

Identification and assessment of Geoheritage Values in Tasman District

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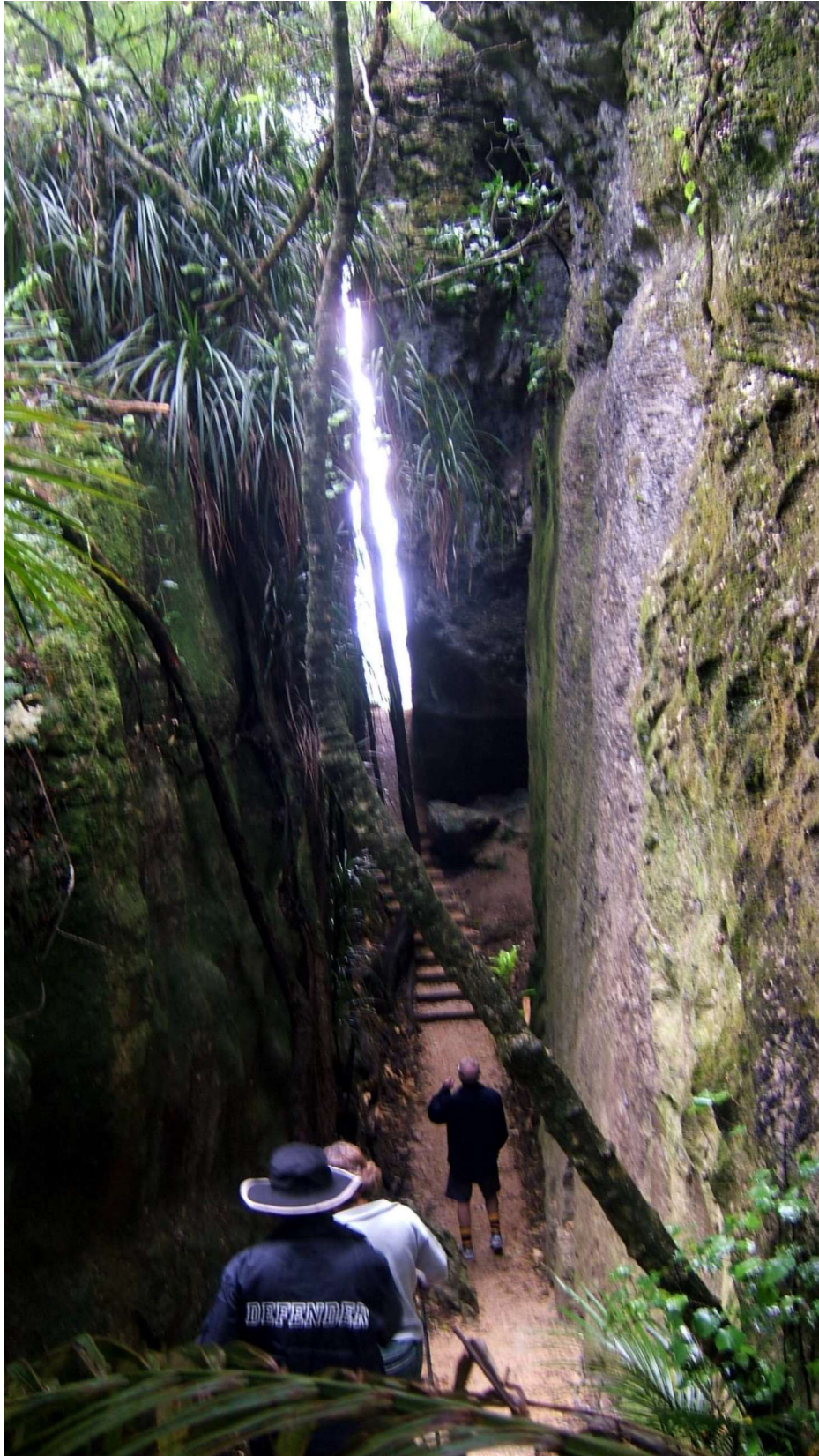


1. Horse Terrace Bridge gorge proposed ONF, Murchison

Example of a large landform ONF, Wharariki Beach sea arches

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2. The Grove limestone karst - proposed small landform ONF

Contents

1.0 Summary	4
2.0 Introduction.....	8
2.1 Definition of an ONF	
2.2 Structure of this study	
2.3 Source of information	
3.0 Criteria used for identifying, assessing and scoring potential ONFs.....	11
3.1 Assessment criteria	
3.2 ONF scoring assessment outline	
4.0 Categories of ONFs	15
4.1 Feature categories	
4.2 Example of activity table that relates to categories of ONF	
5.0 Lists of proposed ONFs for scheduling, significant sites for listing under ONLs or sites considered but not reaching ONF standard	23
Table 5.1 Proposed ONFs for scheduling in Golden Bay	
Table 5.2 Proposed ONFs for scheduling in the rest of Tasman District	
Table 5.3 Geoheritage features to be listed as significant under ONLs in Golden Bay	
Table 5.4 Geoheritage features to be listed as significant under ONLs in rest of Tasman	
Table 5.5 Features considered but not recommended as potential ONFs in Golden Bay	
Table 5.6 Features considered but not recommended as potential ONFs in rest of Tasman	
5.0 References	34



3. *A proposed small landform ONF – Lake Killarney, Takaka; a doline lake*



4. Proposed small geological exposure ONF containing a dinosaur footprint depression at Whanganui Inlet. Photo 0.5 m across

1. Summary

Dr Bruce Hayward was engaged by Tasman District Council to evaluate and map the features of high geoheritage value in the District. The purpose of this work is to inform the forthcoming Tasman Resource Management Plan District Plan Review process, which is (amongst other considerations) intended to give effect to s6(b) of the Resource Management Act 1991 and Policy 15 of the New Zealand Coastal Policy Statement 2010.

The following criteria have been used to assess, score and document the values of geoheritage features to determine whether they should be considered as candidates for classification as Outstanding Natural Features in the Tasman District.

Primary criteria: Geoscience significance; Rarity; Scenic/aesthetic values; Tourism and/or Recreational values; Community values; Educational values.

Additional criteria: State of preservation and/or naturalness; Views and visual prominence; Legibility and expressiveness; Memorability; Representative geoscience values; Research potential; Geodiversity; Geohistorical values.

To aid in the management of the diversity of high value geoheritage features (and outstanding natural features) with different levels of robustness and fragility, the features have been placed in one of the following categories: A. Large landforms; B. Small, vulnerable landforms; C. Dynamic landforms and natural physical systems; D. Large exposures of geological material; E. Small, vulnerable exposures of geological material; F. Caves.

For the convenience of Tasman District Council, the High Value Geoheritage Features (and ONFs) referenced in this report have been split into two regions - Golden Bay (marked with a ^G) and the rest of Tasman District (marked with a ^R). The majority of High Value Geoheritage Features that occur within proposed ONLs are not recommended for scheduling as ONFs as District Plan rules for ONLs should suffice to protect these and a layer showing their location as **high value landforms and geological features** has been provided.

Sites asterisked (*) in the list below are recommended for scheduling as ONFs. These have been evaluated in collaboration with Bridget Gilbert who has applied a landscape expert 'lens' to ensure a degree of consistency with the ONL assessment work that has been undertaken in the District. The Tables in section 5 of this report summarise the geoheritage values of each feature and have been used to inform the ONF Schedules in the Tasman Landscape Report (prepared by Bridget Gilbert Landscape Architecture).

29 sites in Golden Bay are proposed for scheduling as ONFs and 13 sites in the rest of Tasman District. A further 61 sites are identified and mapped and recommended for listing as **high value landforms and geological features** within ONLs but not proposed for separate scheduling, unless the ONLs are not accepted. A further 90 sites were considered but assessed as not meeting the level to be considered ONFs.



5. *Whispering Falls over NZ's largest travertine deposit, Aniseed Valley – proposed high value landform and geological site*

Proposed ONFs and high value landforms and geological features in Tasman District
Sites asterisked (*) and **bolded** in the list below are recommended for scheduling as ONFs.

A. Large robust landforms

In an ONL Coastal landforms – Aorere River delta and Ruataniwha Inlet^G; Bark and Sandfly Bays^R; ***Farewell Spit and tidal flats^G**; ***Motueka sand spits^R**; Pillar Pt to Kaihoka coastal arches and conglomerate^G; Torrent Bay^R; Wainui Bay Inlet^G
Glacially-carved landforms and moraine – Angelus Basin^R; Boulder Lake multiple cirque^G; Cobb glacial valley^G; Lake Rotoiti^R; Lake Rotoiti moraine dam and roche moutonee^R; Lake Rotoroa^R; Lake Sylvester cirque^G; upper Motueka Valley (right branch)^R
Karst related landforms - ***Canaan Downs marginal polje^G**; Goulard Range karst^G; Kaihoka tilted pavement^G; Meroiti limestone pavement^G; ***Mt Arthur marble karst and caves^G**; ***Mt Owen marble karst and caves^R**;
Landslides and landslide-dammed lakes – Blue Duck^R; Lake Matiri and block slide^R; Lake Stanley landslide dam^G; ***Lower Matakitaki 1929 landslide^R**
Plateaux, mesas and inland bluffs – Haidinger Bluffs^G; Mt Arthur Tablelands^G; Puponga conglomerate bluffs^G; The Sphinx mesa^R; ***Thousand Acre Plateau^R**
River gorges and waterfalls – ***Aorere gorges and Salisbury Falls^G**; Upper Buller Gorge^R

B. Small fragile landforms

Coastal landforms – ***Big River estuary**^G; Kaihoka dune-dammed lakes^G; ***Kaka Pt and Island**^R; Lake Otuhie dune-dammed lake^G; ***Moutere Bluff to Hina coastal cliffs**^R; Tangmere shell spits^G; Turamawiri River mouth longitudinal dunes^G

Corestone boulders – Cottage Loaf Rock^R; ***Split Apple Rock**^R

Landslide-dammed lakes – Lake Caslani and Cliff Creek lake^R

Fault traces – Speargrass Creek Alpine Fault trace^R; ***White Creek displaced terraces and road**^R

Glacial landforms - Cobb Valley roche moutonnée^G

Karst landforms – Cobb Valley magnesite and karst^G; ***Devils Boots**^G; Goulard Downs karst^G; Kaihoka Lakes solution runnels^G; ***Labyrinth Rocks karst**^G; Meroiti doline field^G; Motupipi limestone hogback and karst^G; ***Paynes Ford, Irvines Cave and Oxbow spring**^G; ***Takaka Hill marble karst**^G; ***Tarakohe coastal karst and natural tunnel**^G; Tata Islands coastal karst^G; Taupo Pt limestone islets^G; Te Hapu collapse feature and limestone pavement^G; ***The Grove karst**^G

River gorges and canyons – Falls River granite canyons^R; ***Horse Terrace Bridge gorge**^R;

Rocky ridges – Dragons Teeth Ridge^G; Lockett Range limestone gendarme^G; Old Man of the Buller^R

Sinkholes - ***Hamama-Takaka Valleys sinkholes**^G; ***Lake Killarney sinkhole lake**^G;

***Rototai Road sinkhole lake**^G Waterfalls – Cascade Falls and Cleopatra's Pool^R; ***Maruia Falls**^R; Matiri Hole in the Wall waterfall^R; Travers Falls^R; Whispering Falls travertine^R

C. Dynamic natural systems

Underground drainage systems – ***Canaan block marble caves and subterranean drainage**^G; Pearse Resurgence^R; ***Takaka Hill marble caves and subterranean drainage**^G; ***Te Waikoropupu Springs**^G

Gas seep – Blackwater burning gas seep^R

D. Large exposures of geological material

Sedimentary sequences and fossils – Baton River Devonian^R; Mt Patriarch Paleozoic sequence^R; Mt Snowden oolitic limestone^G; ***Puponga Pt fluviatile sedimentary rocks**^G; upper Tadmor sedimentary rocks and Huia Cave^R

Vertically-tilted strata – ***Longford vertical strata**^R

Folds and thrusts – Mt Patriarch folding^R

Ultramafic rocks and mélange – Red Hills ultramafic massif and Patuki Melange^R

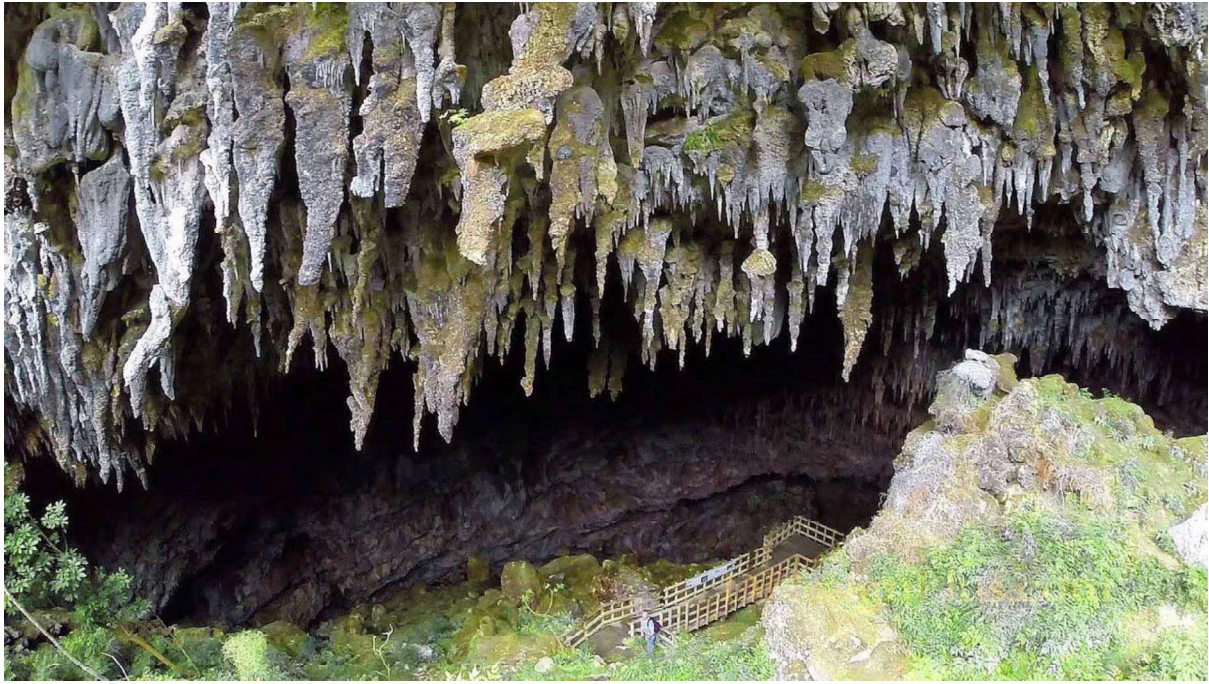
E. Small exposures of geological material

Orbicular granite – Guilbert Pt orbicular granite^R

Sedimentary sequences and fossils – ***Beebys Conglomerate Cretaceous sequence**^R;

***Nuggety Creek Road fossil leaves and sedimentary sequence**^R; ***Rangihacata fossil forest**^G; ***Trilobite Rock**^G; ***Wairoa R mouth coal measures and dinosaur footprints, Whanganui Inlet**^G

Mineral deposits – Little Ben chromite^R; Takaka Quarry asbestos^G



6. Cave entrance with spectacular biokarst – Rawhiti Cave proposed ONF

F. Caves

In marble or limestone – ***Aorere Caves^G; *Canaan block marble caves and subterranean drainage^G; * Harwoods Hole/Starlight Cave^G; *Paynes Ford, Irvines Cave and Oxbow spring^G; Moonsilver Cave^G; * Mt Arthur marble karst and caves^G; * Mt Owen marble karst and caves^R; *Ngarua Cave^G; * Paturau Caves^G * Rawhiti Cave^G; Rua Ruru Cave^G; Takaka Hill Fossil Cave^G; *Takaka Hill marble caves and subterranean drainage^G; *Te Anaroa/Rebecca Cave, Rockville^G; Upper Tadmor and Huia Cave^R**



7. Kettle lake in Rotoiti moraine proposed high value landform and geological site

2. Introduction

2.1

2.2 Structure of this study

In this study potential High Value Geoheritage Features were identified, scored and mapped in Tasman District split into two parts – Golden Bay and the rest of Tasman. Potential High Value Geoheritage Features were identified throughout the region no matter what the land ownership and location. Large parts of the district have been identified, mapped and assessed as Outstanding Natural Landscapes. In this study, most of the potential High Value Geoheritage Features lying within these ONLs are proposed not to be scheduled as ONFs, as the ONL rules in the District Plan will likely provide all the planning protection necessary for their survival.

Documented assessment and scoring sheets (Tables *) and GIS map layers have been prepared for all proposed High Value Geoheritage Features, presented separately for each of the two geographic areas and with the sites separated into those inside ONLs not intended for scheduling and the others.



8. Cobb Valley glacial valley, proposed high value landform and geological site

2.3 Source of information on potential High Value Geoheritage Features

2.3.1. New Zealand Geopreservation Inventory

The major source of potential ONFS that were considered in this study was the Geoscience Society of New Zealand's Geopreservation Inventory site at:

<https://services.main.net.nz/geopreservation/>

This primarily lists geoscientifically and educationally significant sites. Compilation of the Inventory began in 1983. It is built on the combined knowledge of the whole geoscience community voluntarily provided over a period of 20 years. It attempts to be a complete list of sites of geoscience significance, is periodically updated but clearly it will never be fully comprehensive.

Not all sites listed in the Inventory were suited for or necessarily need to be scheduled as High Value Geoheritage Features or ONF. Thus, in Tasman District the Inventory sites have been carefully considered before being assessed for ONF status. Some sites in the Inventory, particularly mineral and rock exposure sites, do not warrant the effort to schedule them as High Value Geoheritage Features (or ONF) as they already lie within conservation land or have been exposed by quarrying or road making and stopping further excavation or trimming may hide the values of such sites. In Tasman District many geological sites in the GPI have not been proposed for ONF status for the above reasons (see Tables 5.5, 5.6).

2.3.2. LINZ topographic maps and Google Earth

The NZ Geopreservation Inventory does not attempt to be a comprehensive list of landform sites that have outstanding aesthetic and scenic values or are of high value for tourism, recreation or to the community. Thus, for Tasman District a desktop search of google earth and LINZ contour maps was undertaken looking for clues to the existence of any unusual or prominent small landforms that could be considered for High Value Geoheritage Features /ONF status. These may be named features or indicated by symbols on the maps e.g. named waterfalls, caves, springs, etc. A few of these have been assessed and are proposed as High Value Geoheritage Features / ONFs (e.g. Dragons Teeth ridge, The Sphinx).



9. The Sphinx proposed high value landform and geological site



10. Split Apple Rock proposed ONF

2.3.3 Drive the roads

During site visits, many roads were driven and during these drives several additional scenically-appealing landforms were added to the draft list for assessment (e.g. Kaka Pt and Island, Kaiteriteri).

2.3.4 Local knowledge

In preparing the list of sites to assess and also in obtaining information on the significance of some sites, geoscientists with a wide specialist knowledge of the region were consulted: Prof Paul Williams, Auckland (karst and caves), Peter Crossley, Auckland (cave mapping) and Dr Michael Johnson, Nelson (geology). All three have suggested additional sites for assessment and provided descriptions of their values.



11. Tarakohe Natural Tunnel proposed ONF with high geohistorical and scenic values



12. Takaka Hill marble karst is a scenically- and scientifically-valued proposed ONF

3. Criteria used for identifying, assessing and scoring High Value Geoheritage Features

3.1 Assessment criteria

The following criteria were used in identifying potential High Value Geoheritage Features and assessing whether they are outstanding and documenting their values. The criteria are divided into primary and additional. From a geoscience perspective, to be a High Value Geoheritage Feature a feature or site must be outstanding in at least one of the primary criteria. The additional criteria are used to supplement the assessment of value of each site.

PRIMARY CRITERIA

- (a) **Geoscience significance** - the extent to which the landform, feature or geological site contributes to the understanding of the geology or evolution of the biota in the District, Region, New Zealand or the Earth;
- (b) **Rarity** - the rarity or unique nature of the feature, physical process or geological exposure within the District or Region, and few comparable examples exist;
- (c) **Scenic/aesthetic values** – extent of public appreciation of a natural feature’s visually-striking scenic beauty, or iconicism;
- (d) **Tourism and/or recreational values** – extent of a feature’s use or potential use for tourism or recreation because of the feature’s natural attributes;
- (e) **Community values** – extent of the community’s association with a natural feature which is widely known and highly valued for its contribution to local identity within its community;
- (f) **Educational values** - the existing or potential value of the feature for public education;



13. A small landform with high recreational values to the New Zealand rock climbing community is Paynes Ford limestone and biokarst bluffs proposed ONF, Takaka.

ADDITIONAL CRITERIA

Geoscience values

- (g) **Representative values** - the extent to which the feature is an outstanding representative example of the natural landforms, natural physical processes or geological features that strongly typify the character of an area.
- (h) **Research potential** of the feature to provide additional understanding of the geological or biotic history;
- (i) **Geodiversity values** – the diversity of different small landform or geological features within the site;
- (j) **Geohistorical value** - the extent to which a feature is associated with an historically important natural event (e.g. earthquake, tsunami), geologically-related industry, or historically-important individual involved in geoscience research;
- (k) **State of preservation and/or naturalness** of the feature – including degree of natural degradation of values by weathering or erosion, as well as degree of modification by humans;

Perceptual values

- (l) **Views and visual prominence** to and from the feature;
- (m) **Naturalness of the setting** – including naturalness of the vegetation cover of the site and surrounding area;
- (n) **Memorability** of the feature, because of its striking visual character and setting that make such an impact on the senses that it becomes unforgettable;
- (o) **Legibility and expressiveness** of the feature in the surrounding landscape – how clearly the feature's values can be seen;

Associative values

- (p) ***Ecological value** of the biota, including vegetation, associated with the feature;
- (q) ***Historic or archaeological values** associated with the feature;
- (r) ***Indigenous cultural values** - the importance of the feature or site to Mana Whenua (most appropriately undertaken by local iwi).

* Note that if a potential feature has high associative values (historical, archeological, ecological or indigenous cultural values) then it should be assessed and protected under these categories in a District Plan independently of this ONF evaluation.

Each of the criteria (a-o) have been considered and where appropriate documented for every assessed potential High Value Geoheritage Features (and ONF).



14. *Fossil leaves from Nuggety Creek Rd Miocene sedimentary sequence and fossil leaves proposed ONF.*

3.2 High Value Geoheritage Features **Scoring Assessment outline**

In this study weighted scores have been given for each of the assessment criteria for each site with brief documentation supporting each score. The primary criteria are weighted to give them greater significance than the secondary criteria. The scores given for all criteria for each potential High Value Geoheritage Feature have been summed and the resulting total for each site gives an indication of the perceived significance of each site.

This is the weighted scoring scheme used for the Tasman District (based on schemes used by Auckland City Council – Inner Gulf Islands District Plan and Waitomo and Kaipara draft District plans).

Values assessment:

	Significance level/ Values assessment	International/ Superlative	National/ Excellent	Regional/ Very good	District/ Good	Local/ Moderate
	PRIMARY CRITERIA					
a	Geoscience significance	64	32	16	8	4
b	Rarity	64	32	16	8	4
c	Aesthetic/scenic values	64	32	16	8	4
d	Tourism/recreational values	32	16	8	4	2
e	Community values	32	16	8	4	2
f	Educational values		16	8	4	2
	ADDITIONAL CRITERIA					
	<u>Geoscience values</u>					
g	Representative values			8	4	2
h	Research potential			8	4	2
i	Geodiversity values			8	4	2
j	Geohistorical values		16	8	4	2
k	State of preservation/naturalness		8	4	2	1
	<u>Perception values</u>					
l	Views and visual prominence		16	8	4	2
m	Naturalness of setting		8	4	2	1
n	Memorability		8	4	2	1
o	Legibility and expressiveness		8	4	2	1
	<u>Other values</u>					
p	Ecological values					
q	Historical or archaeological values					
r	Indigenous cultural values					

Total score:

Feature Category: A. Large Landform, B. Small Landform, C. Natural system, D. Large exposure, E. Small exposure, F. Cave

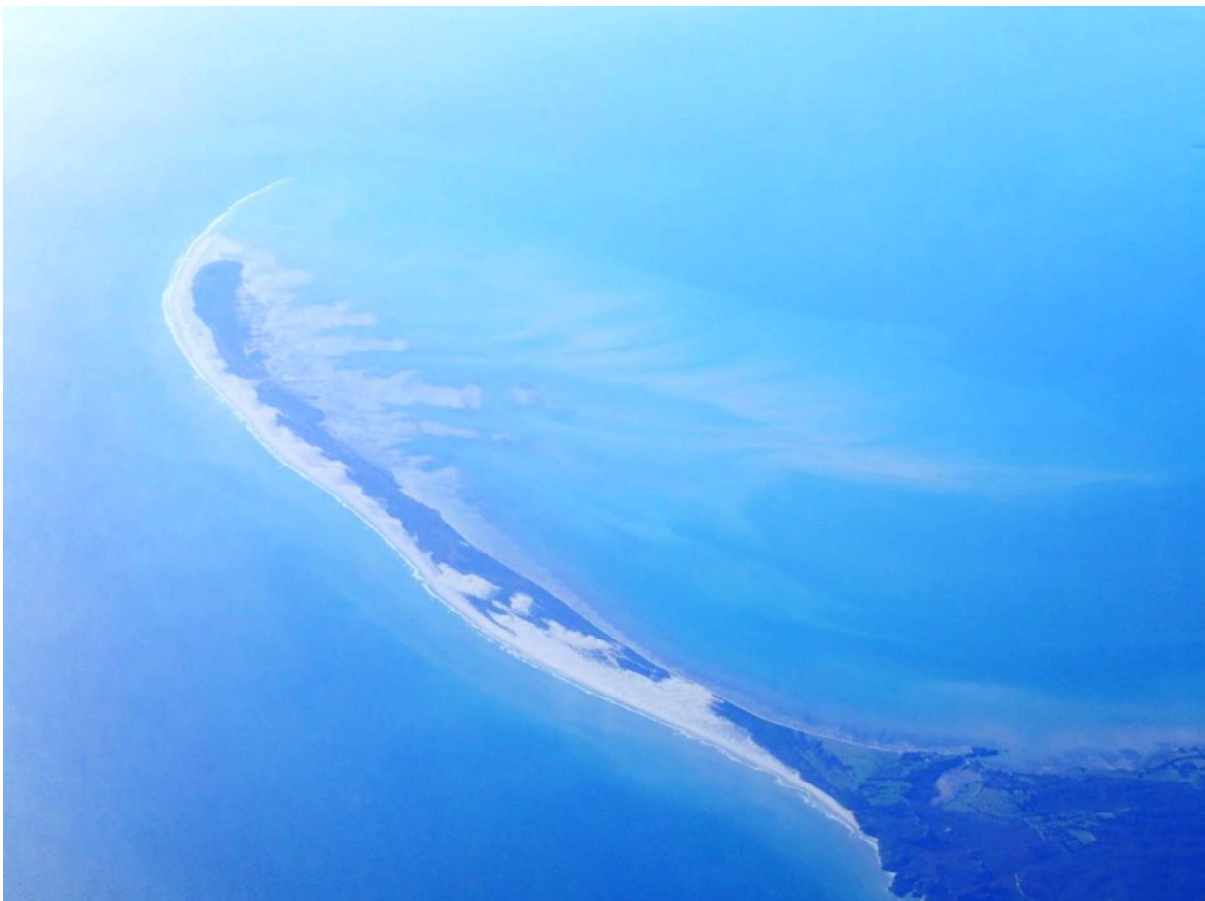
4. Categories of High Value Geoheritage Features and outstanding natural features

4.1 Feature categories

High Value Geoheritage Features (and ONFs) can be large and robust or small and vulnerable, they can be underground (caves) or dependent on continuation of processes beyond the limit of the feature (e.g. active sand dunes, gas seeps, springs). To assist management and decision-making for such a diverse range of features, the proposed High Value Geoheritage Features and ONFs have been categorised by type to provide a guide to the kind of values that make them significant, how susceptible to damage they may be from various activities, and how better to manage potential risks to their values. The categories described below are more or less the same as in the Auckland Unitary Plan, the Northland Regional Plan and the draft Waitomo District Plan.

A. Large landforms

These are prominent landforms that are sufficiently large and robust to withstand small-scale earthworks or constructions without significant impact. The prime values of such features may relate to the underlying geology which tells of the history of their formation or to their value to the community for their scenic/aesthetic/tourism/recreational/educational values. Major building construction, large scale earthworks (e.g., quarry or significant road cuttings) or planting and harvesting of commercial exotic forest can significantly detract from the integrity or hide these prominent landforms.



High Value Geoheritage Features in Tasman District

15. A - A proposed large landform ONF – Farewell Spit.

B. Small, vulnerable landforms

Small landforms or other features that could be damaged or destroyed by relatively small-scale earthworks or constructions. The values of these often spectacular, localised landforms relate to their visual and aesthetic appeal and/or geoscientific interest or educational values. Most earthworks, buildings, constructions or commercial forest plantings would adversely impact on the visual and aesthetic appeal or scientific value of these vulnerable features.



16. B - A proposed small vulnerable landform ONF – Devils Boots, Aorere.



17. B - Another proposed small vulnerable landform ONF – Labyrinth Rocks, Takaka

C. Dynamic landforms and natural systems

These are landforms, features or systems that rely on the continuation of natural physical processes in and beyond the feature for their continued existence. Because of this, these dynamic landforms or features are not only susceptible to direct damage, but to more distant actions that may impact the continuation of the natural processes (e.g. sand or shell supply; dune stabilisation; soil erosion in catchments; water extraction; river modifications). Permanent earthworks, building construction, commercial exotic forest plantings, or other actions could adversely affect the functioning and appearance of these features.



18. C - A dynamic landform proposed ONF— Farewell Spit is all younger than 7000 years old and relies on the continued supply of sand from the south.



19. C - A proposed dynamic natural physical system ONF— Te Waikoropupu Springs

D. Large exposures of geological material

High Value Geoheritage Features (and outstanding natural features) include rock formations and the details that can be seen in or extracted from these rocks. These details can only be seen where rock is visible at the surface either in natural or man-made exposures or cuttings. This category includes exposures of rock that are sufficiently large and robust that small-scale earthworks or road widening will have no significant adverse impact and in most cases will improve the visibility or freshness of features in the rocks. The values of these sites relate to the natural geological features that can be seen within the rocks and the information they contain about the history of their formation, the geological origins of the district or the fossil history of the biota of New Zealand. Large-scale earthworks, construction of buildings, vegetation plantings, grass seeding or constructions of retaining walls or erosion barriers could adversely impact the visual, educational or scientific values of these exposures.



20. D - a proposed robust exposure of geological material ONF – Puponga Pt cliff section.



21. D - a proposed large exposure of geological material ONF – Longford vertical strata, Murchison.

E. Small, vulnerable exposures of geological material

These are small, natural or man-made exposures that could be damaged or destroyed by small-scale earthworks or construction. Their prime values relate to the information they contain about the history of their geological formation or the fossil biota of New Zealand. Most earthworks, building constructions, vegetation plantings, grass hydroseeding or constructions of walls or erosion barriers are likely to adversely impact the visual, scientific or educational values of these exposures. Periodic vegetation clearance may improve their values.



22. E - A proposed small vulnerable geological exposure ONF –Trilobite Rock containing NZ's oldest fossils



23. E - A proposed small vulnerable geological exposure ONF – Rangiahaeata fossil forest, Golden Bay.

F. Caves

This category includes limestone caves, marble caves and sea caves and their entrances, which may, depending upon their depth underground, be susceptible to damage from significant earthworks, constructions or quarrying above them, or from changes in their catchments that may fill them with eroded soil or starve them of water flow.



24. F - A proposed limestone cave ONF with speleothem drapes and touristic values – Te Anaroa Cave.



25. F - a cave with recreational values – Riwaka Resurgence in the proposed Takaka Hill marble karst ONF.

4.2 Example of activity table that relates to categories of ONF

This activity table is derived from several district plans. It applies to ONFs outside the Coastal Environment. The table relates to resource consent requirements for land use and development on ONFs. It provides an indication of the sort of controls that would be necessary to adequately protect the values of the proposed ONFs as required by the RMA. There are minor differences between all these plans in the listed activities and permission levels indicated and the below example is a compromise between them.

Table 1: Activity table – Outstanding natural features overlay - Land use and development

*A-F = feature categories of 6.1

Activity	A	B	C	D	E	F
Construction						
Buildings and structures	D	NC	NC	NC	NC	RD
Earthworks						
Removal, fill, modification of more than 5 cu m	D	Pr	D	D	Pr	D
Removal, fill, modification of less than 5 cu m	P	RD	RD	D	NC	RD
Rural						
Grazing by stock	P	RD	RD	P	RD	P
Quarries of any sort	Pr	Pr	Pr	D	Pr	Pr
Forestry	RD	Pr	D	D	Pr	D
Conservation planting	P	RD	D	NC	NC	P
Fences - post and wire	P	P	RD	P	RD	P
Fences - except post and wire	RD	D	NC	D	NC	P
Utilities						
Minor infrastructure upgrading	P	RD	D	RD	NC	RD

P = permitted

RD = restricted discretionary

D = discretionary

NC = non-compliant

Pr = prohibited

Criteria for allowing discretionary activities

The council will consider the relevant assessment criteria below for the discretionary activities listed above:

1. Whether the nature, form and extent of the proposed works or activity adversely affects the values of the ONF for which the item was scheduled:
 - a. whether the activity will result in increased erosion of the ONF;
 - b. for grazing applications, whether the proposed stocking intensity will result in increased erosion of the ONF, or will result in changes to the vegetation on site in ways that will affect the values for which the ONF is scheduled e.g. grazing effects on dune vegetation resulting in changes to the nature of the dunes;
 - c. for fencing applications, whether the proposed fence requires ground disturbance or earthworks that will affect the values for which the ONF is scheduled;
 - d. whether the activity will interfere with natural processes (e.g. forestry or vegetation planting effects the natural dynamic supply of sand to wind-blown dunes or groundwater to caves).
2. Whether the proposed works or activity will cause adverse visual effects or adversely affect visual appreciation of the ONF.
3. The degree to which the ONF has already been modified so that further modification will not cause significant additional loss of the identified values.
4. The extent to which the modification is necessary.
5. The purpose of the proposed works or activity and whether it has specific connections or relevance to the scheduled ONF.
6. What alternative methods and locations are available to the applicant for carrying out the work or activities that do not affect a scheduled ONF.
7. The extent to which the proposed works will protect the ONF from further damage, or remediate it from previous damage. This excludes potential damage from the activity for which consent is sought.
8. In the case of subdivisions, the extent to which the resultant sites can be developed without affecting the values for which the ONF is scheduled.



26. Proposed small landform ONF - Hamama sinkhole lakes, Takaka Valley



27. Arika Falls in proposed upper Buller Gorge proposed high value landform and geological site

5. Lists of proposed ONFs for scheduling, significant sites for listing under ONLs or sites considered but not reaching ONF standard

Table 5.1. Proposed ONFs for scheduling that meet the assessment criteria for outstanding and natural features in the Golden Bay region of Tasman District.

Name	Type	Score	Criteria met	Significance statement
Aorere gorges and Salisbury Falls	A	74	a, b, c, d, g, k, l, m, n, o	Easily accessible examples of gorges on Aorere River and tributaries incised into the Aorere Peneplain (Waipounamu Erosion Surface). Scenic and tourist values.
Aorere Caves	F	62	a, b, c, d, f, g, I, j, n	Group of small freely accessible limestone caves with scenic and geohistorical values
Big River estuary	B	92	a, b, c, g, k, m, n, o, q, r	A pristine small river mouth estuary with high scenic and moderate scientific values.
Canaan block marble caves and subterranean drainage	F, C	116	a, b, c, d, f, g, h, I, k, l, m, n, r, s	Major subterranean drainage system with numerous caves and shafts in marble of scientific, scenic, recreational and community value.
Canaan Downs marginal polje	A	94	a, b, c, f, g, h, k, m, o	Best example of polje in New Zealand with high geoscientific and moderate scenic and educational values.
Cobb Valley magnesite and karst	B	117	a, b, c, f, g, h, j, k, r	Best exposures of talc magnesite in New Zealand and only known magnesite karst in country, of high scientific values.
Devils Boots	B	116	a, b, c, d, e, k, l, m, n, o	Two unusually shaped limestone pinnacles on either side of road that are a much loved tourist attraction.
Farewell Spit and tidal flats	A	236	a, b, c, d, e, f, g, h, k, l, m, n, q, r	Internationally significant, large and young sand spit and sheltered intertidal flats of high scientific, scenic, tourist and educational value.
Hamama-Takaka Valleys sinkholes	B	74	a, b, c, f, g, h, k, l, m, n, o, s	Numerous distinct and subsidence sinkholes in valley alluvium where gravels have slid into solution cavities in marble or limestone, of scientific and scenic value.

Harwoods Hole/Starlight Cave	F	118	a, b, c, d, g, k, l, m, n, q, r	New Zealand's deepest vertical dissolved pothole or shaft at end of dry valley, of scientific, recreational and tourist value.
Labyrinth Rocks karst	B	76	a, b, c, d, f, g, k, m, n	Among the most easily accessible, young family friendly areas of small-scale outstanding karst in Tasman District of scenic and tourist value.
Lake Killarney sinkhole lake	B	58	a, b, c, d, e, f, g, k, m, n	A scenically attractive small lake filling a sinkhole in the underlying limestone. Most accessible example of this kind of feature in Tasman District of scenic and recreational value.
Motupipi limestone hogback and karst	B	98	a, b, c, f, g, h, k, r	Superb example of a narrow low elevation hogback made of limestone of high scientific and scenic value.
Mt Arthur marble karst and caves	A, F	194	a, b, c, d, e, g, h, I, k, l, m, n, o, q, r, s	One of two areas of extensive well-developed montane marble karst in New Zealand of international scientific, scenic and recreational value.
Ngarua Cave, Takaka Hill	F	96	a, b, c, d, f, g, h, k, l, n	A relatively small but ancient, uplifted, dry marble cave used for tourism of high scientific, scenic, tourist and educational values.
Paturau Caves	F	142	a, b, c, d, e, f, g, h, j, k, l, m, n, r	Four separate caves. Uplifted old caves containing marine sediment deposited when at sea level of high scientific value (Wet Neck and Baby Grand caves); small Tunnel Cave area contains small spectacularly decorated caves of high scientific, aesthetic, recreational and community values; Twin forks Cave has nice speleothems that played a major role in the development of techniques to study paleoclimate recorded in speleothems, of geohistorical value.
Paynes Ford stalactite bluffs, Irvines Cave and Takaka oxbow spring	B, C, F	116	a, b, c, d, f, g, h, i, k, l, m, n, o	Limestone bluffs and biokarst stalactites of high scientific, scenic and recreational value. A small complex cave with three levels; of scientific and recreational values. Accessible example of a large freshwater spring flowing out of an abandoned oxbow bend of a river of scientific and educational value.
Puponga Pt fluvial sedimentary rocks	D	96	a, b, c, e, f, g, h, k, l, m, n	A scenic point and sea stack surrounded by cliffs and intertidal platforms that contain an important sequence of strata that document the history of the region between 65 and 25 million years ago; of scientific and scenic value.
Rangihaeata fossil forest	E	78	a, b, c, f, h, k, l, n, o	Weirdly shaped root systems sticking out of beach are best example of a young fossil forest in Tasman District. Scenic, educational and scientific value.
Rawhiti Cave, Takaka	F	134	a, b, c, d, f, g, h, I, k, m, n, o, q, r	Huge cave entrance with spectacular display of rare hooked biokarst stalactites of high scientific, scenic and educational value.
Rototai Road sinkhole lake	B	54	a, b, c, g, k, m, n	A scenically attractive small lake filling a sinkhole in the underlying limestone. One of two similar features close to Takaka in Tasman District of scenic value..
Takaka Hill marble caves and subterranean drainage	F, C	144	a, b, c, d, f, g, h, j, k, l, n, o, r	Major subterranean drainage system with numerous caves and shafts in marble of scientific, scenic, recreational and community value.
Takaka Hill marble karst	B	126	a, b, c, d, f, g, h, j, k, l, n, o, r	Most easily accessible and visible karst developed in marble in New Zealand of scientific and scenic value.
Tarakohe coastal karst and natural tunnel	B	112	a, b, c, d, g, j, l, m, n, r	Coastal cliffs of karst limestone with tunnel created by pinnacle tilted during Murchison Earthquake; of high scenic and geohistorical value.
Te Anaroa/Rebecca Cave, Rockville	F	78	a, c, d, f, g, I, k, m, o, q, r, s	A typical limestone cave with wet and abandoned dry passages with nice speleothems and high touristic values.
Te Waikoropu Springs	C	218	a, b, c, d, e, f, g, h, k, , m, n, o	Most important karst spring in Southern Hemisphere of high scientific, scenic and tourist value.
The Grove karst	B	94	a, b, c, d, e, g, k, l, m, n, q	An excellent example of grikes, clints, pinnacles and sink holes set in mature rata forest.
Trilobite Rock	E	160	a, b, c, e, f, h, j, k	An internationally important scientific site for its rich trilobite and other fossil fauna and as the oldest fossils in New Zealand.
Wairoa R mouth coal measures and dinosaur footprints, Whanganui Inlet	E	90	a, b, f, h, j, k	Cliff and foreshore rock exposures of shallow marine and freshwater coal measure sequence containing cross-sections through dinosaur footprints.



28. Maruia Falls, Murchison proposed ONF.

Table 5.2 Proposed ONFs for scheduling that meet the assessment criteria for outstanding and natural features in the Tasman District other than Golden Bay.

Name	Type	Score	Criteria met	Significance statement
Beebys Conglomerate Cretaceous terrestrial sequence	E	61	a, b, g, h, i, k	Road cutting is best exposed example of Cretaceous fluvial conglomerate and coal sequence in east Tasman District. Fossil leaves also present. Partly overgrown.
Horse Terrace Bridge gorge	B	122	a, b, c, d, e, g, h, i, k, l, m, n, o	Scenically attractive sluice-like gorge with superb views from road bridge over it. Unusual sluice box gorge origin.
Kaka Point and Island, Kaiteriteri	B	70	a, b, c, d, g, k, l, m, o	Small granite island and point of scenic value as part of the tourist and recreational attraction of highly popular Kaiteriteri Beach.
Longford vertical strata	D	82	a, b, c, f, g, l, k	Visually arresting steep slopes crossed by near-vertical beds of hard conglomerate that have been tilted up from horizontal during formation of the huge Longford Syncline provide visual evidence of the spectacular Syncline.
Lower Matakita 1929 landslide	A	88	a, b, d, f, g, j, k, l, o	Readily observable classic combination of large landslide scarp and 1 sq. km of landslide deposit that swept across river and was deposited on the valley floor. Of considerable historic significance as it was generated by the 1929 Murchison Earthquake, demolished the Morel homestead (with four deaths) and dammed and diverted the river.
Maruia Falls	B	103	a, b, c, d, f, g, k, m, o	Visually attractive waterfall with unusual history of exhumation as a result of 1929 Murchison Earthquake.
Motueka sand spits	A	82	a, b, c, d, f, g, k, l, m, o, r	Unusually shaped, multiply stranded sandspit. One of the fastest-growing sandspits in New Zealand.
Moutere Bluff to Hina coastal cliffs	B	86	a, b, c, f, g, h, k, l, o	Best exposure of Moutere Gravel that fills Moutere Graben. Only substantial sea cliffs along Tasman Bay coast between Tahunanui and Riwaka River.
Mt Owen marble karst and caves including Pearse Resurgence	B & F	226	a, b, c, d, e, g, h, i, k, l, m, n, o, q, r, s	One of two areas of extensive well-developed montane marble karst in New Zealand of international scientific, scenic and recreational value. Longest cave in New Zealand. New Zealand's best cave.
Nuggety Creek Road fossil leaves and sedimentary sequence	E	86	a, b, f, g, h, l, k	Road cuttings exposing mid Miocene fluvial and freshwater sedimentary rocks containing rich and diverse fossil leaves, among best in NZ of this age.

Split Apple Rock	B	100	a, b, c, d, e, g, k, l, n, o	A spectacular large granite corestone split into two halves like a split apple. A popular tourist attraction.
Thousand Acres Plateau	A	134	a, b, c, d, g, I, k, l, m, n, o, q, r	Best example in New Zealand of an uplifted plateau surrounded by high limestone bluffs.
White Creek Fault displaced terraces and road	B	89	a, b, d, f, j, k	One of the few preserved examples of a surface fault rupture and displacement that occurred during an historic earthquake. Easily viewable and of educational and historic value. White Creek Fault Scientific Reserve. Remnants of the fault scarp across the main Buller Rd that was displaced 4.5 m vertically during historic Murchison Earthquake. Can be compared with historic photos.



29. The everlasting flames of Blackwater gas seep proposed high value geological site are a tourist attraction in Murchison.

Table 5.3. Sites that meet the assessment criteria for ONFs but are not recommended for scheduling as they occur in ONLs and should be listed and mapped as high-value landforms and geological features within the respective ONLs in the Golden Bay region of Tasman District.

Name	Type	Score	Criteria met	Significance statement
Aorere River delta and Ruataniwha Inlet	A	70	a, b, c, e, f, g, h, k, l, m, n, o, r	Small river delta flowing into tidal inlet behind sand barrier with scientific, community and scenic values.
Boulder Lake multiple cirque	A	98	a, c, d, g, i, k, l, m, n, r	Outstanding examples of cirques, tarns and striated rocks of high scenic and moderate recreational and scientific value.
Cobb glacial valley	A	120	a, c, d, e, f, g, h, l, k, l, n, o, r	Most easily accessible and viewed U-shaped glacial valley in Tasman District with high scenic, scientific, recreational, geodiversity and educational values.
Cobb Valley roche moutonnée	B	56	a, b, c, f, g, k, o	Excellent, easily accessible example of small roche moutonnée of high educational value.
Dragons Teeth Ridge	A	108	b, c, d, e, g, k, l, m, n, o, q, r	One of most rugged and scenically attractive mountain ridges in Tasman District of high landform, scenic and recreational value.
Goulard Downs karst	B	98	a, b, c, d, f, g, j, k, l, m, n, r	Small area of intricate limestone karst clothed in magical mosses and natural vegetation of high scenic and tourist values.
Goulard Range karst	A	92	a, b, c, g, k, m, n, q, r	Excellent example of mature karst landforms beneath natural forest of high scientific and scenic value.
Haidinger Bluffs	A	60	b, c, k, l, m, n, o, r	High bluffs in native forest with high scenic values.
Harwoods Hole/Starlight Cave	F	118	a, b, c, d, g, k, l, m, n, q, r	New Zealand's deepest vertical dissolved pothole or shaft at end of dry valley, of scientific, recreational and tourist value.
Kaihoka dune-dammed lakes	B	90	a, b, c, d, k, l, m, n, r	Two excellent examples of dune-dammed lakes and some of the surrounding dunes of landform and scenic value.
Kaihoka Lakes solution runnels	B	64	a, b, c, g, k	Rocky hillside made of limestone with beautifully developed solution runnels of high scenic and landform value.
Kaihoka tilted pavement	A	78	a, b, c, g, h, l, m, n, o	Large west-tilted, highly dissected limestone pavement bordered to east by bluffs, all of high geoscientific and scenic value.
Lake Otuhie dune-dammed lake	B	66	a, b, c, g, k, l, m, n, r	Excellent example of a dune-dammed lake with bluffs on one side of scenic and landform value.
Lake Stanley landslide dam	A	86	a, b, c, d, g, k, l, m, n, o, q, r	One of the largest and best examples of a permanent lakes created by a landslide dam during the Murchison Earthquake of high scenic and scientific value.
Lake Sylvester cirque	A	84	a, b, c, g, h, k, l, m, n, o, q, r	A classic example of a glacial cirque basin containing a tarn lake. The fresh rock walls have excellent exposures of two kinds of Paleozoic conglomerate rocks; of scientific and scenic value.
Lockett Range limestone gendarme	B	90	a, b, c, g, h, k, l, m, n, o, q, r	Major thrust fault and Ordovician limestone sliver preserved in an unusual gendarme of high scientific and scenic value.
Meroiti doline field	B	50	a, b, c, g, k, m	Small field of dolines of geoscientific value.
Meroiti limestone pavement	A	80	a, b, c, g, h, k, l, m, n, o, q	Excellent example of highly dissected limestone karst pavement bounded to east by bluffs of high scientific and scenic values.
Moonsilver Cave	F	68	a, b, c, d, g, k, m	One of longest cave in Oligocene limestone in Tasman District. Contains good speleothems; of scenic and recreational value.
Mt Arthur Tablelands	A	100	a, b, c, d, g, h, k, l, m, n, o, q, r	One of the best examples in New Zealand of an uplifted and exhumed peneplain with outliers of limestone and caves on top of scientific, scenic and recreational value.
Mt Snowden oolitic limestone	D	96	a, b, g, h, k	Only example in New Zealand of unusual oolitic limestone. One of oldest rocks in New Zealand. Of high scientific value.
Pillar Pt to Kaihoka coastal arches and conglomerate	A	204	a, b, c, d, e, f, g, h, k, l, m, n, o, q	Coastal scenery comprised of ancient river gravels eroded into some of the internationally spectacular sea arches, caves and stacks. Also high tourist and scientific value.
Puponga conglomerate bluffs	A	60	a, b, c, g, h, k, l, m, n, o	Spectacular inland conglomerate bluffs with dip slope away from them of high scenic value.
Rua Ruru Cave	F	76	a, b, h	A small natural cave containing fossil bird bones of scientific importance.
Takaka Hill Fossil Cave	F	88	a, b, g, h, r	A small cave containing rich and well-preserved fossils of vertebrates and land molluscs of considerable scientific value.

Takaka Quarry asbestos	E	74	a, b, f, j, k	Largest, most visible and one of the most easily accessible examples in New Zealand of asbestos and talc mineralisation within ultramafic rocks; of scientific value.
Tangmere shell spits	B	66	a, b, c, f, g, h, k, l, m, n, o, r	Best examples in Tasman District of uncommon coastal landform of scientific and aesthetic value.
Tata Islands coastal karst	B	88	a, b, c, d, e, g, k, l, m, n, o, r	Stunning coastal karst with partly drowned small-scale landforms mostly formed when sea level was lower of high scenic, tourist and recreational values.
Taupo Pt limestone islets	B	80	a, b, c, d, g, k, l, m, n, o, r	Stunning coastal karst with partly drowned small-scale landforms mostly formed when sea level was lower of high scenic, tourist and recreational values.
Te Hapu collapse feature and limestone pavement	B	64	a, b, c, k, l, m, q, r	An unusual collapsed area surrounded by cliffs and containing large limestone blocks of scientific and scenic value.
Turamawiri River mouth longitudinal dunes	A	62	a, b, c, g, h, k, l, m, n, o, r	Unusual elongate coastal sand dunes with interdune ponds of high scientific and moderate scenic values.
Wainui Bay Inlet	A	80	a, b, c, d, e, f, g, h, k, l, m, n, r	A large scenically attractive inlet with two contrasting barrier landforms on either side of the entrance. Golden sand flats in the bay outside the inlet.

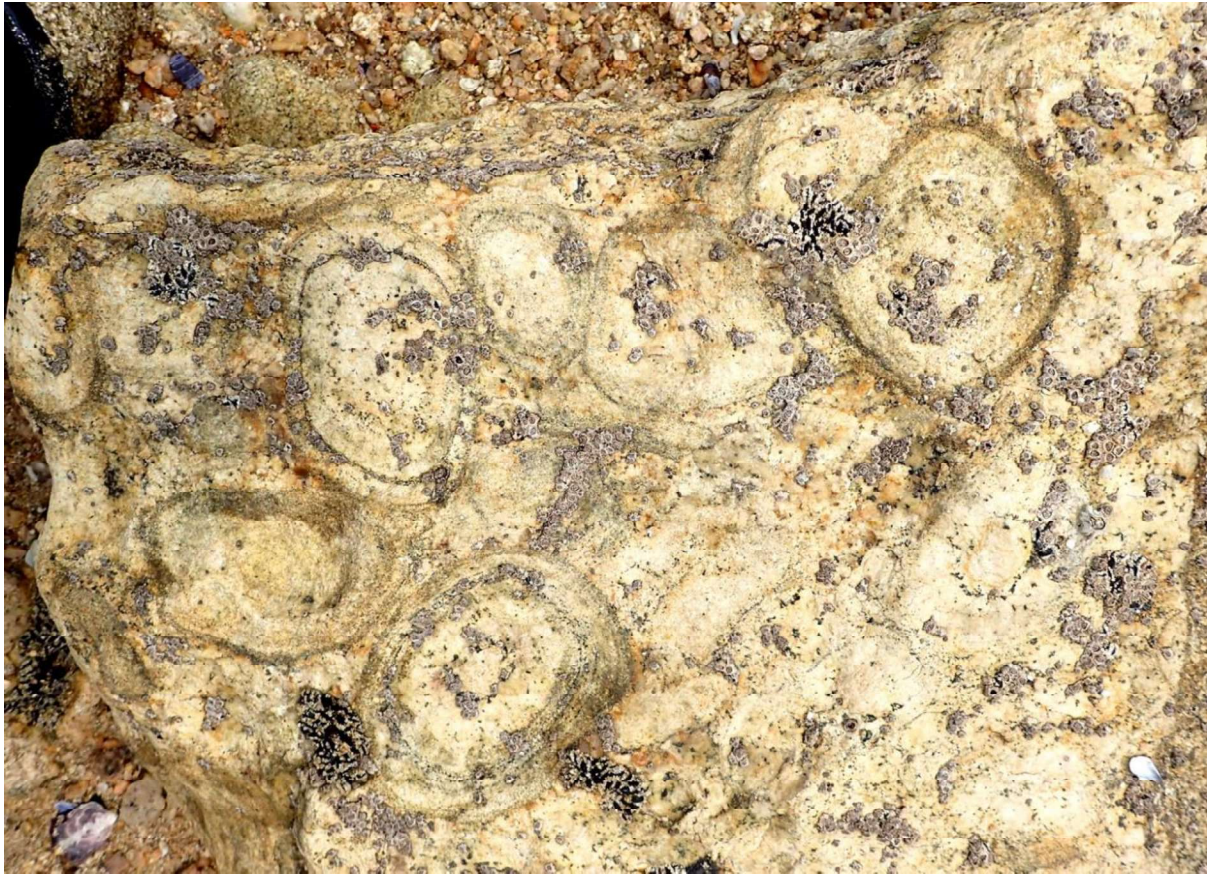


30. Old Man of the Buller proposed high value landform, Murchison

Table 5.4. Sites that meet the assessment criteria for ONFs but are not recommended for scheduling as they occur in ONLs and should be listed and mapped as high-value landforms and geological features within the respective ONLs in Tasman District other than Golden Bay.

Name	Type	Score	Criteria met	Significance statement
Angelus Basin cirques and tarns	A	98	a, c, d, g, i, k, l, m, n, r	Outstanding example of a large cirque lake, tarns and lofty peaks of high scenic, recreational and moderate scientific value.
Bark and Sandfly Bays sand barriers and estuaries	B	98	a, b, c, d, f, g, k, l, m, n, o	Two of best examples in region of granite-derived yellow sand beaches and idyllic small estuary-bays with sand spits across their mouths.
Baton River Devonian fossils	D	106	a, b, g, h, I, k, m	One of only two areas of fossiliferous Devonian sedimentary rocks in New Zealand with diverse fossil fauna.
Blackwater burning gas seep	C	118	a, b, d, e, f, g, h, j, k, m, n, o	Unusual example of a hydrocarbon gas seep in small grotto in natural forest. Only example of a continuously burning gas seep in New Zealand.
Blue Duck landslide-dammed lake	A	63	a, b, c, g, k, m	Excellent, but remote, example of a large, ancient, reforested landslide in soft sedimentary rocks that has dammed a stream creating a small idyllic lake that is starting to fill with sediment.
Cottage Loaf Rock	B	86	a, b, c, d, g, k, l, m, n, o	A spectacular giant granite corestone in the rounded shape of a huge cottage loaf. A tourist attraction for people on boat trips along the Abel Tasman Nat Pk coast.
Falls River granite canyons	B	80	a, b, c, d, g, k, m, n, o	Amazing water-smoothed and eroded granite-walled canyons and waterfalls in remote natural setting.
Guilbert Pt orbicular granite	E	102	a, b, g, h, k, m, o	Possibly the best in-situ and reasonably accessible example of orbicular granite in New Zealand
Johnson Creek 1929 landslide	B	60	a, b, c, d, g, k, m	Excellent and well-preserved example of a 1929 landslide with walking track access.
Lake Caslani and Cliff Creek lake	B	61	a, b, g, k, m, q	Picturesque but remote examples of lakes ponded behind landslides in mudstone country.
Lake Matiri, debris dam and block slide	A	76	a, b, c, d, g, h, k, l, m, n	Picturesque lake ponded behind a rockslide debris dam. The landslide is an excellent example of sliding of slabs of Miocene sedimentary rocks down bedding planes inclined towards the valley.
Lake Rotoiti glacially-eroded valley	A	164	a, b, c, d, e, f, g, h, I, k, l, m, n, o	Scenically spectacular, classic glacially-carved valley with narrow elongate lake. A much-loved recreational and tourist attraction.
Lake Rotoiti moraine dam and roche moutonee	A	82	a, b, c, d, f, g, i, k, l, m, o	Sequence of terminal moraines that dam the lake, showing successive glacial advances and retreats during the Last Glacial period. Also kettle lake ponds and Black Hill roche moutonee.
Lake Rotoroa glacially-eroded valley	A	148	a, b, c, d, e, f, g, h, I, k, l, m, n, o	Scenically spectacular, classic glacially-carved valley with narrow elongate lake. A much-loved recreational and tourist attraction. Black Hill is largest remnant.
Little Ben chromite	E	96	a, b, g, h, j, k, m	Small historic quarry exposure of 3 m wide vein of nodular chromite in serpentinite. Best nodular chromite in New Zealand.
Matiri Hole in Wall Waterfall	B	176	a, b, c, d, g, h, k, l, m, n, o	Waterfall that periodically gushes out of a cave part way up a 200 m high bluff of calcareous siltstone is of national rarity, a helicopter tourist destination in a remote natural setting.
Mt Patriarch folding	D	83	a, b, c, g, i, k, l, m, q, r	Large recumbent folds and thrusts in Paleozoic rocks exposed in high mountain bluffs.
Mt Patriarch Paleozoic sequence	D	116	a, b, c, g, h, i, k, m, q	Unique section through upper Cambrian and lower Ordovician carbonate sedimentary rocks with excellent conodonts, molluscs and New Zealand's richest trilobite fossil faunas.
Old Man of the Buller	B	94	a, b, c, d, e, g, k, l, m, n, o	Rocky ridge crest of Oligocene conglomerate sitting over granite creates skyline profile resembling a gnarled face looking skyward. Of local community and tourist value.
Owen Valley hogback ridge	A	64	a, b, c, f, g, k, l, o	A prominent and unusual steeply-descending hogback ridge being part of the eastern limb of the Longford Syncline complex.
Red Hills ultramafic massif and Patuki Melange	A, D	142	a, b, c, g, h, i, j, k, l, m, n, o	Large, uplifted and eroding massif of well-exposed red-tinged ultramafic rocks that were critical in the recognition of the Alpine Fault. Also well-exposed ultramafic mélange of tectonic origins and significance to the history of the basement rocks of New Zealand.

Speargrass Creek Alpine Fault trace	B	97	a, b, f, g, h, i, k, m	Excellent trace and exposures of Alpine Fault showing schist thrust over late Pleistocene gravels and shearing. Valley has eroded along fault.
The Sphinx mesa	A	74	a, b, c, g, h, l, k, l, m	A good example of a prominent mesa. Prominent bluffs composed of a syncline of Oligocene conglomerate.
Torrent Bay, Cascade Falls and Cleopatra's Pool	B	86	a, b, c, d, f, g, l, k, l, m, n, o	Unmodified, scenically-attractive, natural tidal estuary-bay with sand barrier across mouth, upstream Cleopatra's Pool has an amazing narrow natural waterslide eroded in granite.
Upper Buller Gorge	A	188	a, b, c, d, e, f, g, h, i, k, l, m, n, o	One of the most easily accessible, visually appreciated, major river gorges in the South Island. Highly variable character as a result of the wide variety of rocks and fault lines it has eroded through. includes 4 m-high Ariki Falls (Cascades) formed by uplift on the White Creek Fault during 1929 Murchison Earthquake. Of high scenic, tourist and recreational value.
Upper Motueka River (right branch) glaciated valley	A	78	a, b, c, g, k, l, m, o	Excellent example of a classic U-shaped glaciated valley and moraine in natural condition in a remote location.
Upper Tadmor Valley Eocene-Oligocene sedimentary rocks and Huia Cave	D, F	91	a, b, g, h, i, k, m	Stream bed rock exposures provide best sections through transgressive sedimentary rock sequence of coal measures, greensand, algal limestone and siltstone in the District. Unusual stream cave system dissolved mostly along bedding planes in sandy limestone with long strike passages and short joint passages joining them. Unusual example of stream capture through a cave. Access over private land.
Whispering Falls travertine	B	120	a, b, c, d, g, k, m, o	Scenic waterfall and terraces flows over largest deposit of travertine in New Zealand. Secondary tourist attraction in natural setting.



31. Multi-shelled orbicules in Guilbert Pt orbicular granite proposed high value landform and geological site, Abel Tasman National Park coast.

Table 5.5 Natural features considered but not recommended as potential ONFs in Golden Bay

Feature name	Source	Reason for non-inclusion
Aorangi Mine first NZ graptolite discovery	NZ Geopreservation Inventory	Geological exposure within a Forest Park not worth assessment because of lack of threats.
Aorangi Mine Ordovician graptolites, Anthill Creek	NZ Geopreservation Inventory	Geological exposure within a Forest Park not worth assessment because of lack of threats.
Aorangi Mine Ordovician graptolites, Slaty Creek	NZ Geopreservation Inventory	Geological exposure within a Forest Park not worth assessment because of lack of threats..
Aorere goldfields	NZ Geopreservation Inventory	More appropriately protected as an historic site.
Aorere valley peneplain remnants	NZ Geopreservation Inventory	Large feature more appropriately considered for protection as a natural landscape.
Boulder Lake metamorphosed schist	NZ Geopreservation Inventory	Geological exposure within a National Park not worth assessment because of lack of threats.
Canaan Valley hornfels	NZ Geopreservation Inventory	Geological exposure within reserve land not worth assessment because of lack of threats.
Canaan Valley scheelite	NZ Geopreservation Inventory	Geological exposure within reserve land not worth assessment because of lack of threats.
Canaan Valley skarn	NZ Geopreservation Inventory	Geological exposure within reserve land not worth assessment because of lack of threats.
Chaffey's Creek ridge Ordovician fossils, Cobb Valley	NZ Geopreservation Inventory	Geological exposure within a National Park not worth assessment because of lack of threats.
Cobb Valley Cambrian volcanics	NZ Geopreservation Inventory	Geological exposure within a National Park not worth assessment because of lack of threats.
Cobb Valley slate (Leslie Formation)	NZ Geopreservation Inventory	Geological exposure within a National Park not worth assessment because of lack of threats.
Copperstain Creek porphyry and skarn	NZ Geopreservation Inventory	Geological exposure within a National Park not worth assessment because of lack of threats.
Eliot Creek porphyry	NZ Geopreservation Inventory	Geological exposure within a National Park not worth assessment because of lack of threats.
Graptolite Hill Ordovician fossils, Cobb Valley	NZ Geopreservation Inventory	Geological exposure within a National Park not worth assessment because of lack of threats.
Hansen Winter	Tasman District Council	Made part of Tarakohe coastal karst proposed ONF.

Heaphy Track homfels	NZ Geopreservation Inventory	Geological exposure within a National Park not worth assessment because of lack of threats.
Iron Ridge Cambrian section, Cobb Valley	NZ Geopreservation Inventory	Geological exposure within a National Park not worth assessment because of lack of threats.
Johnstons United Gold Mine	NZ Geopreservation Inventory	More appropriately protected as an historic site.
Kairuru marble quarry, Takaka Hill	NZ Geopreservation Inventory	More appropriately protected as an historic site.
Ligar Bay quartz diorite	NZ Geopreservation Inventory	Significant natural geological exposures not requiring any protection.
Ligar Bay tourmaline	NZ Geopreservation Inventory	Significant natural geological exposures not requiring any protection.
Mangarakau Wetlands	NZ Geopreservation Inventory	Large feature more appropriately considered for protection as a natural landscape with high natural vegetation values.
Motupipi lime kiln	NZ Geopreservation Inventory	More appropriately protected as an historic site.
Mt Burnett dolomite	NZ Geopreservation Inventory	Large feature more appropriately considered for protection as a natural landscape with high natural vegetation values.
Mt Burnett uvarovite and Zn-chromite	NZ Geopreservation Inventory	Natural exposures of rock not requiring special protection.
Mt Mytton early Paleozoic section	NZ Geopreservation Inventory	Geological exposure within a National Park not worth assessment because of lack of threats.
Nguroa to Paturau limestone coastal features	NZ Geopreservation Inventory	Large feature more appropriately considered for protection as a natural landscape.
Onekaka Iron Works complex	NZ Geopreservation Inventory	More appropriately protected as an historic site.
Parapara hematite quarry	NZ Geopreservation Inventory	Old quarry exposures of rock not requiring special protection.
Parapara Peak Permian fossils	NZ Geopreservation Inventory	Geological exposure within a National Park not worth assessment because of lack of threats.
Parapara Quarry tourmaline	NZ Geopreservation Inventory	Old quarry exposures of rock not requiring special protection.
Pariwhakao River kyanite	NZ Geopreservation Inventory	Geological exposure within a National Park not worth assessment because of lack of threats.
Paturau marine terraces	NZ Geopreservation Inventory	Large feature more appropriately considered for protection as a natural landscape with high natural vegetation values.
Puponga Mine and Cretaceous fossil macroflora	NZ Geopreservation Inventory	More appropriately protected as an historic site.
Rangihaeata Head coal measures	NZ Geopreservation Inventory	Natural exposures of rock not requiring special protection.
Richmond Flat tourmaline	NZ Geopreservation Inventory	Significant natural geological exposures not requiring any protection.
Rockville lime kiln	NZ Geopreservation Inventory	More appropriately protected as an historic site.
Sam Creek Ordovician coral fossils	NZ Geopreservation Inventory	Significant natural geological exposures not requiring any protection.
Sams Creek peralkaline granite and minerals	NZ Geopreservation Inventory	Significant natural geological exposures not requiring any protection.
Serpentine Creek talc	NZ Geopreservation Inventory	Geological exposure within a National Park not worth assessment because of lack of threats.
Takaka Hill Pikikiruna schist	NZ Geopreservation Inventory	Road cut exposure of rock not requiring special protection.
Takaka Valley fold structures	NZ Geopreservation Inventory	Road cut exposure of rock not requiring special protection.
Tarakohe cement works fossils	NZ Geopreservation Inventory	Old quarry exposures of rock not requiring special protection.
Thompson Creek Ordovician fossils	NZ Geopreservation Inventory	Geological exposure within a Forest Park not worth assessment because of lack of threats.
Thornes Creek middle Cambrian fossils, Cobb Valley	NZ Geopreservation Inventory	Geological exposure within a National Park not worth assessment because of lack of threats.
Wainui Falls	Topographic map	Insufficiently significant.
Whanganui (Westhaven) Inlet	NZ Geopreservation Inventory	Large feature more appropriately considered for protection as a natural landscape.
Whanganui Inlet soft sandstone	NZ Geopreservation Inventory	Significant natural geological exposures not requiring any protection.
Wharariki Rd Paleocene leaf fossils	NZ Geopreservation Inventory	Road cut exposure of rock not requiring special protection.



32. Matiri Hole in the Wall waterfall proposed high value landform in an ONL.

Table 5.6 Natural features considered but not recommended as potential ONFs in Tasman District other than Golden Bay

Feature name	Source	Reason for non-inclusion
Appleby Maori "gravel borrow" pit	NZ Geopreservation Inventory	More appropriately protected as an archaeological feature rather than ONF
Baton River – Moran Creek unconformity	NZ Geopreservation Inventory	Geological exposures within National Park not worth assessment because of lack of threats.
Boulder Valley prehnite	NZ Geopreservation Inventory	Geological exposure significant as good example of microscopic mineral and metamorphism, not worth assessment because of lack of threats.
Breaker Bay orbicular granite	NZ Geopreservation Inventory	Geological exposure in intertidal zone and partly hidden by barnacle growth.
Davis Creek gneiss	NZ Geopreservation Inventory	Geological exposures significant as good example of low pressure, high temperature metamorphism west of Alpine Fault. Not worth assessment because of lack of threats.
Eighty Eight Fault	NZ Geopreservation Inventory	Old Tophouse Hotel fault trace is a better example of active fault trace on the Waimea-Flaxmore Fault System.
Fern Flat granite	NZ Geopreservation Inventory	Numerous rock exposures not under threat.
Glenroy buchite with clinoenstatite	NZ Geopreservation Inventory	Geological exposure significant for its microscopic minerals. [No perceived threat.
Glenroy granulites	NZ Geopreservation Inventory	Numerous rock exposures not under threat.
Glenroy Rd Alpine Fault traces	NZ Geopreservation Inventory	Location of traces not easy to see or map and not threatened by any perceived future activities.
Graham Valley nickel	NZ Geopreservation Inventory	Numerous rock exposures not under threat.
Graham Valley pyroxenite	NZ Geopreservation Inventory	Numerous rock exposures not under threat.
Holyoake Valley wollastonite-rich hornfels	NZ Geopreservation Inventory	Old mining area in remote location under no threat.
Honeymoon Bay orbicular granite	NZ Geopreservation Inventory	Geological exposure not worth assessment because Breaker Bay next door a better example
Hope Saddle glacial/interglacial sediments	NZ Geopreservation Inventory	Exposure becoming overgrown and rocks not significant enough to conclude.
Howard Valley gabbro-norite	NZ Geopreservation Inventory	Numerous rock exposures not under threat.
Kaka clay mine	NZ Geopreservation Inventory	Not significant enough to include as an ONF.
Kaka lime kiln and quarry	NZ Geopreservation Inventory	More appropriately protected as an historic site. best protected as an historic site
Little Ben Sandstone	NZ Geopreservation Inventory	Numerous rock exposures not under threat.
Longford Syncline	NZ Geopreservation Inventory	Significant natural geological exposures and landforms covering large area, not requiring any specific protection.
Mangles Valley fossil leaves	NZ Geopreservation Inventory	Becoming overgrown and not as good as Nuggety Creek Rd sequence.
Marahau salt marsh	NZ Geopreservation Inventory	Better protected for its ecological values rather than as an ONF.

Motupiko Valley fault trace	NZ Geopreservation Inventory	Field inspection showed it to be too indistinct to include.
Moutere Gravels thrust	Prof Rick Sibson	Small, subtle feature not significant enough to warrant ONF status.
Moutere Inlet – barrier enclosed inlet	NZ Geopreservation Inventory	Better protected for its ecological values rather than as an ONF.
O’Sullivan’s granite	NZ Geopreservation Inventory	Numerous rock exposures not under threat.
Pig Valley Triassic fossils	NZ Geopreservation Inventory	Geological exposures not warranting scheduling as no threats and not significant enough
Riwaka wollastonite	NZ Geopreservation Inventory	Numerous rock exposures not under threat.
Separation Pt granite headland	NZ Geopreservation Inventory	More appropriately protected as part of an ONL within National Park.
Speargrass fault zone	NZ Geopreservation Inventory	Exposure of rocks showing fault between two major blocks of ancient rocks. Not considered to be threatened.
Tonga Bay granite quarry	NZ Geopreservation Inventory	More appropriately protected as an historic site. best protected as an historic site
Tophouse historic inn Waimea Fault scarp	NZ Geopreservation Inventory	Fault trace too indistinct for general public to recognise and therefore does not warrant ONF scheduling, despite importance of Waimea Fault.
Tophouse to Lake Rotoiti Alpine Fault scarp	NZ Geopreservation Inventory	Fault trace too difficult for non specialist to locate and visualize.
Wai-iti Valley fault trace	NZ Geopreservation Inventory	Now under exotic forest. Not one of the best examples in Tasman District.
Waimea River cut-off meander	NZ Geopreservation Inventory	Meander not considered sufficiently outstanding to warrant scheduling at this time.
Wairau Valley wairauite type locality	NZ Geopreservation Inventory	Geological exposure significant for its microscopic minerals. [No perceived threat.
Wairoa Gorge Permian fossils and limestone blocks	NZ Geopreservation Inventory	Geological exposures not warranting scheduling as no threats and not significant enough.
Whale Creek granite	NZ Geopreservation Inventory	Numerous rock exposures not under threat.



33. Kaka Pt and Island proposed ONF, Kaiteriteri

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- Hayward, B.W. 1996. *Precious Land: Protecting New Zealand's landforms and geological features*. Geological Society of New Zealand Guidebook 12.
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- Geoscience Society of New Zealand. New Zealand Geopreservation Inventory.
<https://services.main.net.nz/geopreservation/>



34. Moutere Bluff to Kina Beach cliffs proposed ONF



35. Owen Valley hogback ridge proposed high value landform