liquefaction from September 2010 & February 2011 quake

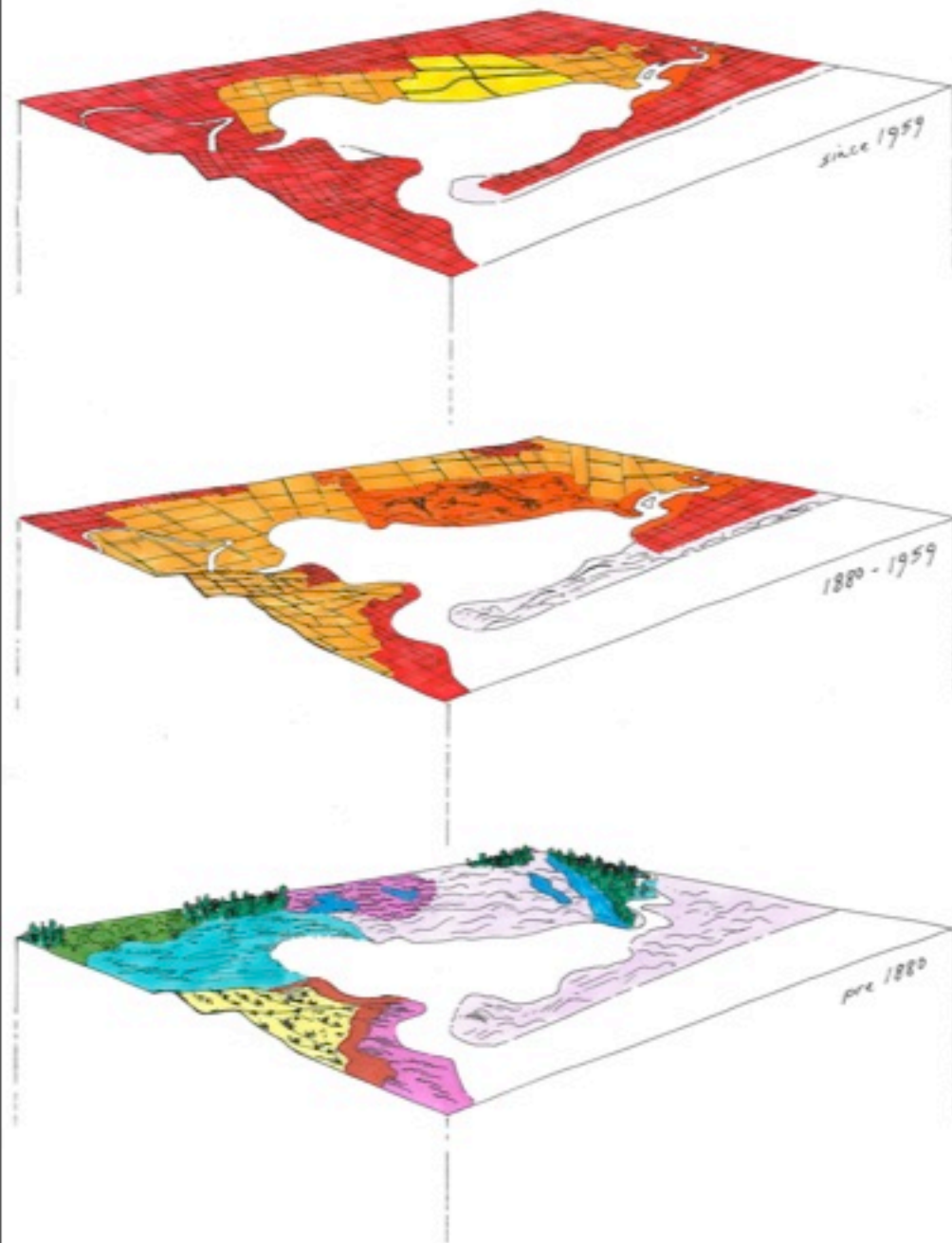




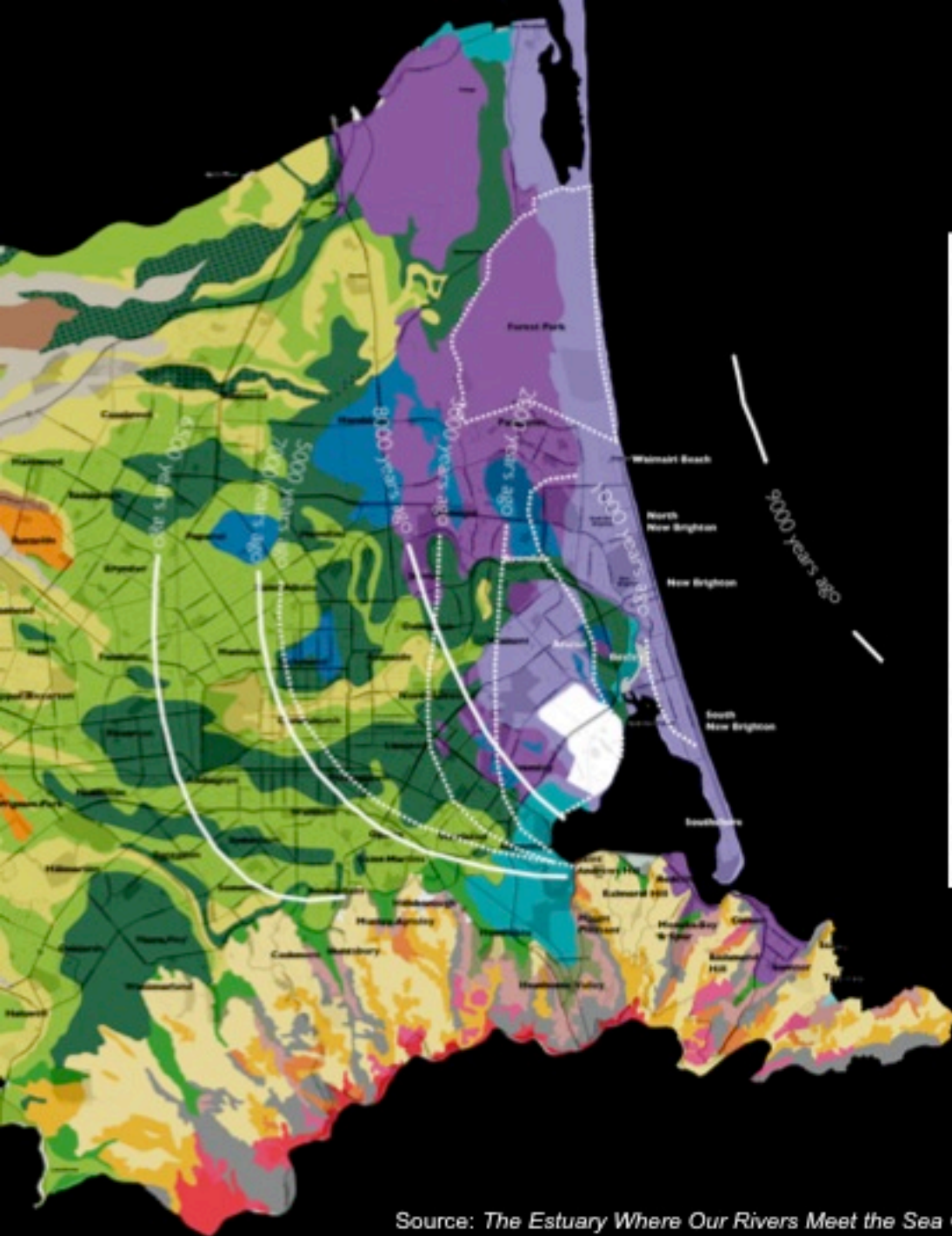
Flood Management Areas Christchurch City Council

Adopted January 2011





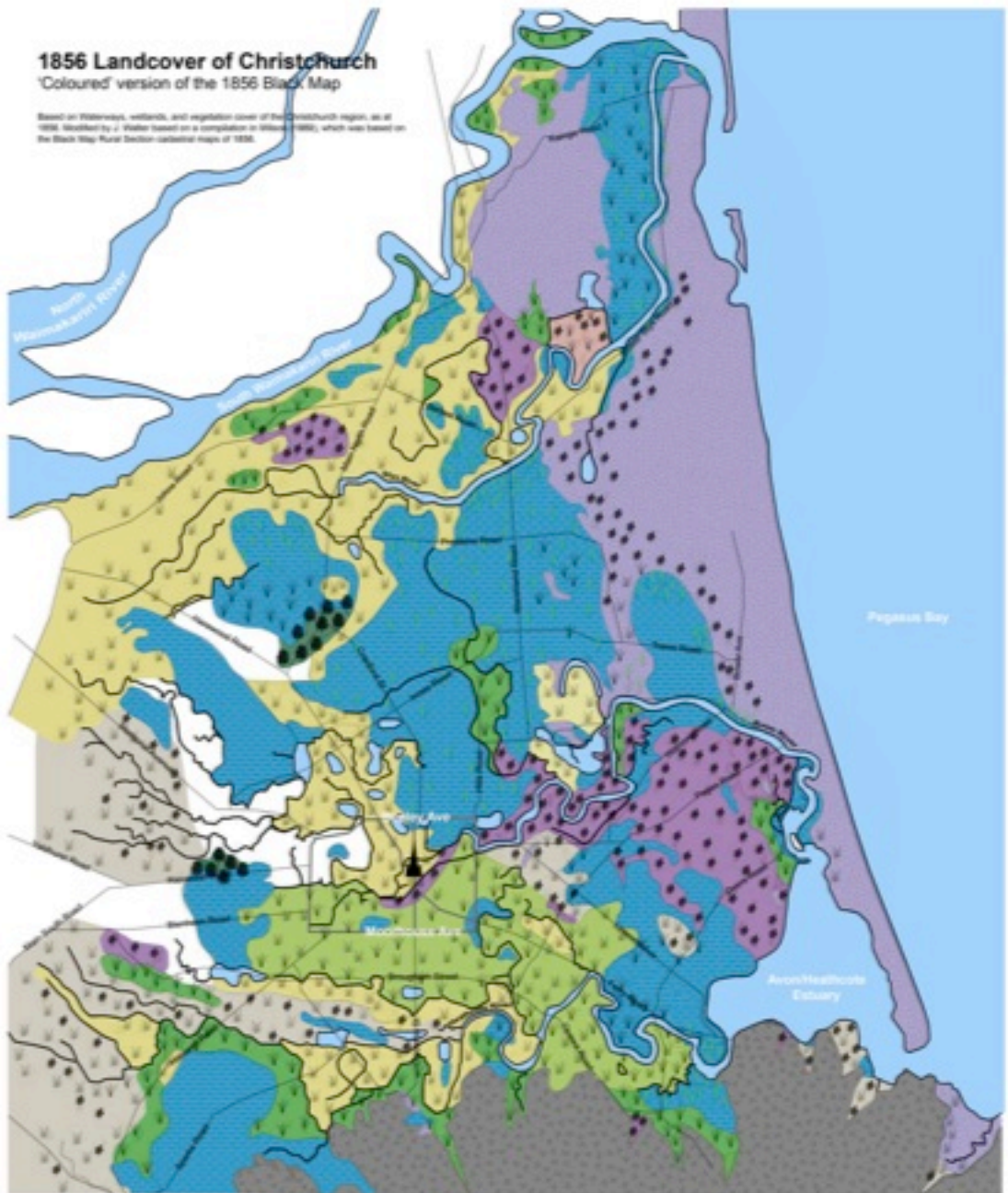
Shorelines in the last 9,000 years



1856 Landcover of Christchurch

'Coloured' version of the 1856 Black Map

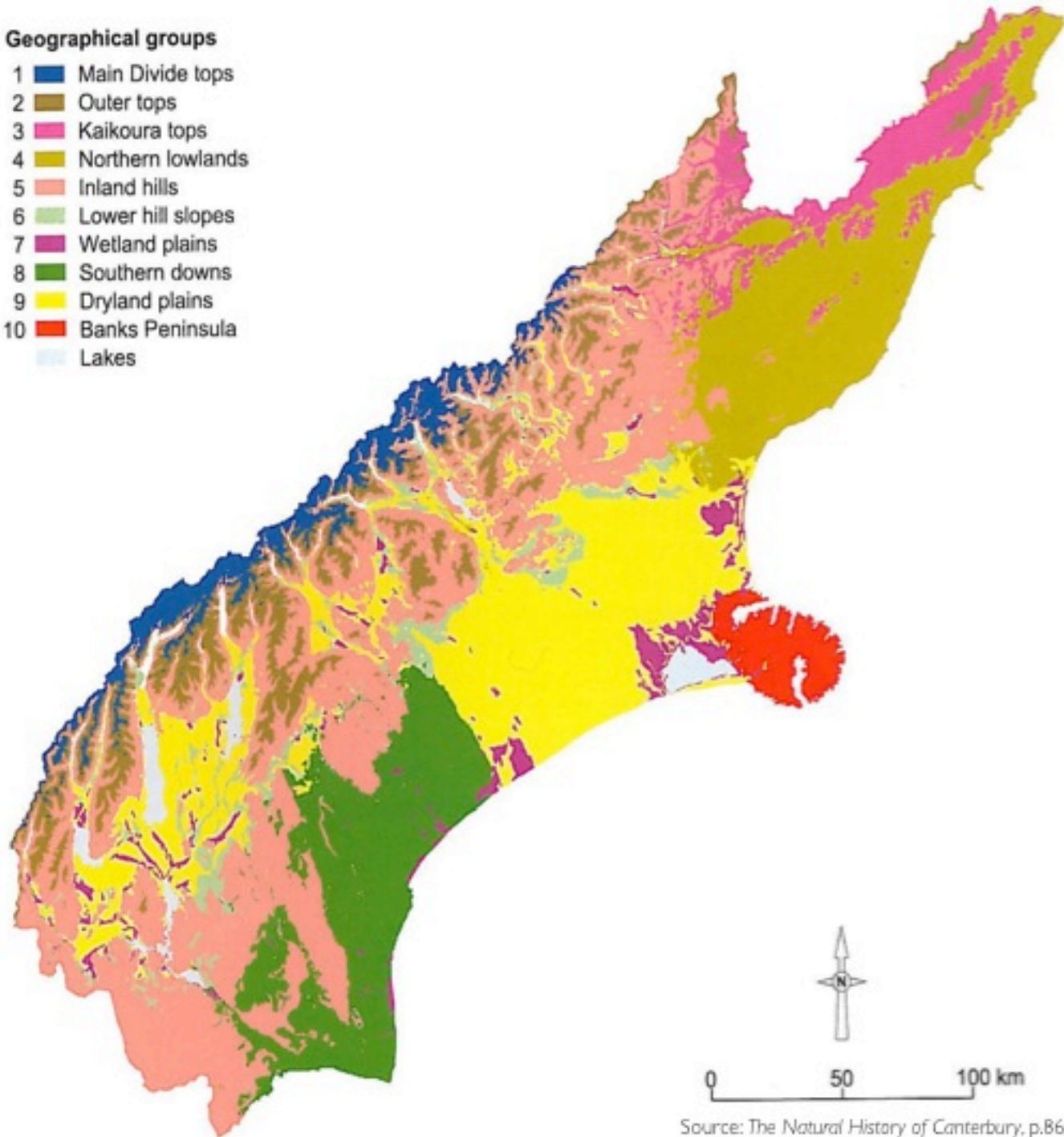
Based on Waterways, wetlands, and vegetation cover of the Christchurch region, as at 1856. (Compiled by J. Fisher based on a compilation of 1856 maps, which was based on the Black Map Rural Section cadastral maps of 1856.)



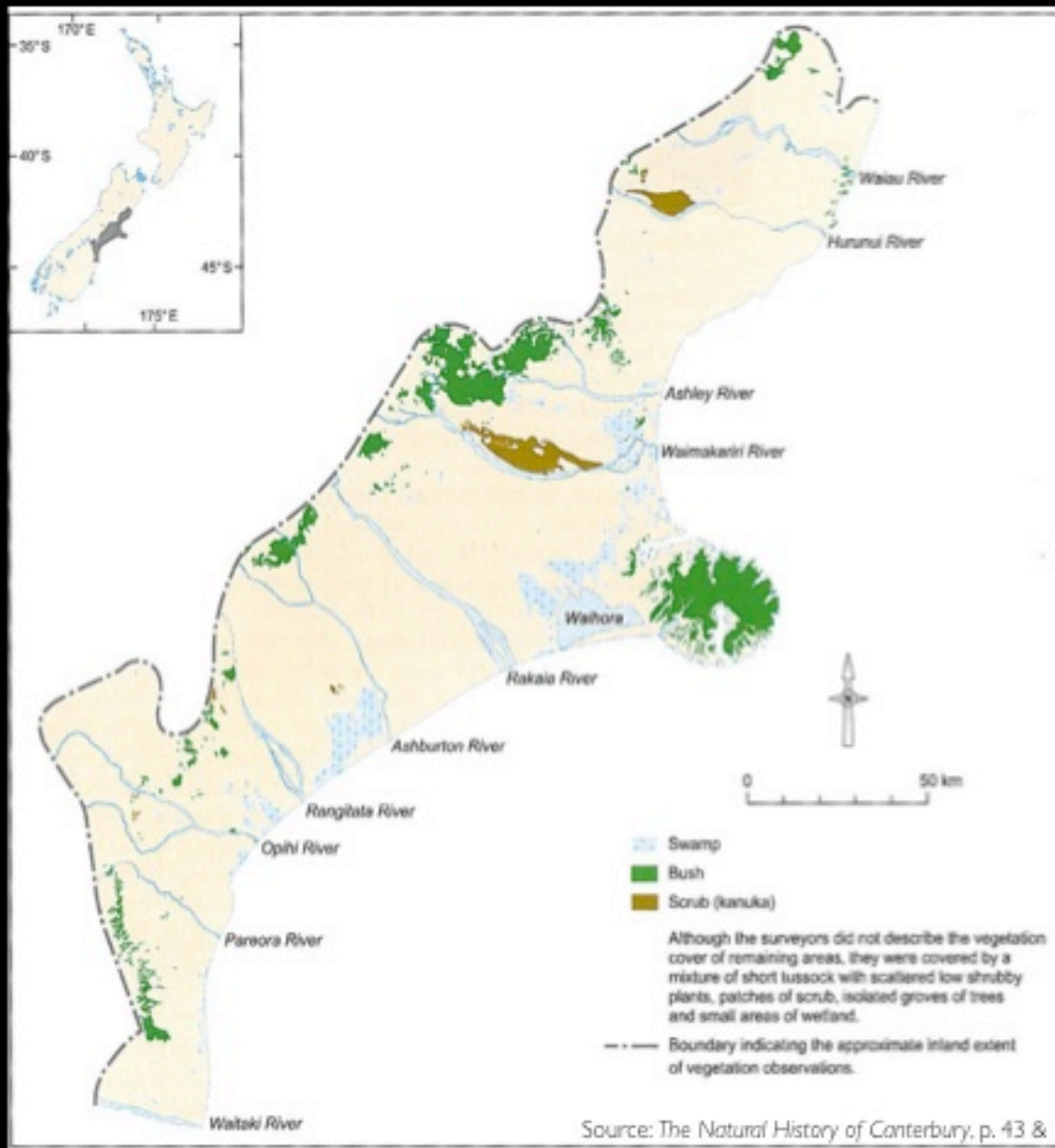
© 2011 Lucas Associates Ltd

Geographical groups

- 1 Main Divide tops
- 2 Outer tops
- 3 Kaikoura tops
- 4 Northern lowlands
- 5 Inland hills
- 6 Lower hill slopes
- 7 Wetland plains
- 8 Southern downs
- 9 Dryland plains
- 10 Banks Peninsula
- Lakes



Source: *The Natural History of Canterbury*, p.863



Source: *The Natural History of Canterbury*, p. 43 &



Horseshoe Lake

Horseshoe Lake off Moncrieff Place



Avon River



Avon River - Kerr's Reach







Halswell River levees ripped after the February earthquake



Fitzgerald Avenue - Avon River



AVONSIDE ~~DRIVE~~ PARK

from Fitzgerald Avenue to Linwood Avenue



Lucas Associates

351 Manchester Street tel. 385 0789 April 6, 2001



EXISTING SITUATION:
 Two-lane, two-way traffic, no pedestrian and cycle opportunities or riverbank access.
 © 2010
 Prepared for the City of Riverside, California
 by Lucas Associates
 3770 Main Street, Suite 200, Riverside, CA 92504

RIVERSIDE PARK

With road removed, pedestrian and cycle routes, slopes regraded and naturalised plus riverbank access with possible landing stages etc.



With one lane, one way slow street, pedestrian and cycle routes, slopes re-graded and naturalised.

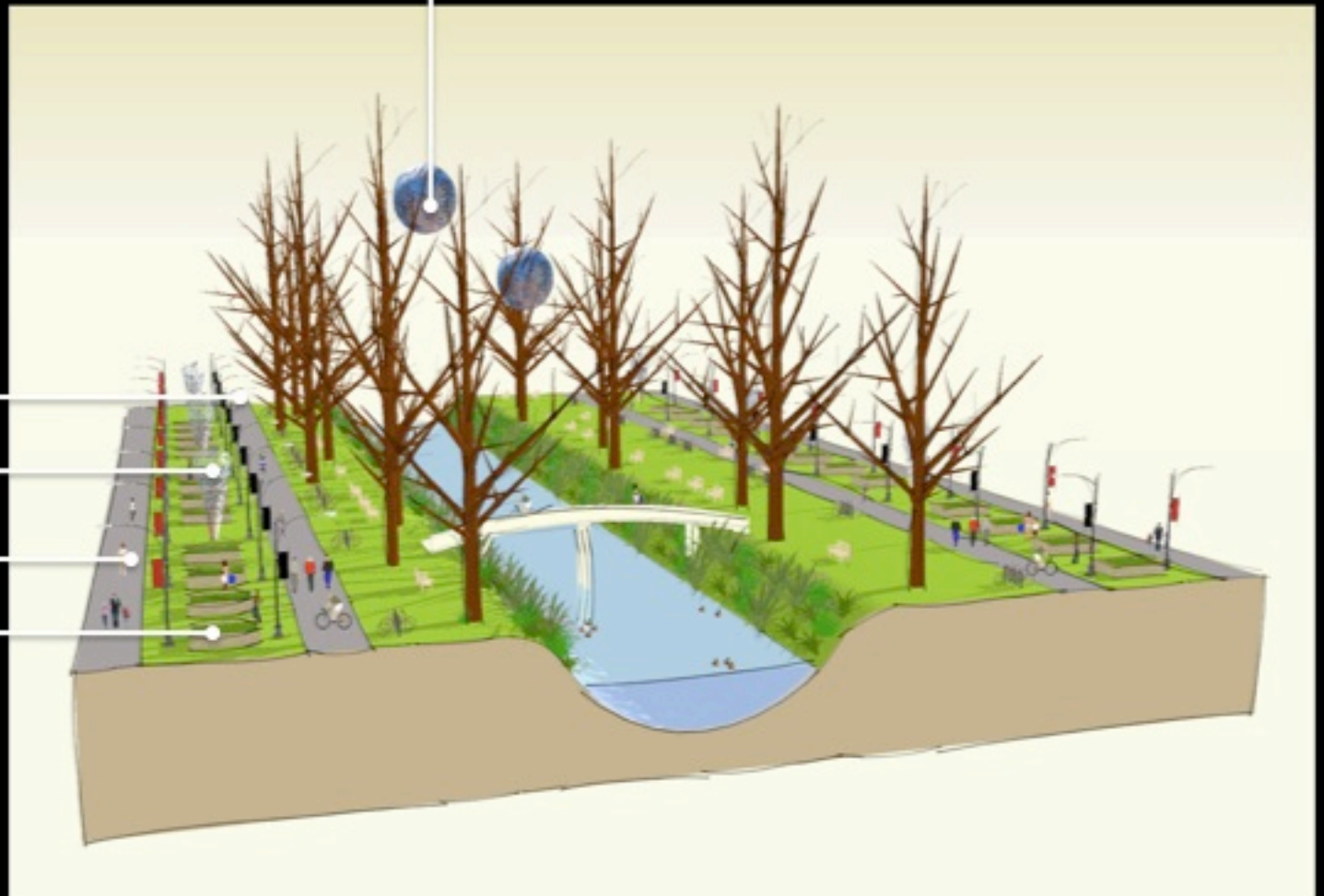
Art work

Cycleway

Art work

Promenade

Allotments



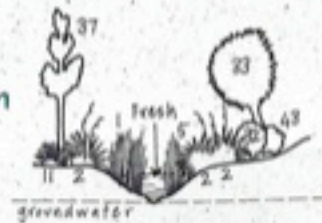
Avon River corridor

RIVER AND STREAM PROFILES

These profiles show the sequence of native plants best suited to each zone. Scale is exaggerated.

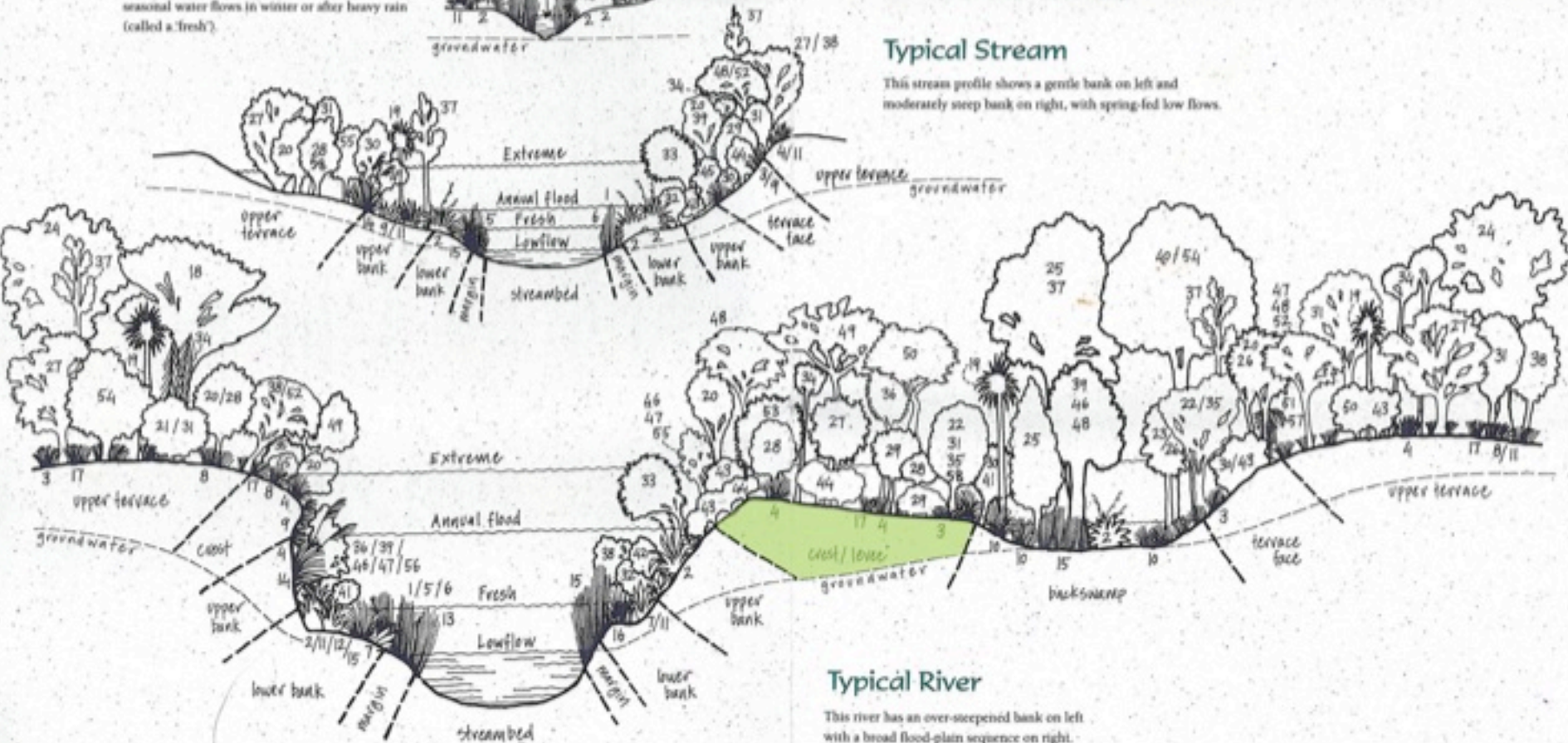
Typical Seasonal Stream

This profile shows upper stream reaches with seasonal water flows in winter or after heavy rain (called a 'fresh').



Typical Stream

This stream profile shows a gentle bank on left and moderately steep bank on right, with spring-fed low flows.

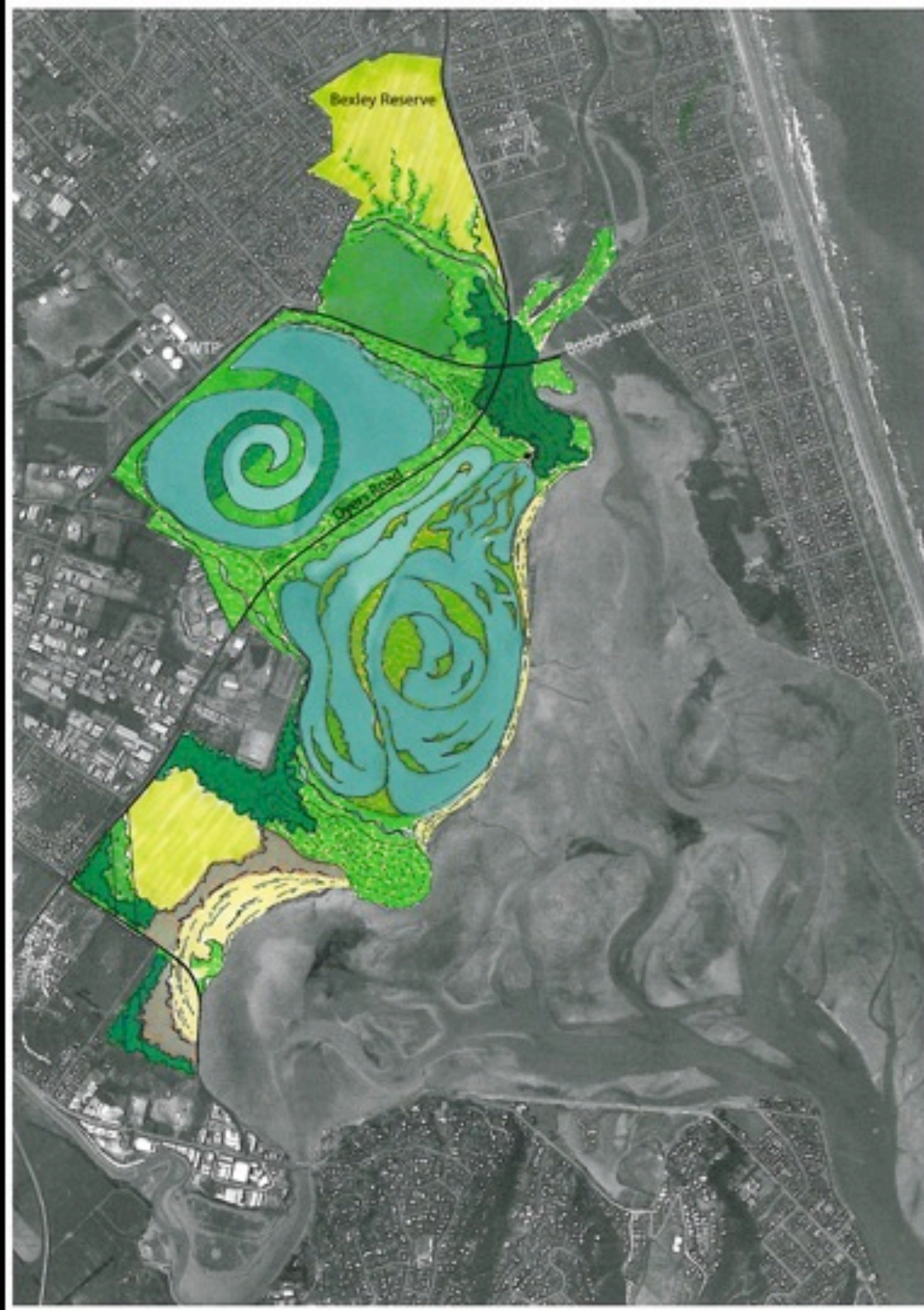


Central City Waterways as at 1850 & in 2000



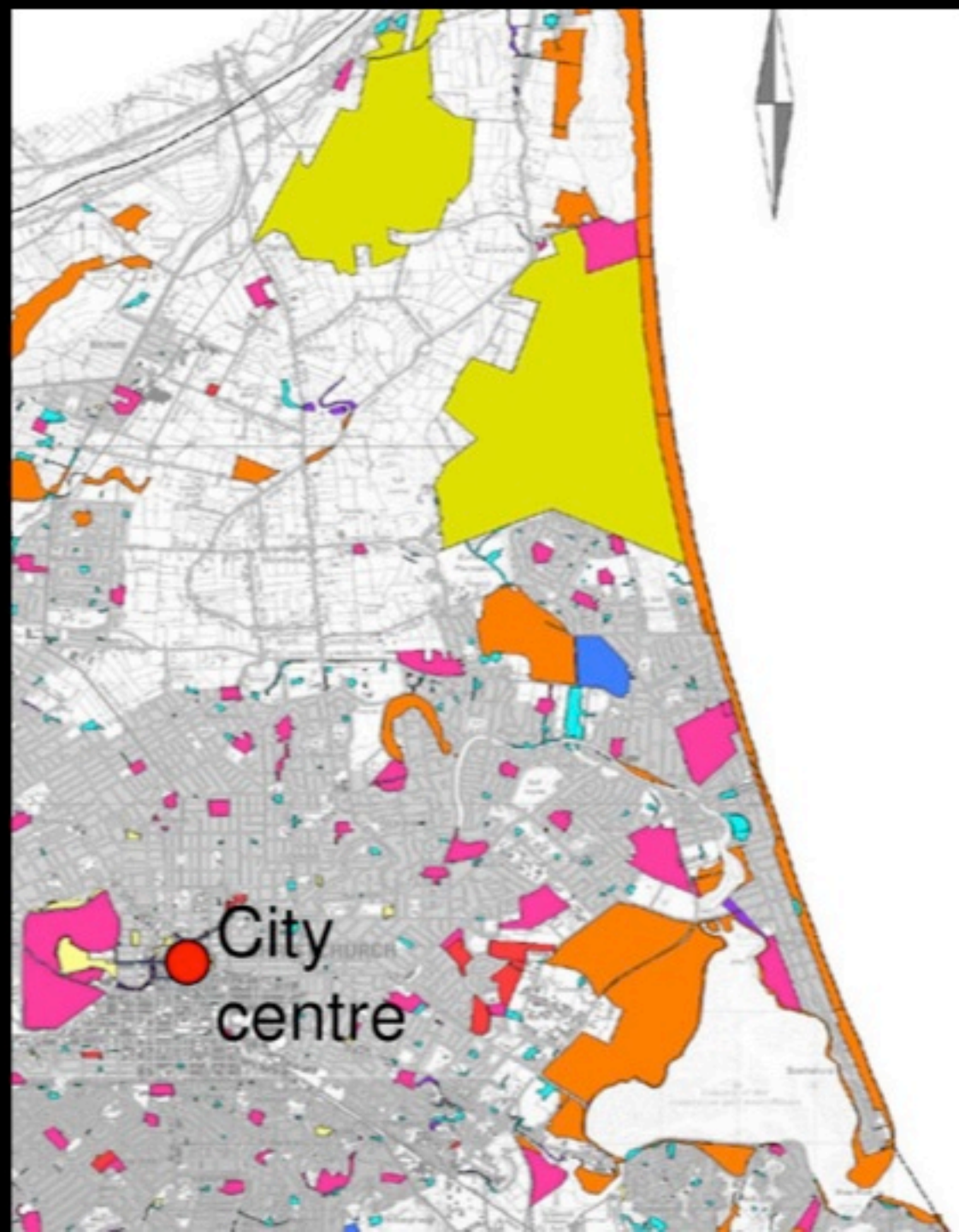




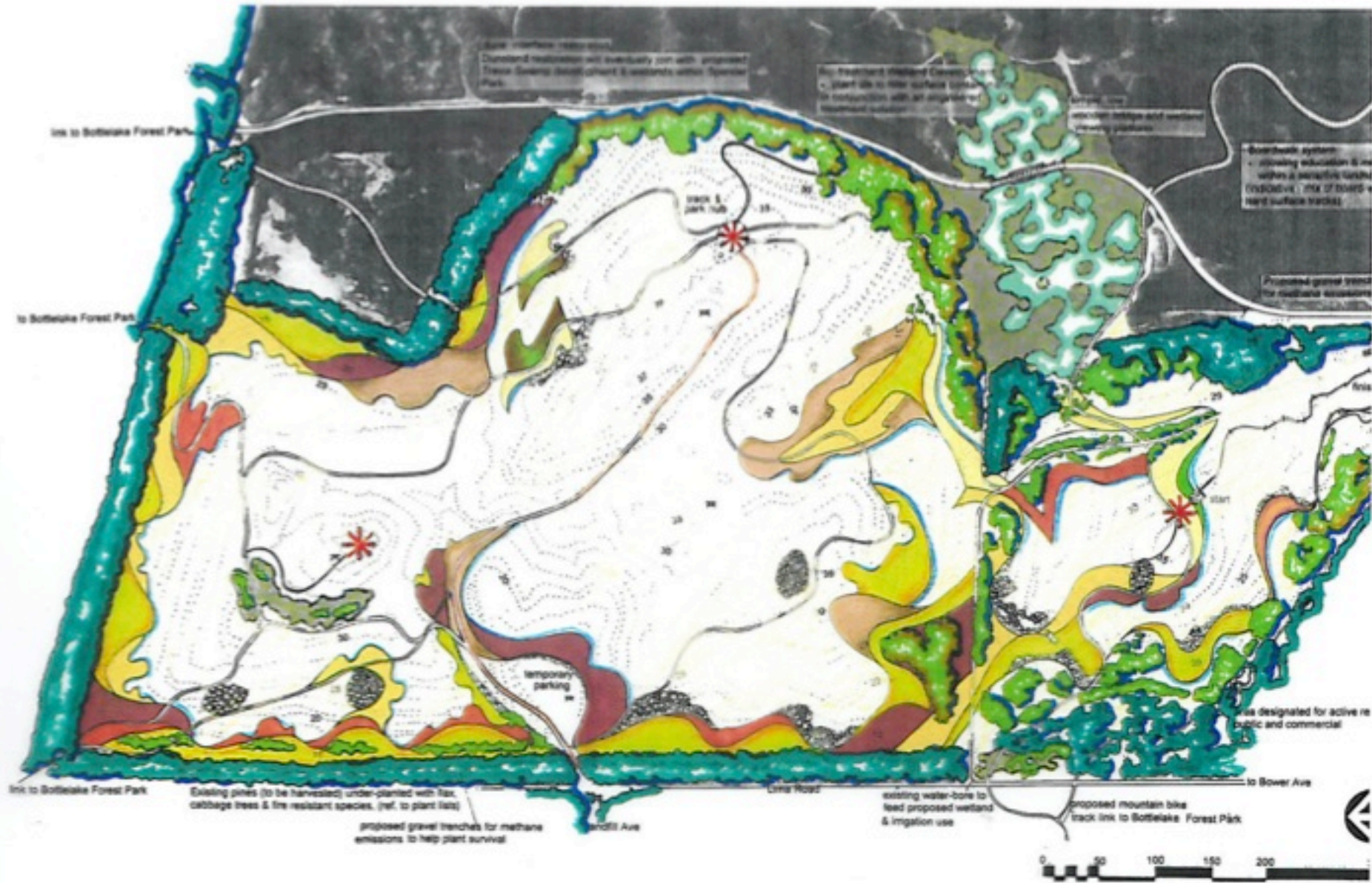


780 parks
50,000 street trees

- Sports Park
- Riverbank Area
- Regional Park
- Community Park
- Garden/Heritage Park
- Forest Park
- Conservation Area
- Cemetery
- Department of Conservation Administerec
- Conservation Covenant on private land



Burwood Landfill Concept





Main North Rd

Marshland Rd

Prestons Rd

Buttwood Rd

Mairehau Rd

2068 m

Forest Park Option

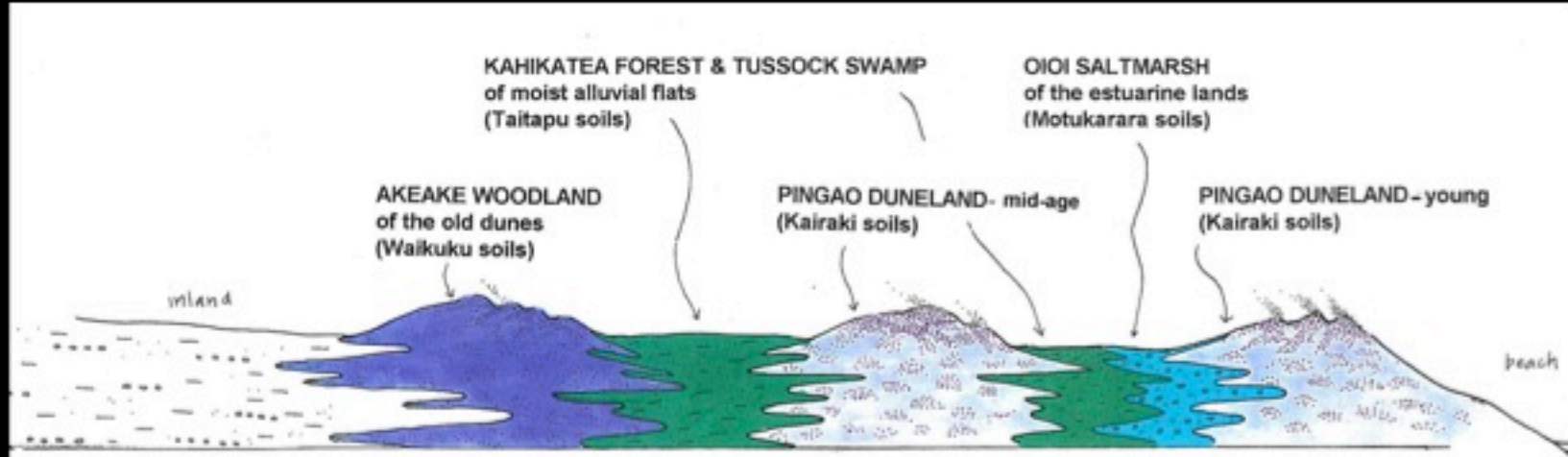
Exclusion Zone

© 2011 Whereis © Sensis Pty Ltd
Image © 2011 TerraMetrics

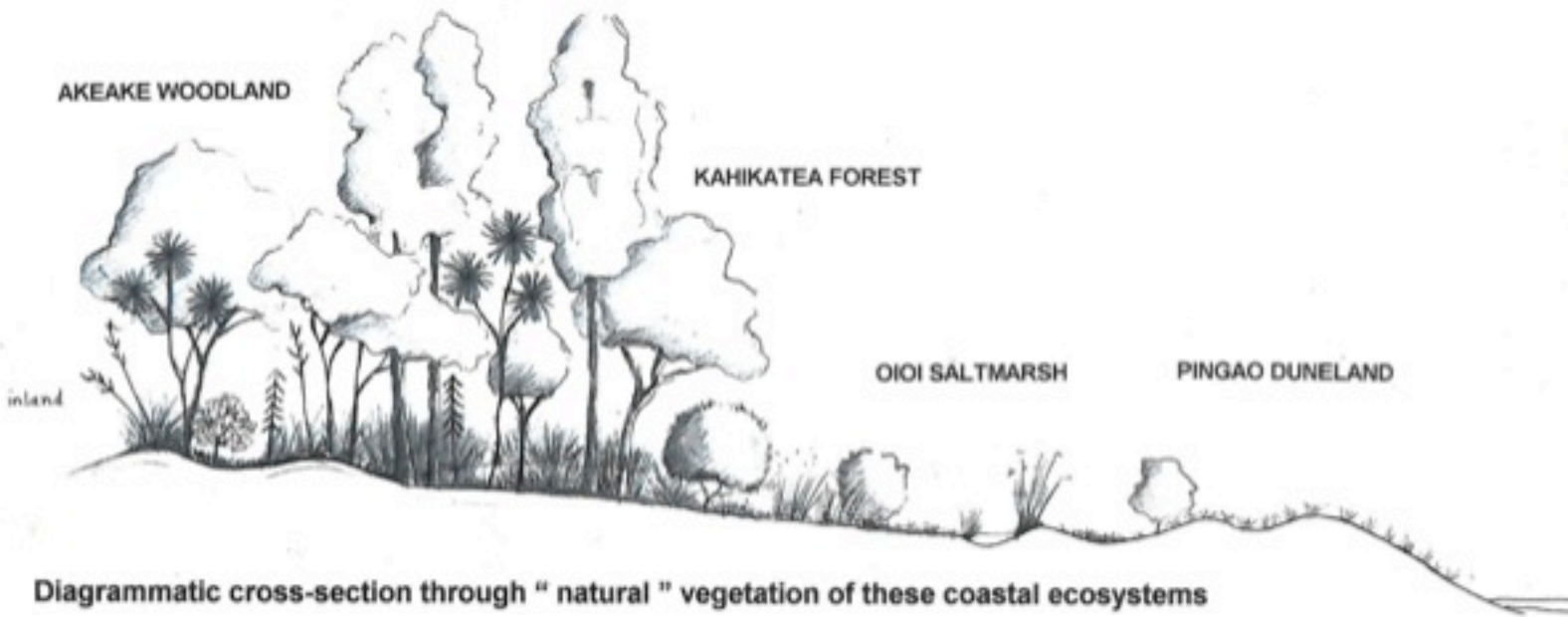
Image © 2011 GeoEye



Diagrammatic cross-sections through 'natural' vegetation of these coastal ecosystems

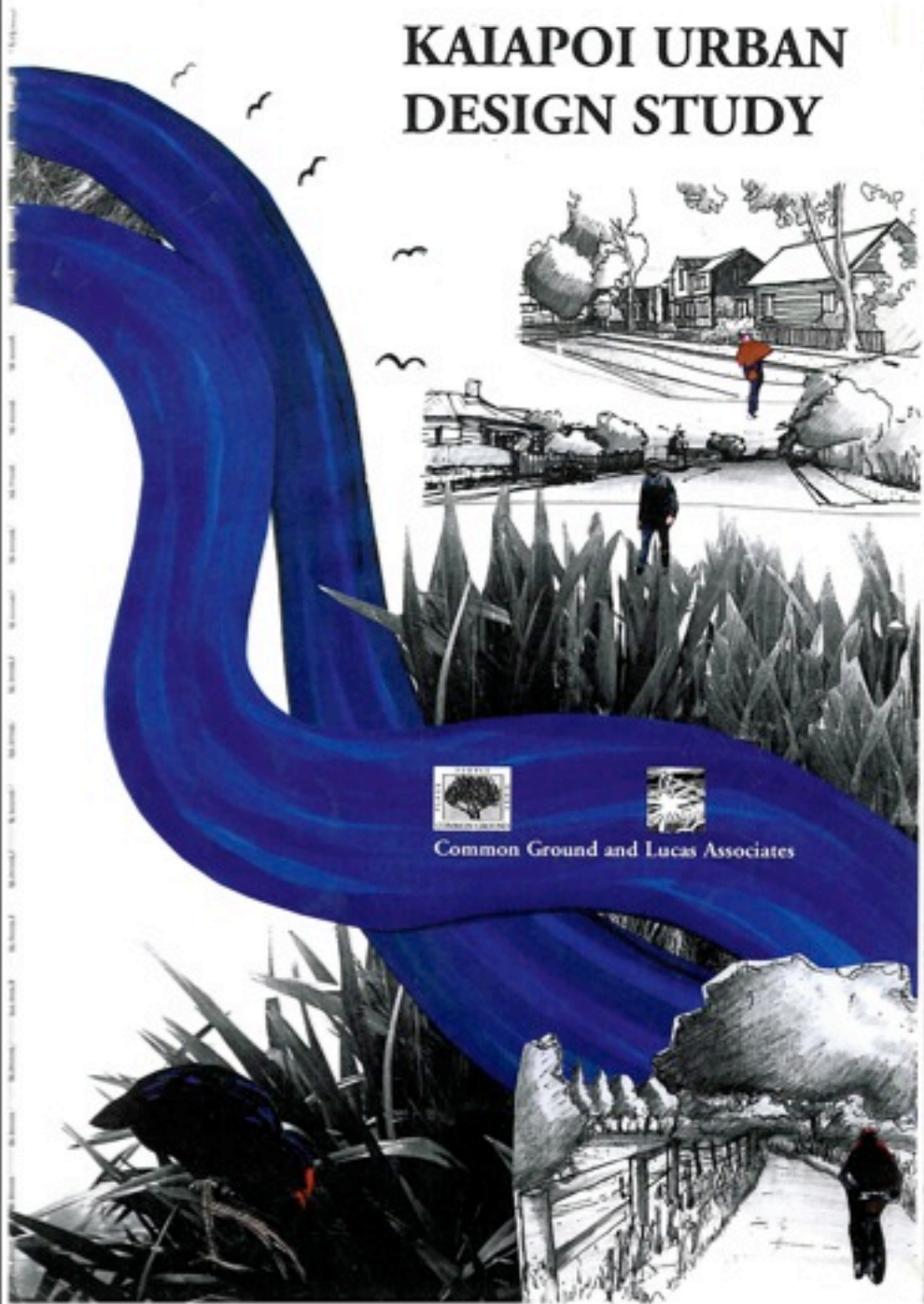


Diagrammatic cross-section through land system underlying ecosystems

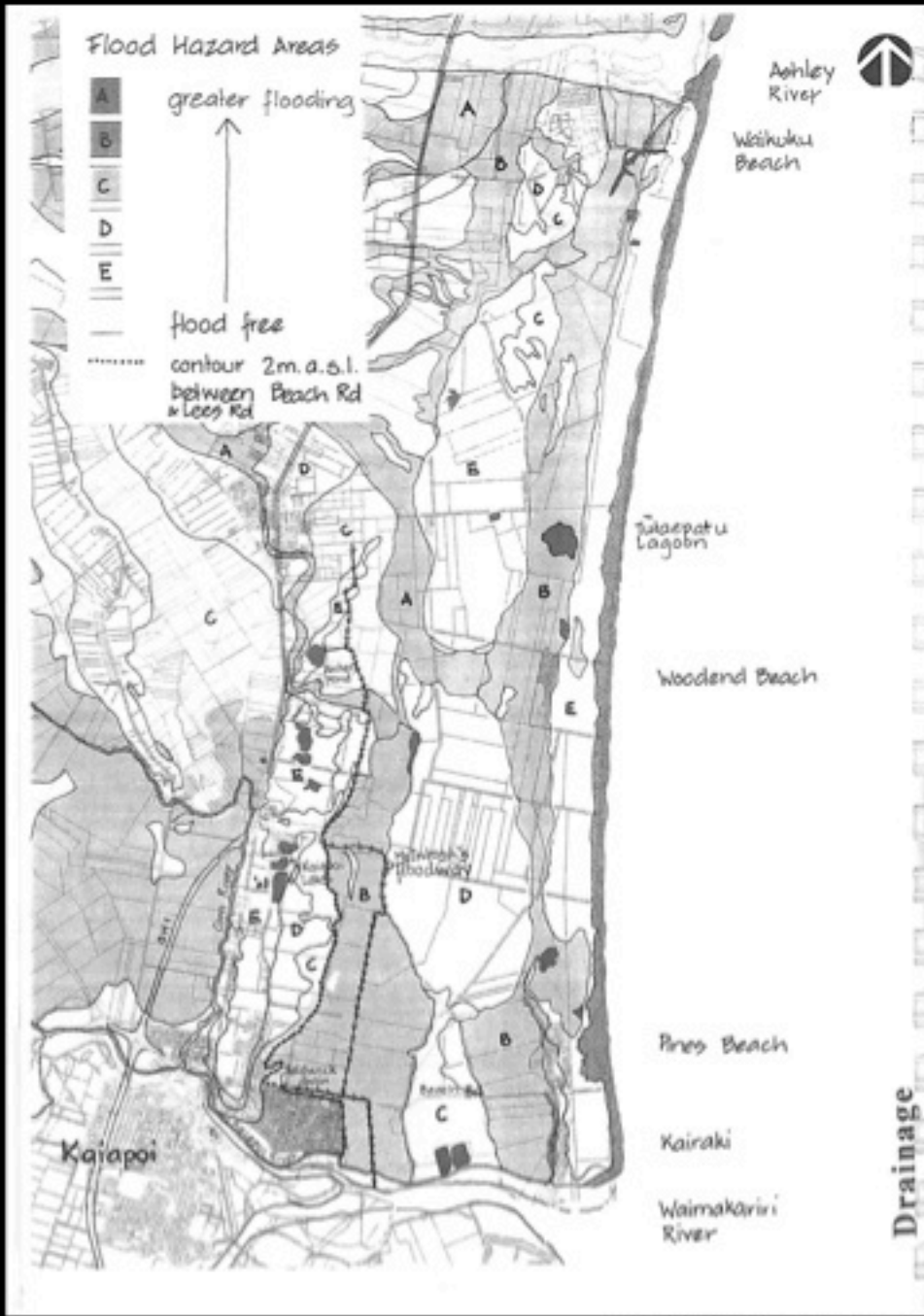


Diagrammatic cross-section through " natural " vegetation of these coastal ecosystems

KAIAPOI URBAN DESIGN STUDY



Common Ground and Lucas Associates



Land Patterns and Const

Although only a few metres above rock. These sands and gravels were brought down by the river during interglacial periods when metres higher than at present. The north-east lands have thus unde

Coastal Erosion

The coast continues to build up lower inland areas. Excepting for hazard. Accelerated sea level rise in the coastal water table (Kirk,

Dune Country

The lands north-east of Kaiapoi inter-dunes. The bands of free-drainage areas between. (refer to Suggested by some nearby sites have been deposited over the so

The higher, drier sand country and gravels have been mined, and the Kaiapoi Lakes pit pond sequenc

Low, Flat Land

The major topographic constraint is the low elevation, flatness and high water table of the floodway. The gentleness of the dune slopes of the north-east lands provide few constraints for urban development. In planning and design of urban development, the subtle landform distinctions and patterns could be:

- * followed;
- * exaggerated with cut and fill - e.g. making the waterway deeper, the dunes higher;
- * ignored, and largely filled or smoothed over to form drainable surfaces; or,
- * countered through development of contrasting landforms - as in the stopbank form that typically sits abruptly on flat floodplains.

Liquefaction

The soft sediments of the north Kaiapoi area have been shown to be vulnerable to liquefaction - particularly evident in the north-east of Kaiapoi in the 1901 earthquake (Berrill, Mulqueen, Ool, 1994). Liquefaction occurs when unconsolidated, water-saturated sandy ground is shaken violently enough during an earthquake that it compacts and settles. Heavy structures can sink, list or float as a result. The degree of proneness to liquefaction of the natural land surface of the site needs to be assessed and considered in the layout planning. Care needs to be taken in the compaction of any fill. (Hull et. al. 1995)

12 Kaiapoi Urban Design Study 1999

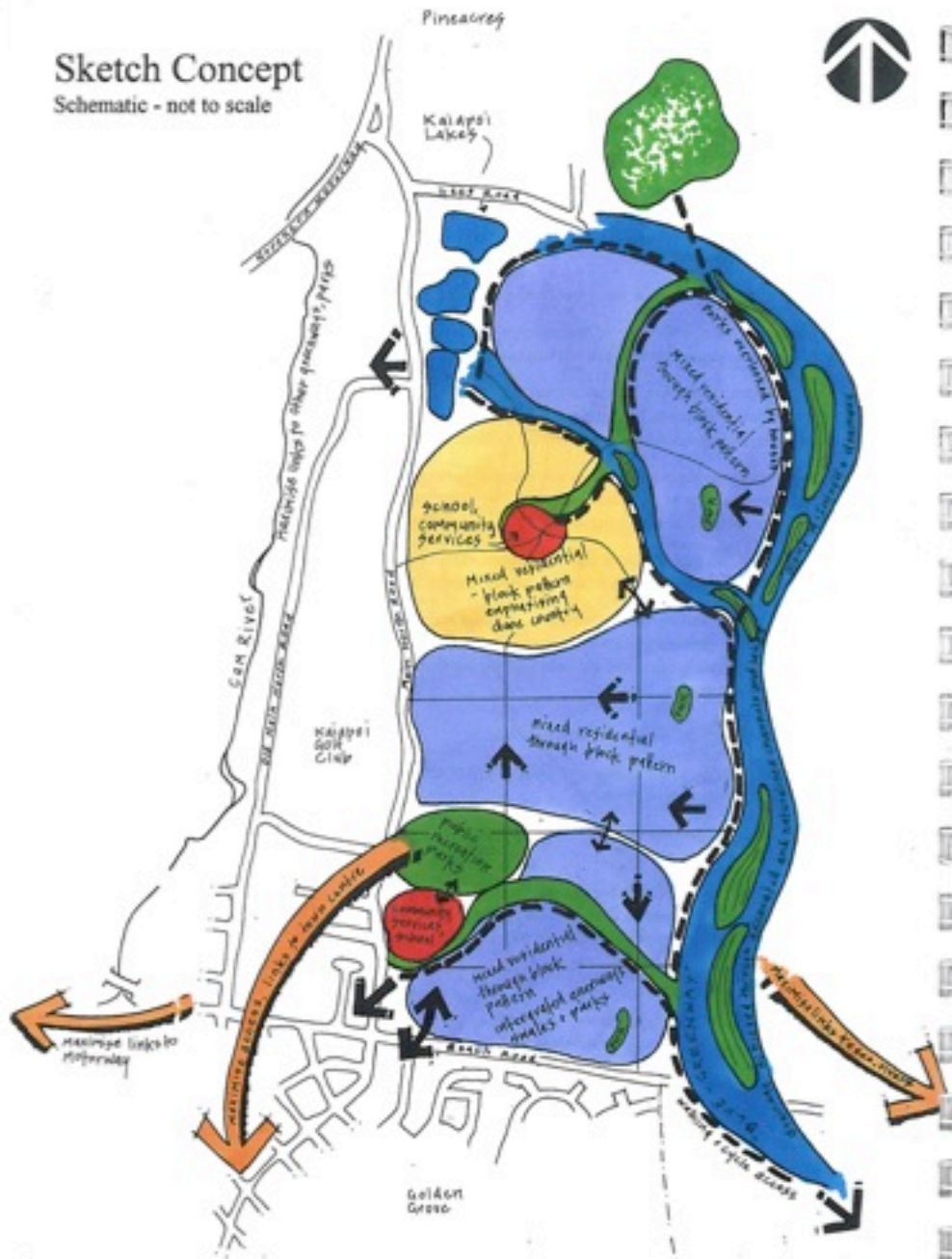


Liquefaction

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Sketch Concept

Schematic - not to scale



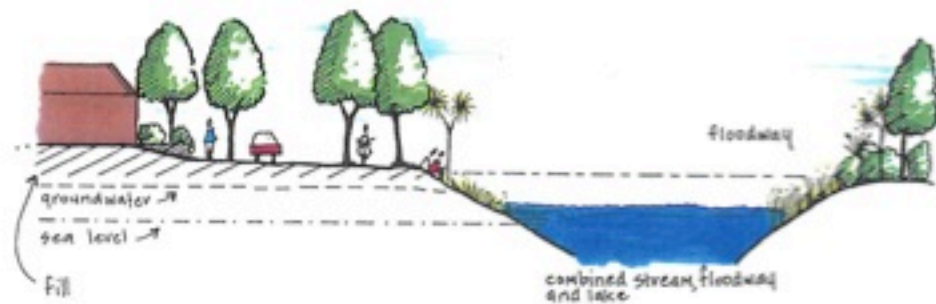
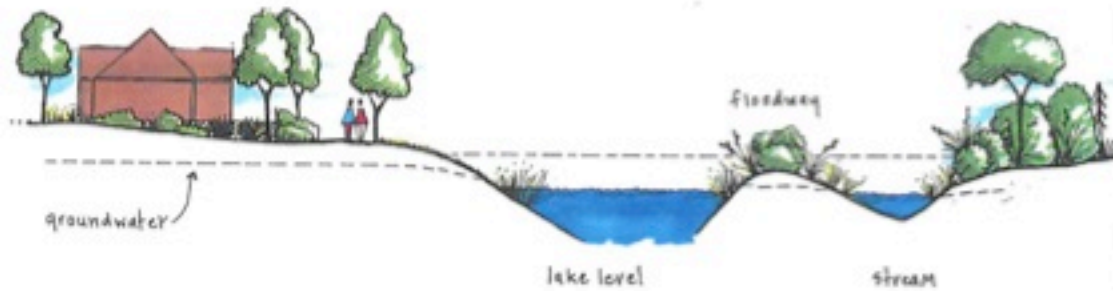
Swale Drainage

Cross Section



Blue-Greenway Concept

Cross Sections



Tjibaou Cultural Centre, New Caledonia





Source: Rachel-de-Lambert, Boffa Miskell

lets ROOC!



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