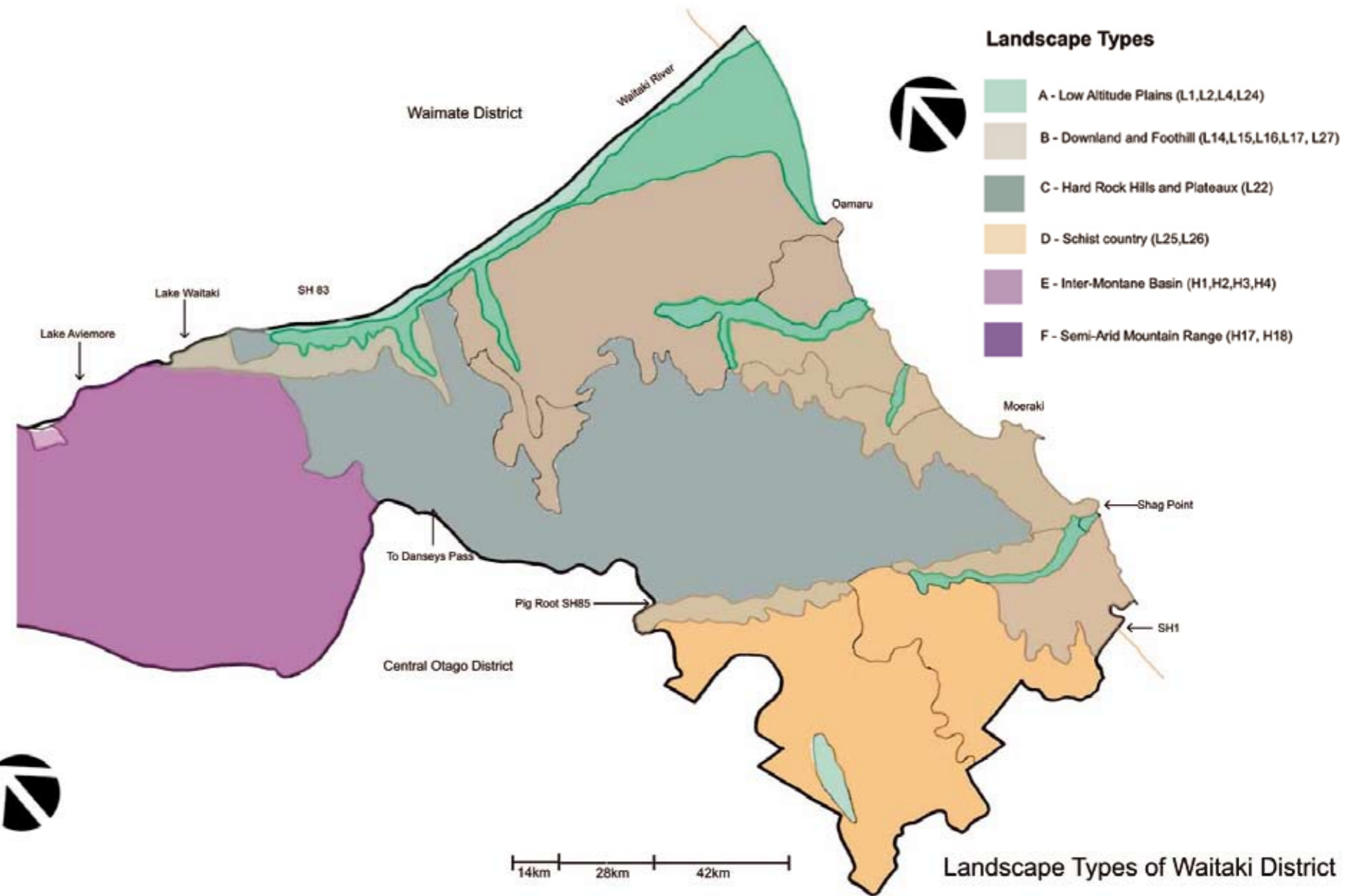
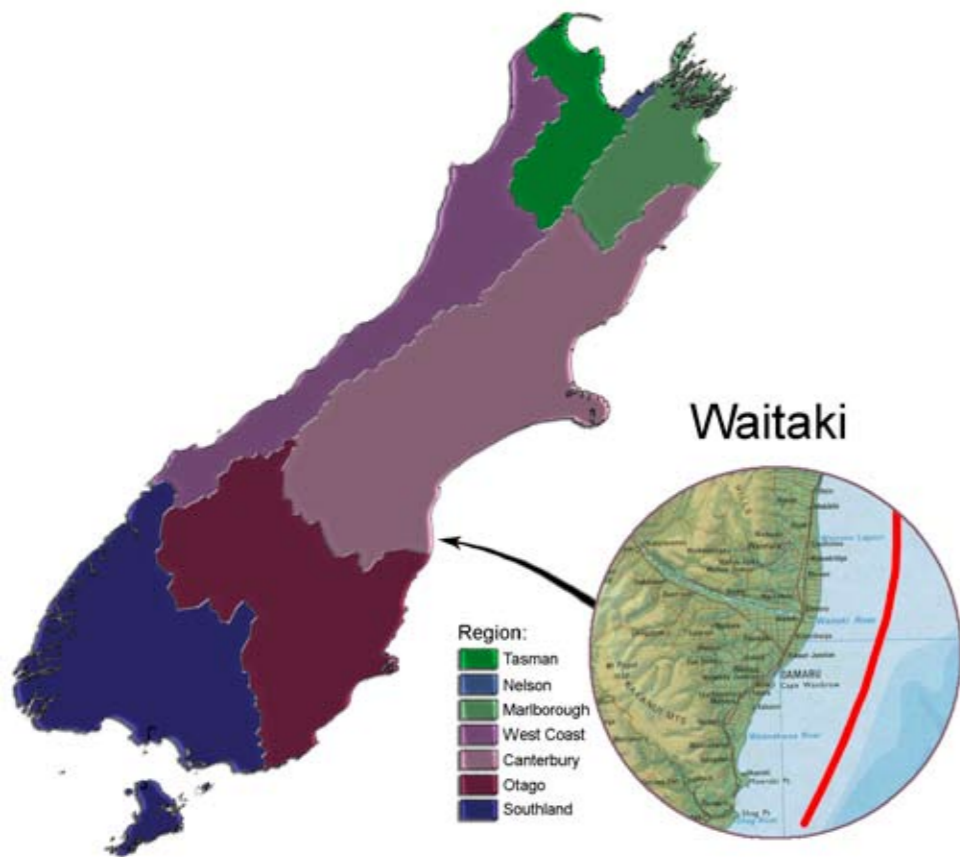
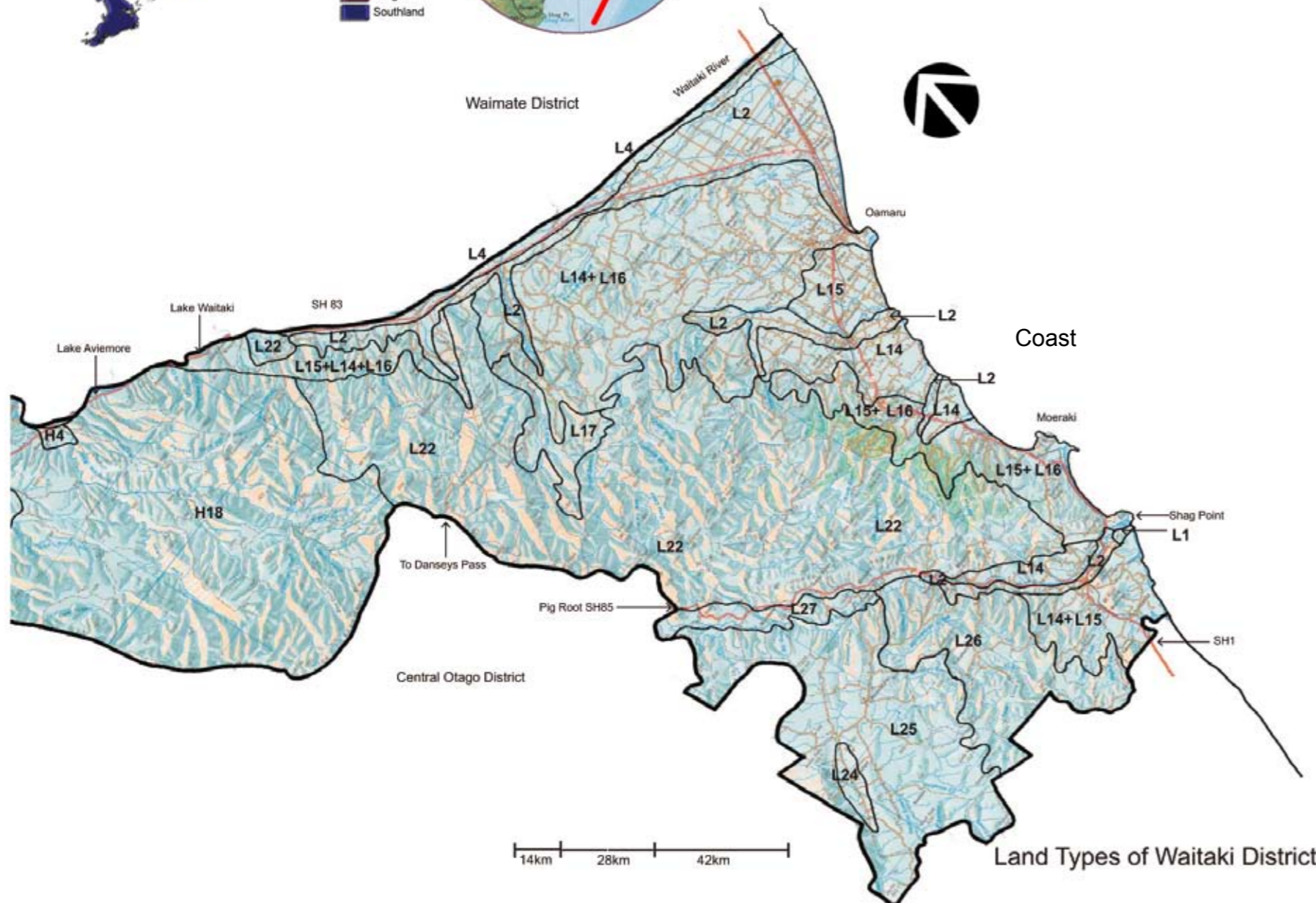


Otago Region

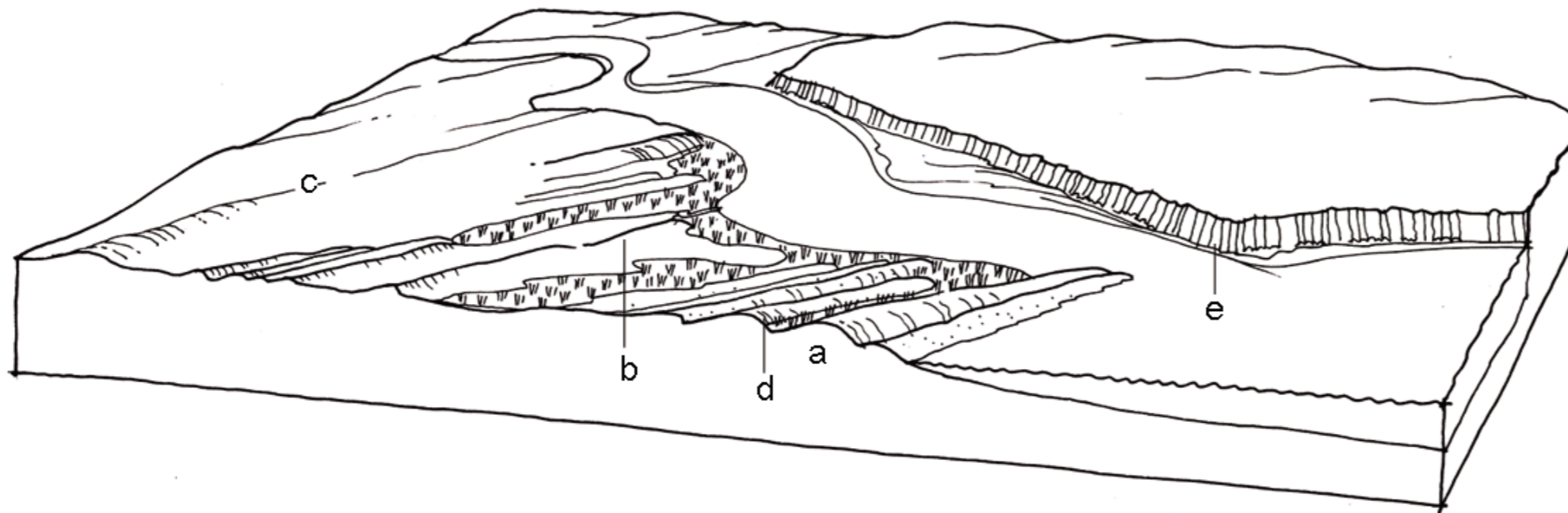


Waitaki District Land Types



Lowland Land Types

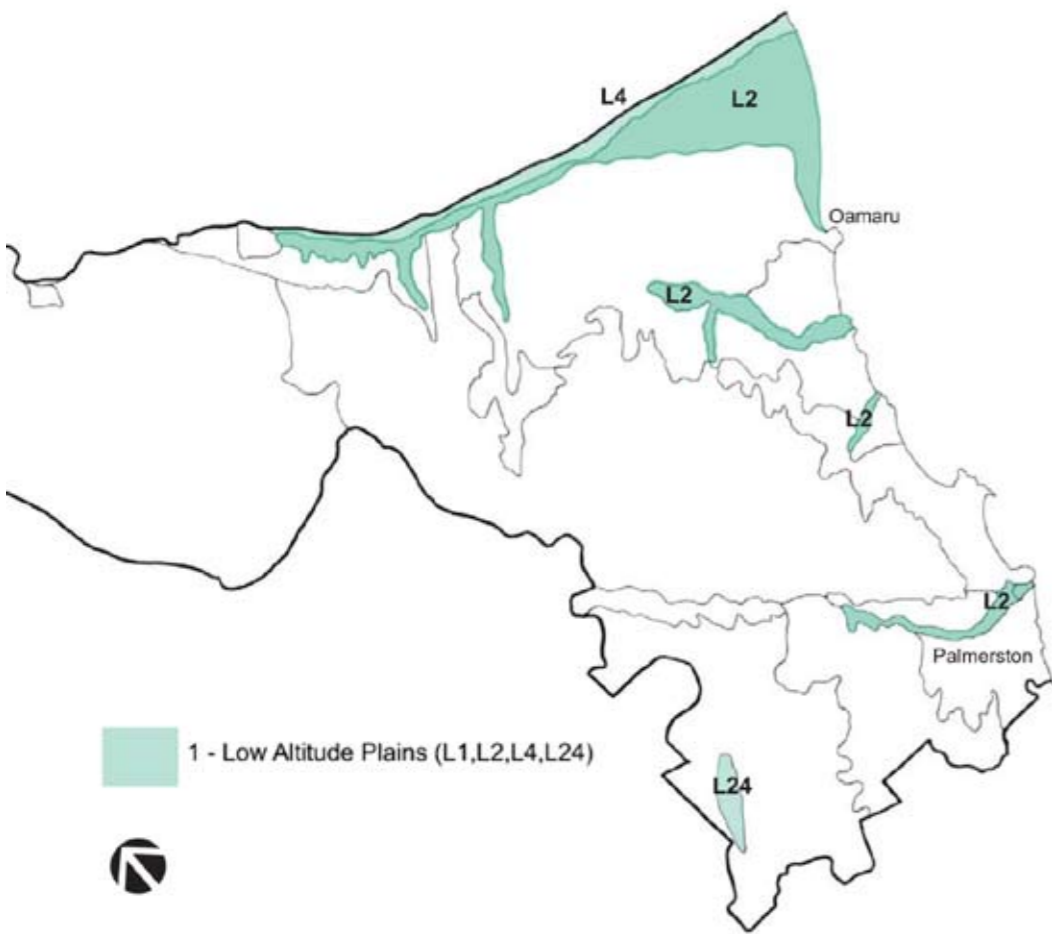
- L1 Plains - Coastal Fringe Land Type
- L2 Lower Plains Land Type
- L4 Plains - Recent Floodplains and Low Terraces Land Type
- L14 Southern Loess Mantled Soft Rock Hills and Downs Land Type
- L15 Southern Soft Rock Hills and Downs Land Type
- L16 Southern Structural Soft Rock Hills Land Type
- L17 Loess Mantled Hard Rock Hills and Downs Land Type
- L22 Southern Hard Rock Hills and Mountain Land Type
- L24 Inland Basins and Major Valleys Land Type
- L25 Exhumed Eastern Peneplain Surface Land Type
- L26 Deeply Dissected Schist Hill Country Land Type
- L27 Tertiary Structural Volcanic Rock Land Type



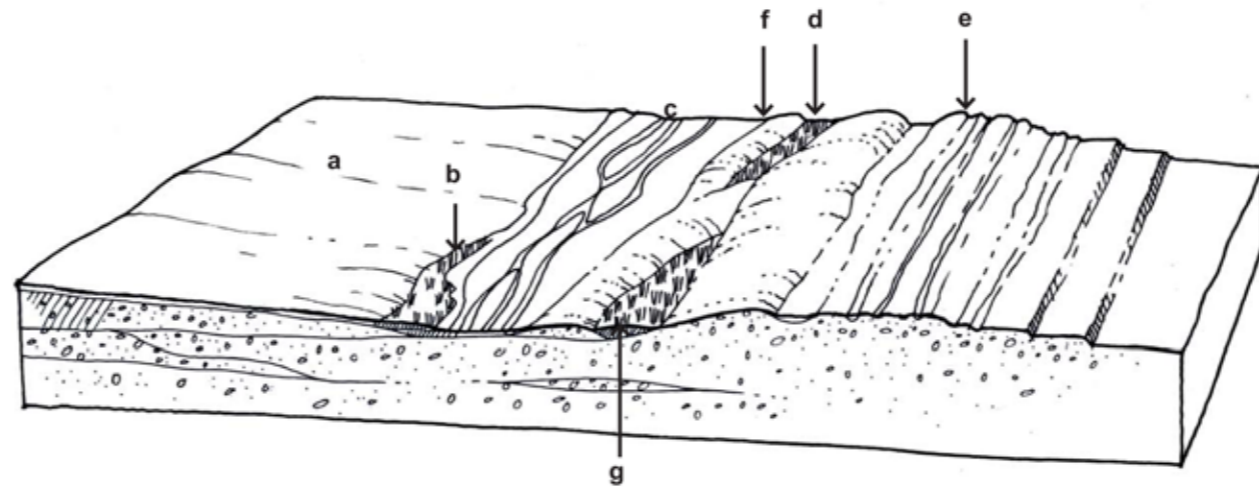
L 1 PLAINS - COASTAL FRINGE LAND TYPE

The coastal fringe incorporating undulating to rolling coastal beach sand dunes and associated interdune backswamps, sand plains, gravel beach ridges and bars often at the foot of sea cliffs, and saline lake and lagoonal/estuary fringe wetlands. Elevation ranges from 0 - 20 m and rainfalls from 600 - 800 mm/A. The land type includes the coastal fringe from the Waitaki River mouth south to the Pleasant River mouth.

landform component	geological formation	elevation m	remnant native vegetation	present land use	agronomic potential	potential land use	potential impacts
(a) Beach sand dune complexes	Holocene and Recent dune sand	0 - 20	pingao, dune slack, danthonia grassland	extensive grazing, exotic forestry, conservation, recreation, stabilized waste land	low	exotic forestry, extensive grazing, stabilization, recreation	exotic trees, recreational impacts, loss of native vegetation
(b) backswamps	Holocene and Recent alluvium and organic deposits	0 - 20	swamp, carr, lacustrine, slacks, saltmarsh	intensive grazing, feed cropping	medium	cash and feed cropping, horticulture, intensive grazing	intensified land use, drainage, windbreaks, subdivision
(c) sand plains	Holocene and Recent sands and lagoonal deposits	0 - 50	Scirpoides sedgeland, dune slack, silver tussock, danthonia grassland	extensive grazing, waste land	low	semi-intensive grazing, recreation	loss of native vegetation, increase in exotics, recreational impacts
(d) gravel bars and beach ridges often below seacliffs	Holocene and Recent beach gravel and dune sands	0 - 20	pingao, scrub, bracken	extensive grazing, waste land	low	semi-intensive grazing, recreation, stabilization	loss of native vegetation, increase in exotics, recreational impacts
(e) saline lake and estuary fringes	Holocene and Recent fluvial and lagoonal deposits	0 - 3	salt marsh (estuarine, lacustrine)	extensive grazing, feed and cash cropping	medium	intensive grazing, cash and feed cropping	intensified land use, drainage, windbreaks, subdivision



Low Altitude Plains - Landscape Type A



L 2 LOWER PLAINS LAND TYPE



Plains near Otiake on the southside of the Waitaki River

Lower eastern plains; broad very low angle coalescing outwash fans and associated low terraces of the Waitaki River, comprising Pleistocene glacial outwash gravels with variable loess cover, and extensive Holocene alluvium, coastal swamp deposits and minor inland dune belts. Elevation ranges from 0 - 150 m, and rainfalls from 600 - 800 mm/A.

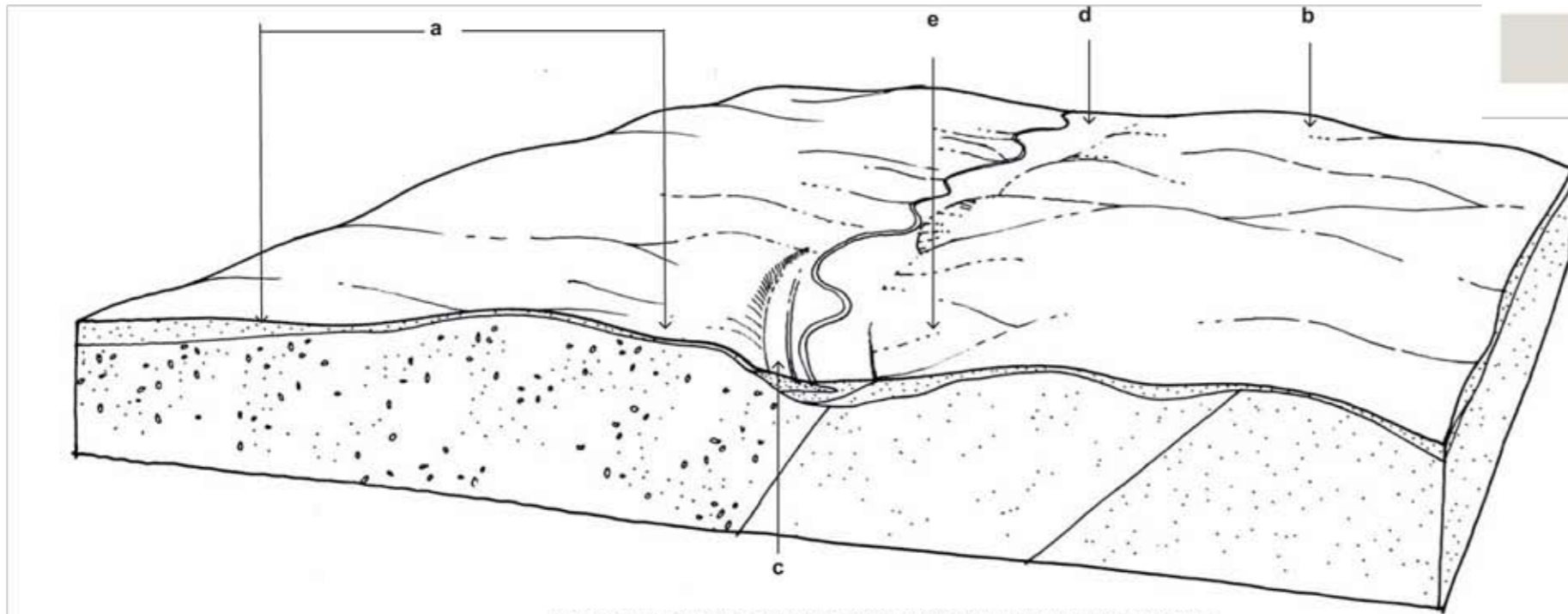
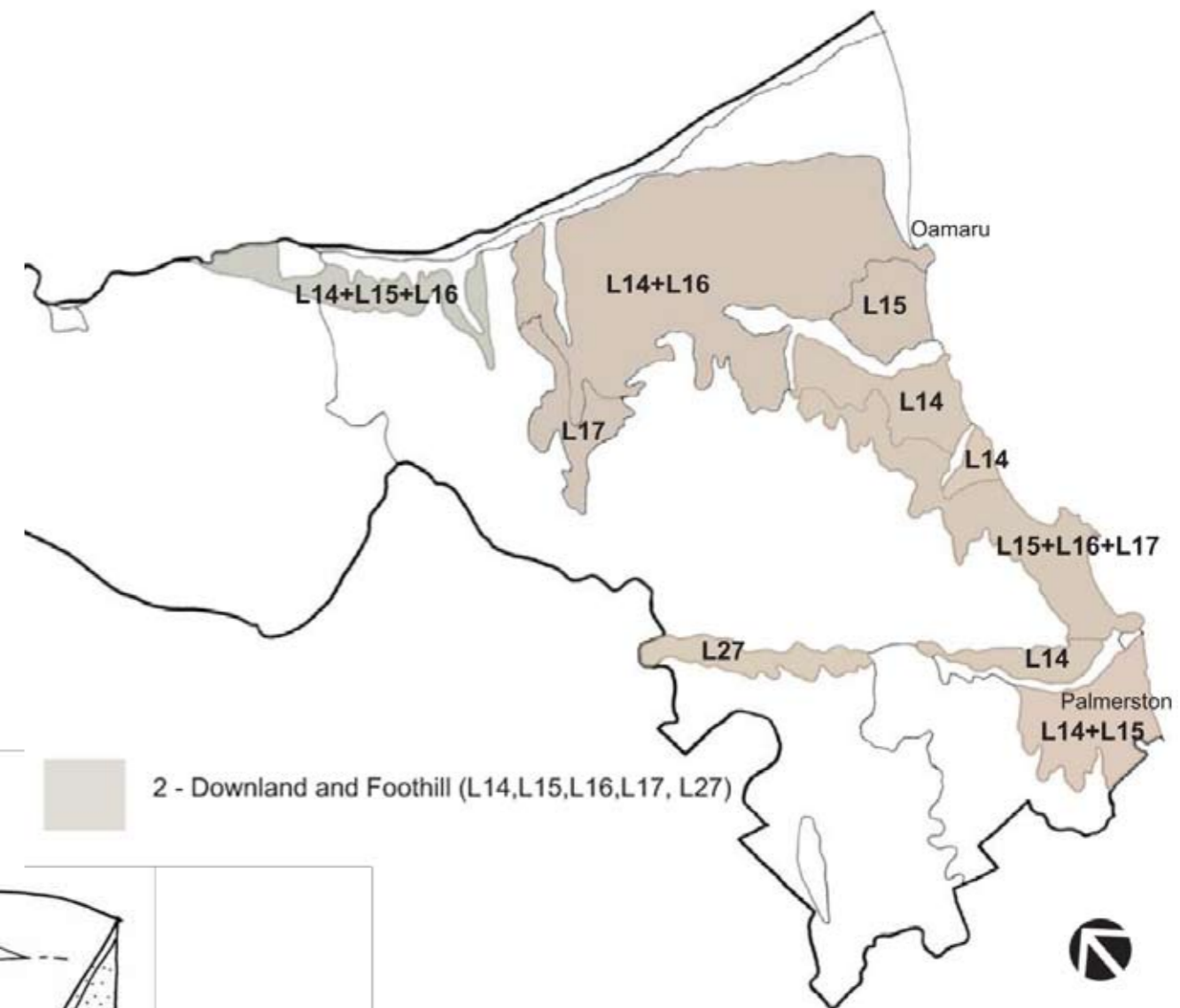
landform component	geological formation	elevation m	remnant native vegetation	present land use	agronomic potential	potential land use	potential impacts
(a) well drained stony fans and terraces	Late Pleistocene and Holocene alluvium, variable loess cover	20 - 150	short tussock grassland, matagouri, kowhai, kanuka scrub / woodland	intensive grazing, cash and feed cropping, viticulture, orchards, exotic forestry	high	cash and feed cropping, horticulture, viticulture, orchards, intensive grazing	intensified land use, windbreaks, irrigation, forestry, subdivision, 'life style' blocks
(b) poorly drained lower fan fringes	late Pleistocene and Holocene alluvium	5 - 150	wetland communities	intensive grazing, cash and feed cropping, orchards	high	cash and feed cropping, horticulture, orchards, intensive grazing	intensified land use, windbreaks, irrigation, subdivision
(c) floodbasins and meander floodplains	Holocene and Recent alluvium	5 - 150	swamp, scrubland	intensive grazing, cash and feed cropping	high	cash and feed cropping, horticulture, intensive grazing	intensified land use, windbreaks, irrigation, subdivision
(d) backswamps	Holocene and Recent alluvium	5 - 150	kahikatea forest, manuka, flax, raupo, sedge and rushland	intensive grazing, cash and feed cropping	high	cash and feed cropping, horticulture, intensive grazing	intensified land use, windbreaks, subdivision
(e) infilled channels and gravel ridges	coarse Holocene and Recent alluvium	5 - 150	danthonia grassland-scrub	semi intensive grazing, feed cropping	medium	feed and cash cropping, viticulture, semi intensive grazing	intensified land use, windbreaks, irrigation, subdivision
(f) levees	Holocene and Recent alluvium	5 - 150		intensive grazing, cash and feed cropping	high	cash and feed cropping, viticulture, horticulture, intensive grazing	intensified land use, windbreaks, irrigation, subdivision
(g) peaty backswamps	Holocene and Recent alluvium and peat	1 - 30	wetland and flax communities	intensive grazing, cash and feed cropping, horticulture	high	horticulture, cash and feed cropping, intensive grazing	intensified land use, drainage, windbreaks, subdivision



Kakanui River from above Kakanui Point looking North

Waitaki District

L2 Lower Plains Land Type



L 14 SOUTHERN LOESS MANTLED SOFT ROCK HILLS AND DOWNS LAND TYPE

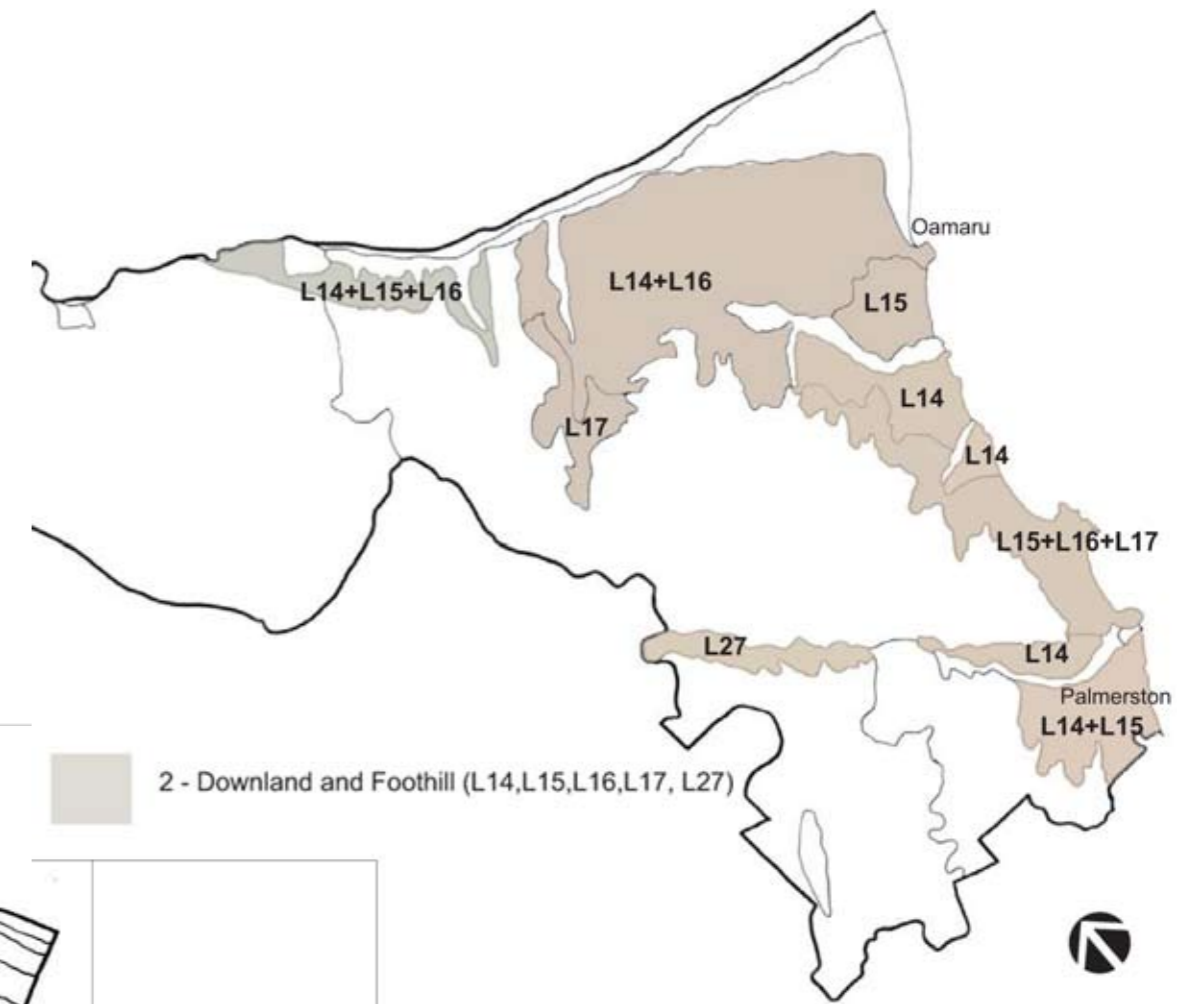
Smooth, rounded, rolling to strongly rolling downland landscapes developed on loess mantled Cretaceous / Tertiary sedimentary and igneous strata, and early Pleistocene gravels, with minor associated terraces, floodplains and fans. Elevation ranges from 0 - 500 m and rainfall from 600 to 1000 mm/A. Example areas include the Oamaru Downslands.

landform component	geological formation	elevation m	remnant native vegetation	present land use	agronomic potential	potential land use	potential impacts
(a) loess mantled 'soft' rock erosional hill slopes	Loess over Cretaceous-Tertiary sandstones, mudstones, conglomerate and tuff	0 - 500	silver tussock grassland matagouri and kowhai scrub, broadleaved scrub	intensive grazing, feed and cash cropping, exotic forestry	medium to high	intensive grazing, cash and feed cropping, exotic forestry	more intensive land use, windbreaks, subdivision, cultivation, exotic forestry
(b) spur crests and summits	Thin loess over Cretaceous-Tertiary sandstones, mudstones, conglomerate and tuff	50 - 500	silver tussock grassland matagouri and kowhai scrub, broadleaved scrub	intensive grazing, feed and cash cropping, exotic forestry	medium to high	intensive grazing, cash and feed cropping, exotic forestry	intensive grazing, cash and feed cropping, exotic forestry
(c) terraces	late Pleistocene and Holocene gravels, variable loess cover	0 - 500	short tussock grassland matagouri and kowhai scrub	intensive grazing, feed and cash cropping	high	intensive grazing, cash and feed cropping, horticulture, orchards	more intensive land use, windbreaks, subdivision, horticulture
(d) minor meander floodplains	Recent alluvium and swamp deposits	0 - 450	wetlands	intensive grazing, feed and cash cropping	high	intensive grazing, cash and feed cropping, orchards	more intensive land use, drainage, windbreaks, subdivision, horticulture
(e) fans	loess over late Pleistocene and Holocene fan deposits	0 - 450	short tussock grassland matagouri and kowhai scrub	intensive grazing, feed and cash cropping	high	intensive grazing, cash and feed cropping, orchards	more intensive land use, windbreaks, subdivision, horticulture

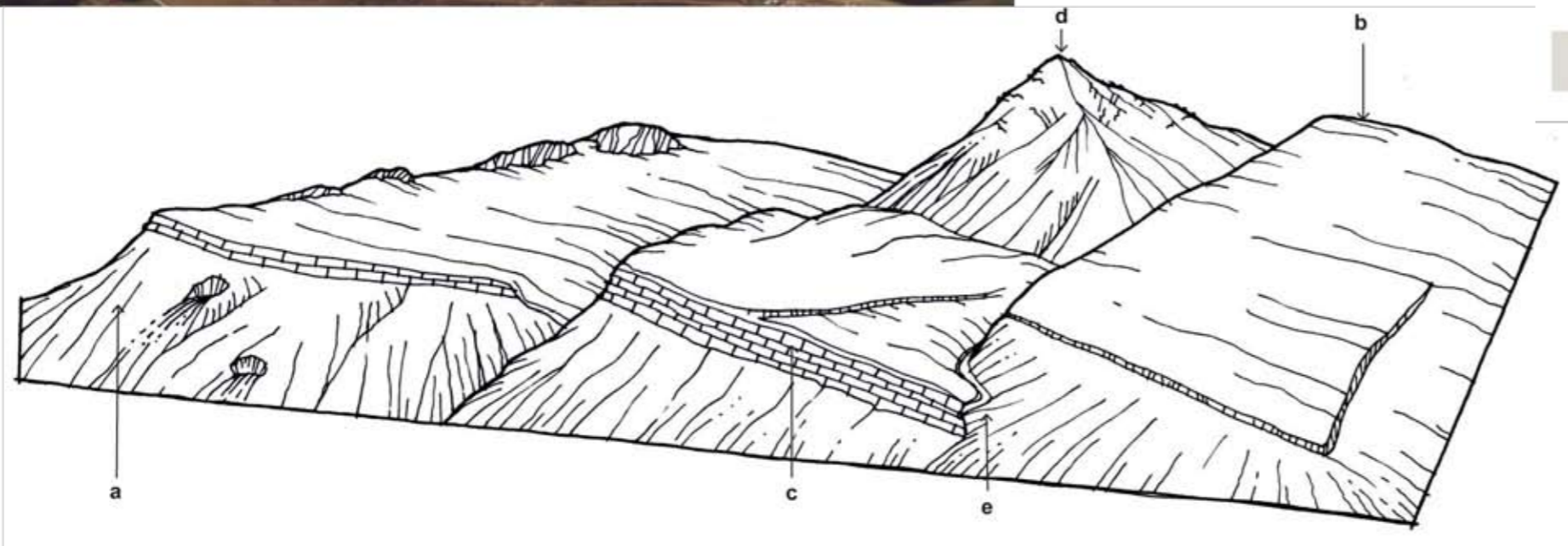
Downland and Foothill - Landscape Type B

Waitaki District

L14 Southern Loess Mantled Soft Rock Hills and Downs Land Type



Downland and Foothill - Landscape Type B



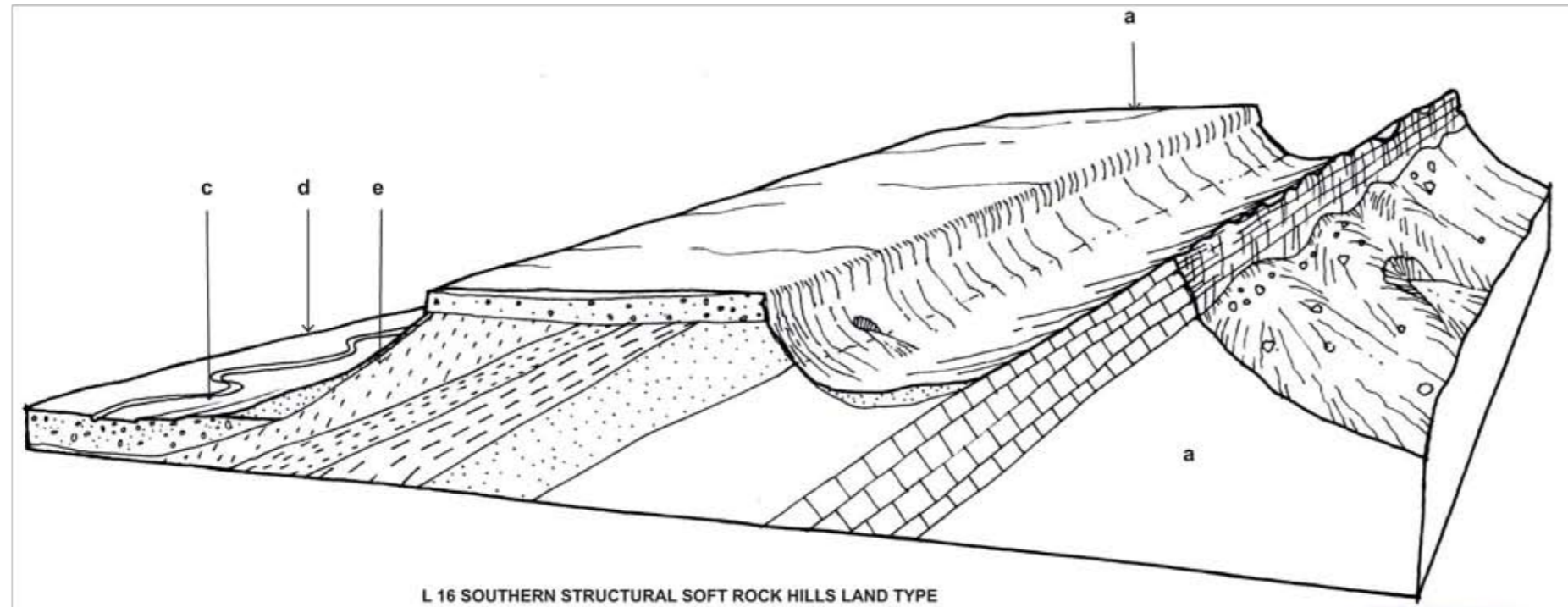
L 15 SOUTHERN SOFT ROCK HILLS AND DOWNS LAND TYPE

Hill and valley landscapes underlain by Cretaceous / Tertiary sedimentary and igneous strata, and minor associated schist rocks; incorporating smooth rounded hill slopes developed on weakly indurated strata, and minor structurally controlled hills, e.g. cuesta's and hogback's, minor 'hard rock' hill slopes and associated terraces, floodplains and fans. Elevation ranges from 40 - 600 m and rainfall from 600 to 1000 mm/A. An example area would include the Ngapara Valley district.

landform component	geological formation	elevation m	remnant native vegetation	present land use	agronomic potential	potential land use	potential impacts
(a) 'soft' rock erosional hill slopes	Cretaceous-Tertiary sandstone, mudstones, conglomerate, limestones and tuff	40 - 600	silver tussock grassland - scrub, matagouri, kowhai, manuka and broadleaved scrub	semi intensive grazing, feed and cash cropping, exotic forestry	medium	semi intensive grazing, feed and cash cropping, exotic forestry	shelter belts, fencing, tracking, exotic forest, decrease in tussock and scrub
(b) spur crests and summits	Cretaceous-Tertiary sandstones, mudstones, conglomerate and tuff	50 - 600	short tussock grassland - scrub, matagouri, kowhai, manuka and broadleaved scrub	semi intensive grazing, feed cropping, exotic forestry	low	intensive grazing, cash and feed cropping, exotic forestry, viticulture	fencing, tracking, exotic forest, decrease in tussock and scrub
(c) 'soft' rock structural landforms eg cuesta's	Cretaceous-Tertiary limestones and calcareous sandstones and tuff	40 - 600	matagouri, kowhai, broadleaved scrub,	semi intensive grazing, scrublands	medium	semi intensive grazing, exotic forestry	fencing, tracking, exotic forest, decrease in tussock and scrub
(d) 'hard' rock erosional hill slopes	Textural Zone IV schist	40 - 600	short tussock grassland - scrub, matagouri, kowhai, manuka and broadleaved scrub	extensive grazing, exotic forestry	low to medium	semi intensive grazing, exotic forestry	fencing, tracking, exotic forest, decrease in tussock and scrub
(e) terraces	late Pleistocene outwash gravels	40 - 400	short tussock grassland - scrub	intensive grazing, cash and feed cropping	high	intensive grazing, cash and feed cropping	cultivation, shelter trees, subdivision
(f) meander floodplain	Recent alluvium and swamp deposits	40 - 400	wetlands	intensive grazing and feed cropping	high	intensive grazing, feed and cash cropping	drainage, cultivation, subdivision, shelter trees
(g) fans	late Pleistocene and Holocene fan deposits	40 - 400	short tussock grassland - scrub	intensive grazing, feed cropping	high	intensive grazing, feed and cash cropping	cultivation, subdivision, shelter trees

Waitaki District

L15 Southern Soft Rock Hills and Downs Land Type



L 16 SOUTHERN STRUCTURAL SOFT ROCK HILLS LAND TYPE

Prominent structurally controlled hill and valley landscapes underlain by Cretaceous / Tertiary calcareous sedimentary rocks, igneous strata, and minor associated schist rocks; structurally controlled hill slopes, e.g. cuesta's and hogback's, with pronounced dip and scarp slopes, and minor 'hard rock' hill slopes, and associated terraces, floodplains and fans. Elevation ranges from 50 to 500 m and rainfalls from less than 600 to 1000 mm/A. Example areas would include the mid Awamoko valley area.

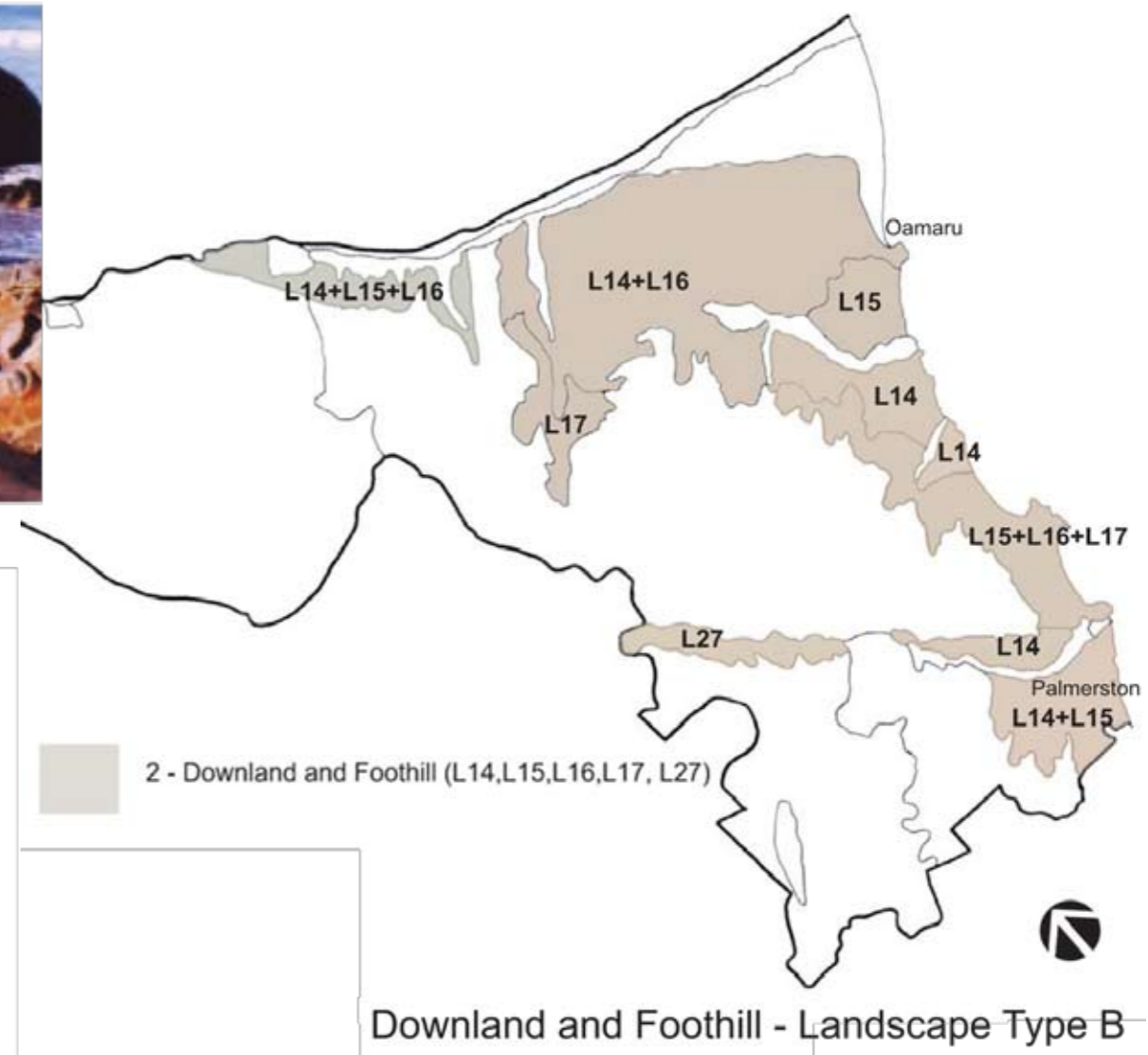
landform component	geological formation	elevation m	remnant native vegetation	present land use	agronomic potential	potential land use	potential impacts
(a) structural landforms - cuesta's, hogbacks and mesa's	Cretaceous-Tertiary limestones and calcareous sandstones, igneous and volcanogenic sediments	50 - 500	silver tussock grassland - scrub, matagouri, kowhai, manuka and broadleaved scrub	extensive and semi intensive grazing, feed cropping	high, especially on scarp and footslopes	semi intensive grazing, feed cropping, exotic forestry	fencing, tracking, exotic forest, decrease in tussock and scrub
(b) 'hard' rock erosional hill slopes	Textural Zone IV schist	50 - 500	short tussock grassland - scrub, matagouri, kowhai, manuka and broadleaved scrub	extensive grazing	low to medium	semi intensive grazing, exotic forestry	fencing, tracking, exotic forest, decrease in tussock and scrub
(c) minor terraces	late Pleistocene outwash gravels	50 - 400	short tussock grassland matagouri, kowhai scrub	intensive grazing cash and feed cropping	high	intensive grazing, cash and feed cropping	cultivation, shelter trees
(d) meander floodplain	Recent alluvium and swamp deposits	610 - 700	wetlands	extensive grazing	high	intensive grazing	increase in exotic pasture, cultivation, drainage, decrease in scrub, fencing
(e) fans	late Pleistocene and Holocene fan deposits	610 - 850	short tussock grassland matagouri, kowhai scrub	Intensive and extensive grazing, feed cropping, shelter trees	high	intensive grazing, feed cropping, exotic forestry	increase in exotic pasture, cropping, shelter trees, cultivation, fencing



Limestone overhang in the Tokarahi area.



Earthquakes, an area west of Duntroon

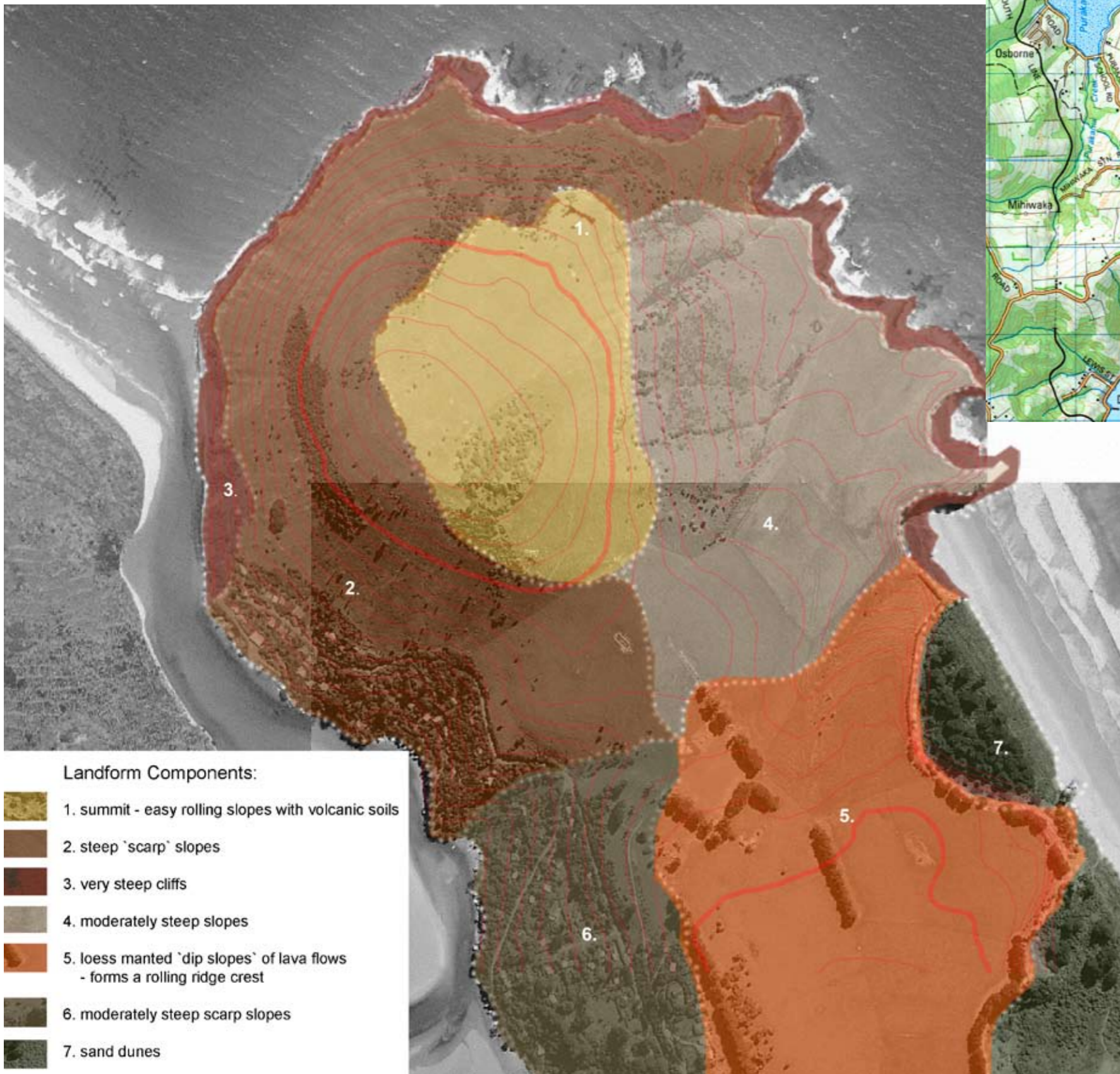


Downland and Foothill - Landscape Type B

Waitaki District

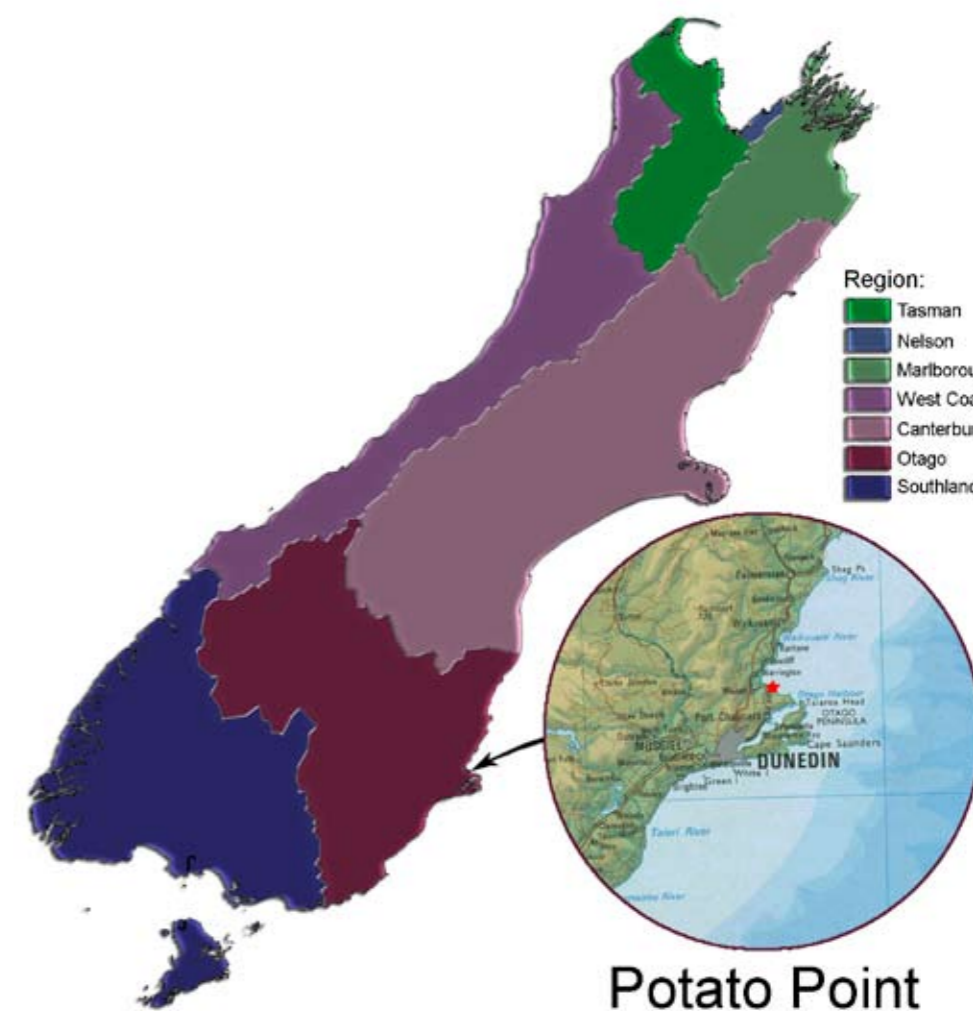
L16 Southern Structural Soft Rock Hills Land Type

Otago Region Dunedin City



Landform Components:

-  1. summit - easy rolling slopes with volcanic soils
-  2. steep 'scarp' slopes
-  3. very steep cliffs
-  4. moderately steep slopes
-  5. loess mantled 'dip slopes' of lava flows - forms a rolling ridge crest
-  6. moderately steep scarp slopes
-  7. sand dunes



Potato Point

Landform Components:

1. easy rolling slopes with volcanic soils
2. steep 'scarp' slopes
3. very steep cliffs
4. moderately steep slopes
5. loess mantled 'dip slopes' or lava flows - forms a rolling ridge crest
6. moderately steep scarp slopes
7. sand dunes
8. swamp

