

Management Plan for Antarctic Specially Protected Area No. 154

BOTANY BAY, CAPE GEOLOGY, VICTORIA LAND

1. Description of values to be protected

The Area at Botany Bay and Cape Geology (Granite Harbour, Victoria Land) has been proposed by New Zealand on the grounds that it is an extremely rich botanical refuge for such a high latitude location (162° 34' 00"E, 77° 00' 30"S), with a lichen and moss species diversity and abundance that is unique for southern Victoria Land. In addition to a high diversity and abundance of lichens and mosses there are abundant growths of algae, large populations of invertebrates (collembola, mites, nematodes, rotifers) and a colony (in excess of 40 pairs) of south polar skua (*Catharacta maccormicki*). The area is the type locality for the collembolan *Gomphiocephalus hodgsoni* Carpenter and the lichen *Caloplaca coeruleofrigida* Sochting.

The structure and development of the moss and lichen communities is similar to that found more than 10° of latitude further north, with several species at their known southern limit. The Area contains the most southerly record of the hepatic (*Cephaloziella varians*). Of great significance is the size (up to 15 cm diameter) of some lichen thalli (e.g. *Umbilicaria aprina*). The boulder beach has rich populations of both epilithic and endolithic lichens.

In addition to the biological values described, the Area contains within it the remains of a rock shelter and associated artifacts of historical importance, known as 'Granite House', designated as Historic Site No. 67 in Measure 4 (1995). Constructed by members of the 1910-1913 British Antarctic Expedition, the shelter and associated artifacts are vulnerable to disturbance and are therefore managed as a Managed Zone within the Area, which is subject to access restrictions. A tent site used by the Western Geological Party under Griffith Taylor, is identifiable as a flat gravel area with a number of stones that were used to weigh down the tent valance. This area is outside the Managed Zone and is subject to access restrictions.

The limited geographical extent of the ecosystem, its unusual ecological features and importance, its exceptional scientific and historic values and the vulnerability of the Area to disturbance through trampling, sampling, pollution or alien introductions, are such that the Area requires long-term special protection.

2. Aims and objectives

Management at Cape Geology aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;

- allow scientific research on the ecosystem and elements of the ecosystem in particular on lichen and moss species, algae, invertebrates and skuas while ensuring protection from over-sampling;
- allow other scientific research provided it is for compelling reasons which cannot be served elsewhere;
- preserve a part of the natural ecosystem as a reference area for the purpose of future comparative studies;
- minimise the possibility of introduction of alien plants, animals and microbes to the Area;
- allow visits to 'Granite House', but under strict control by Permit;
- allow conservation visits to historic sites outside the Managed Zone, but under strict control by Permit;
- allow visits for management purposes in support of the aims of the management plan.

3. Management activities

The following management activities are to be undertaken to protect the values of the Area:

- Maps showing the location of the Area (stating the special restrictions that apply) shall be displayed prominently, and copies of this Management Plan shall be kept in all of the research hut facilities located within 25 km of the Area. Copies of the Management Plan will also be available at Scott Base (NZ).
- Signs illustrating the location, boundaries and clearly stating entry restrictions shall be placed at appropriate locations at the boundaries of the Area and Zones within to help avoid inadvertent entry.
- Markers, signs or structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition.
- Visits shall be made as necessary (no less than once every five years) to assess whether the Area continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate.
- National Antarctic Programmes operating in the region shall consult together with a view to ensuring these steps are carried out.

4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

Map A: Botany Bay and Cape Geology, protected area topographic map. Map specifications:

Projection: Lambert conformal conic; Standard parallels: 1st 79° 20' 00" S; 2nd 76° 40' 00" S Central Meridian: 162° 30' 00" E Latitude of Origin: 78° 01' 16.211" S; Spheroid: WGS84.

Inset 1: Southern Victoria Land, Ross Sea and Ross Island, showing location of Granite Harbour.

Inset 2: Cape Geology location map, and Granite Harbour region.

Map B: Managed Zone with 'Granite House' and viewing area, site topographic, derived from Map A.

Map C: Vegetation density layers, site topographic, showing the distribution density of moss, lichen and algae within ASPA 154. Map specifications are the same as those in Map A.

6. Description of the Area

6(i) Geographical coordinates, boundary markers and natural features

Cape Geology is situated in the south-western corner of Granite Harbour, southern Victoria Land, at 162°32'52"E, 77°00'14"S, approximately 100 km north-west of Ross Island (Map A, Insets). The Area encompasses much of the catchment above Botany Bay and consists of raised boulder beach terraces, weathered rocky steppes and irregular rock platforms around Cape Geology, extending south to include a well-defined elevated cirque containing a small ice field. The bedrock geology at Cape Geology has been described as a porphyritic grey biotite-granite, with phenocrysts of orthoclase of reddish colour, casting the weathered rock with a reddish tinge.

The northwest corner of the Area is marked by a brass plaque in a boulder (M1, 2 m: Map A, 162°31'53"E, 77°00'19"S) 400 m SW of Cape Geology. The west boundary is defined by a line extending first 260 m SSE from M1 to a large boulder (marked by a cairn) with terrier bolt (M2) at an elevation of 118 m on the ridge above the campsite; thence the boundary extends 250 m up this ridge to a point at 162 m elevation marked by an iron tube with bamboo pole. The west boundary extends a further 300 m up this ridge to a large pointed rock at 255 m elevation (162°31'46"E, 77°00'40"S) near the edge of the permanent ice field. The boundary then extends 150 m south across the ice field to the west edge of a prominent line of exposed rock and moraine in the SW corner of the Area at 325 m elevation. The south boundary follows this line of rock east until the exposure is buried by the ice-field, thence SE across the ice field for 500 m to the edge of a second and more prominent exposure at an elevation of just over 400 m (M3, 162°33'22"E, 77°00'59"S). The boundary follows the upper edge of this exposure and then crosses the ice field SE to an elevation of approximately 325 m where the ice-free eastern boundary ridge and the ice field converge, (162°34'15"E, 77°01'16"S). The east boundary follows the ridge crest for 1550 m in a NE direction to a low point on the ridge (M4, 392 m, 162°36'10"E, 77°00'13"S) where the east boundary turns to descend due north to the coast at the eastern extremity of the boulder beach of Botany Bay (M5, 5 m). The mean high water mark of the coastline of Botany Bay and Cape Geology forms the northern boundary of the Area.

The Area is extremely rich botanically for such a high-latitude location — it is also one of the richest sites in the whole of continental Antarctica. There is a high diversity and abundance of lichens (more than 30 species) and mosses (seven species), and the structure and development of these communities are similar to those found 10° of latitude further north (Table 1). Some lichen thalli (e.g. *Umbilicaria aprina*) measure up to 15 cm diameter. The boulder beach has rich populations of both epilithic and endolithic lichens. The Area is the type locality for the lichen *Caloplaca coeruleofrigida* Sochting. The Area contains by far the most southerly record of an hepatic (*Cephaloziella varians*) and the mosses *Bryoerythrophyllum recurvirostre* and possibly *Ceratodon purpureus*. There are abundant growths of algae (at least 85 taxa), although the algal flora is not considered particularly unusual for the locality.

Table 1. Estimated species list for lichen and mosses found at Botany Bay (species in bold are common).

Lichen:	Mosses:
<i>Acarospora gwynnii</i>	<i>Bryoerythrophyllum recurvirostre</i>
<i>Amandinea petermannii</i>	<i>Bryum argenteum</i>
<i>Buellia frigida</i>	<i>Bryum pseudotriquetrum</i>
<i>Buellia papillata</i>	<i>Ceratodon purpureus</i>
<i>Buellia subfrigida</i>	<i>Hennediella heimii</i>
<i>Caloplaca athallina</i>	<i>Hennediella heimii</i>
<i>Caloplaca citrina</i>	<i>Syntrichia sarconeurum</i>
<i>Caloplaca coeruleofrigida</i>	
<i>Caloplaca saxicola</i>	
<i>Candelariella flava</i>	
<i>Carbonea vorticosa?</i>	
<i>Lecanora expectans</i>	
<i>Lecanora fuscobrunnea</i>	
<i>Lecanora mons-nivis</i>	
<i>Lecidea andersonii</i>	
<i>Lecidea cancriformis</i>	
<i>Lecidella siplei</i>	
<i>Lepraria cacuminum</i>	
<i>Physcia caesia</i>	
<i>Physcia dubia</i>	
<i>Rhizocarpon geminatum</i>	
<i>Rhizocarpon geographicum</i>	
<i>Rhizoplaca</i> sp.	
<i>Rhizoplaca melanophthalma</i>	
<i>Rinodina olivaceobrunnea</i>	
<i>Umbilicaria aprina</i>	
<i>Xanthoria elegans</i>	
<i>Xanthoria mawsonii</i>	
indeterminate grey crust	

There are large populations of invertebrates (collembola, mites, nematodes, rotifers) and the area is the type locality for the collembolan *Gomphiocephalus hodgsoni* Carpenter. There is a colony of between 40 – 50 breeding pairs (and numerous non-breeders) of the south polar skua (*Catharacta maccormicki*), which is approximately the same number present in 1911–12. No other bird species are known to breed in the Cape Geology area.

6(ii) *Restricted and managed zones within the Area*

Restricted Zone

An area directly above Botany Bay is designated as a Restricted Zone in order to preserve part of the Area as a reference site for future comparative studies, while the remainder of the Area (which is similar in biology, features and character) is more generally available for research programmes and sample collection. The west boundary of the Restricted Zone is defined by a line from a marker (iron tube in rock, 20 metres from mean high water mark, elevation 8 m) at the west side of Botany Bay (Map A), extending SW for 170 m up to a second iron tube marker on the crest of the adjacent ridge (87 m). This boundary extends 100 m to a third iron tube and a cairn (98 m), thence 50 m to a large flat rock in the centre of the main flush (marked '1' on Map A). The south boundary of the Restricted Zone extends from the flat rock in the flush in a straight line 820 m to the first of two prominent boulders closely adjacent to each other, approximately in the middle of the ice-free slopes above Botany Bay (marked '2' on Map A at 165 m). The east boundary extends 300 m from there to a large rock at 135 m elevation (marked '3' on Map A), thence NE downslope to the NE boundary point (M5, 5 m). The north boundary of the Restricted Zone is the mean high water mark of Botany Bay and is coincident with the north boundary of the Area.

Access to the Restricted Zone is allowed only for compelling scientific or management (such as inspection or review) purposes, which cannot be served elsewhere in the Area.

Managed Zone

Situated along the coast from the northwest corner of ASPA 154 to just west of the northernmost tip of Cape Geology, a Managed Zone is designated to protect historic artifacts and plant communities within this vicinity, yet also to allow access to the rock shelter known as 'Granite House', which was designated as Historic Site No. 67 in Measure 4 (1995). The Managed Zone is an area of 470 m by 20 m along the coast and by 80 m at the point that surrounds a rock ridge leading from the coast at Cape Geology to the old shelter. The boundaries are marked on Map B. The shelter was constructed by members of the 1910-1913 British Antarctic Expedition, and used between December 1911 and January 1912 while the party carried out geological and biological exploration in the vicinity. The structure was built using a natural hollow in the rocks, with walls built up from granite boulders and a roof of seal skins: in January 2007 parts of the walls remained, but while several of the skins were present the roof had collapsed. Access to the Managed Zone may be allowed by Permit, subject to the conditions of this management plan.

6(iii) Structures within and near the Area

The only structures known to exist in the Area are 'Granite House', the boundary survey markers and signposts in appropriate locations.

6(iv) Location of other protected areas within close proximity of the Area

Botany Bay lies within Antarctic Specially Managed Area (ASMA No. 2), McMurdo Dry Valleys. Within the ASMA, the nearest Special Feature is the Sand Dune Feature in Lower Victoria Valley. The nearest protected area to Cape Geology is ASPA 123 at Barwick Valley, 50 km distant in a SW direction in the Victoria Land Dry Valleys.

7. Permit conditions

Entry into the Area is prohibited except in accordance with a Permit issued by appropriate national authorities. Conditions for issuing a Permit to enter the Area are that:

- outside of the Restricted and Managed Zones, it is issued only for scientific study of the ecosystem, or for compelling scientific reasons that cannot be served elsewhere, or for conservation at historic sites, or for essential management purposes consistent with plan objectives such as inspection or review;
- access to the Restricted Zone is allowed only for compelling scientific or management reasons that cannot be served elsewhere in the Area;
- access to the Managed Zone may be permitted for scientific, management, historical, educational or recreational purposes;
- the actions permitted will not jeopardise the ecological, scientific or historic values of the Area;
- any management activities are in support of the objectives of the Management Plan;
- the actions permitted are in accordance with the Management Plan;
- the Permit, or an authorized copy, shall be carried within the Area;
- a visit report shall be supplied to the authority named in the Permit;
- permits shall be issued for a stated period.

7(i) Access to and movement within the Area

Vehicles are prohibited within the Area and access should be by foot. Helicopters are normally prohibited from landing within the Area: there is a designated site 60 m outside of the Area (162° 31' 47.7"E, 77° 00' 20.8"S: Map A, Map B and Map C). Access to the landing site should be from the open water / sea ice to the north of the Area. Overflight of the Area lower than 300 m (~1000 ft) above ground level is normally prohibited. When required for essential scientific or management purposes, transient overflight or landing may be allowed: conduct of such anticipated overflights or landings must be specifically authorised by Permit. Use of helicopter smoke grenades within the Area is prohibited unless necessary for safety, and all grenades should be retrieved. All helicopter landing or overflight lower than 300 m AGL is prohibited within the Restricted Zone.

Access into the Area should preferably be from the recommended camping area along a preferred walking route 10–20 m from the coast, which is relatively devoid of vegetation. Visitors should avoid walking on visible vegetation, or unnecessary disturbance to bird populations. Care should be exercised walking in areas of moist ground, where foot traffic can easily damage sensitive soils, plant and algal communities, and degrade water quality: walk around such areas, on ice or rocky ground. Pedestrian traffic should be kept to the minimum necessary consistent with the objectives of any permitted activities and every reasonable effort should be made to minimise effects.

Access to the Managed Zone should preferably be from the coast, following the ridge leading up to 'Granite House' (Map B). An alternative route may be used from the recommended camping area and helicopter landing site, along a preferred walking route 10–20 m from the coast, if sea-ice travel is unsafe (Map B). Unless specifically authorised by Permit, visitors are prohibited from entering the historic shelter, and are limited to access and viewing from the rock ridge designated for access from the coast in order to prevent damage to the rich vegetation within the Managed Zone. Visitors shall not venture south of 'Granite House', unless specifically authorised by Permit. A maximum of 10 people is permitted to enter the Managed Zone at any one time, and a maximum of 5 people is allowed in the viewing area overlooking 'Granite House' at any one time (Map B).

7(ii) Activities that are or may be conducted in the Area, including restrictions on time or place

- scientific research that will not jeopardise the ecosystem of the Area;
- essential management activities, including monitoring;
- limited visits to the Managed Zone for reasons other than science or management subject to the conditions described in this plan;
- activities with the aim of preserving or protecting the historic resources within the Area.

7(iii) Installation, modification or removal of structures

No structures are to be erected within the Area except as specified in a Permit. All scientific equipment installed in the Area must be authorised by Permit and clearly identified by country, name of the principal investigator and year of installation. All such items should be made of materials that pose minimal risk of contamination of the Area. Removal of specific equipment for which the Permit has expired shall be a condition of the Permit.

7(iv) Location of field camps

Camping within the Area is prohibited and should be at a site outside of the Area, 100 m from the NW corner (Map A), adjacent to the designated helicopter landing site. This camping site has been disturbed by previous activities and visitors should reoccupy these disturbed positions for tents and other facilities.

7(v) Restrictions on materials and organisms which can be brought into the Area

No living animals, plant material or microorganisms shall be deliberately introduced into the Area and precautions shall be taken against accidental introductions. No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted. Fuel is not to be stored in the Area, unless required for essential purposes connected with the activity for which the Permit has been granted. All materials introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of their introduction into the environment is minimised.

7(vi) Taking or harmful interference with native flora or fauna

This is prohibited, except in accordance with a Permit. Where animal taking or harmful interference is involved this should, as a minimum standard, be in accordance with the *SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica*.

7(vii) Collection or removal of anything not brought into the Area by the Permit holder

Material may be collected or removed from the Area only in accordance with a Permit and should be limited to the minimum necessary to meet scientific or management needs. Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the Permit Holder or otherwise authorised, may be removed unless the impact of removal is likely to be greater than leaving the material *in situ* : if this is the case the appropriate authority should be notified.

Unless specifically authorised by Permit, visitors are prohibited from interfering with or attempting restoration of 'Granite House' in any way, or from handling, taking or damaging any artifacts found within the Managed Zone. Evidence of recent changes, damage or new artifacts observed should be notified to the appropriate national authority. Relocation or removal of artifacts for the purposes of preservation, protection or to re-establish historical accuracy is allowable by Permit.

7(viii) Disposal of waste

All wastes, including all human wastes, shall be removed from the Area.

7(ix) Measures that are necessary to ensure that the aims and objectives of the Management Plan can continue to be met

1. Permits may be granted to enter the Area to carry out biological monitoring and site inspection activities, which may involve the collection of small samples for analysis or review, to erect or maintain signposts, or for management activities, especially those associated with the Historic Sites.
2. Any specific sites of long-term monitoring shall be appropriately marked.
3. To help maintain the ecological and scientific values of the isolation and relatively low level of human impact at the Area visitors shall take special precautions against introductions. Of particular concern are microbial or vegetation introductions sourced from soils at other

Antarctic sites, including stations, or from regions outside Antarctica. To minimize the risk of introductions, visitors shall thoroughly clean footwear and any equipment to be used in the area - particularly sampling equipment and markers – before entering the Area.

4. Visitors shall consult and apply where appropriate the comprehensive Code of Conduct and *Guidelines for Conduct of Scientific Research* developed for use within the McMurdo Dry Valleys (ASMA no. 2).

7(x) Requirements for reports

Parties should ensure that the principal holder for each permit issued submit to the appropriate authority a report describing the activities undertaken. Such reports should include, as appropriate, the information identified in the Visit Report form suggested by SCAR. Parties should maintain a record of such activities and, in the Annual Exchange of Information, should provide summary descriptions of activities conducted by persons subject to their jurisdiction, which should be in sufficient detail to allow evaluation of the effectiveness of the Management Plan. Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage, to be used both in any review of the management plan and in organising the scientific use of the Area.

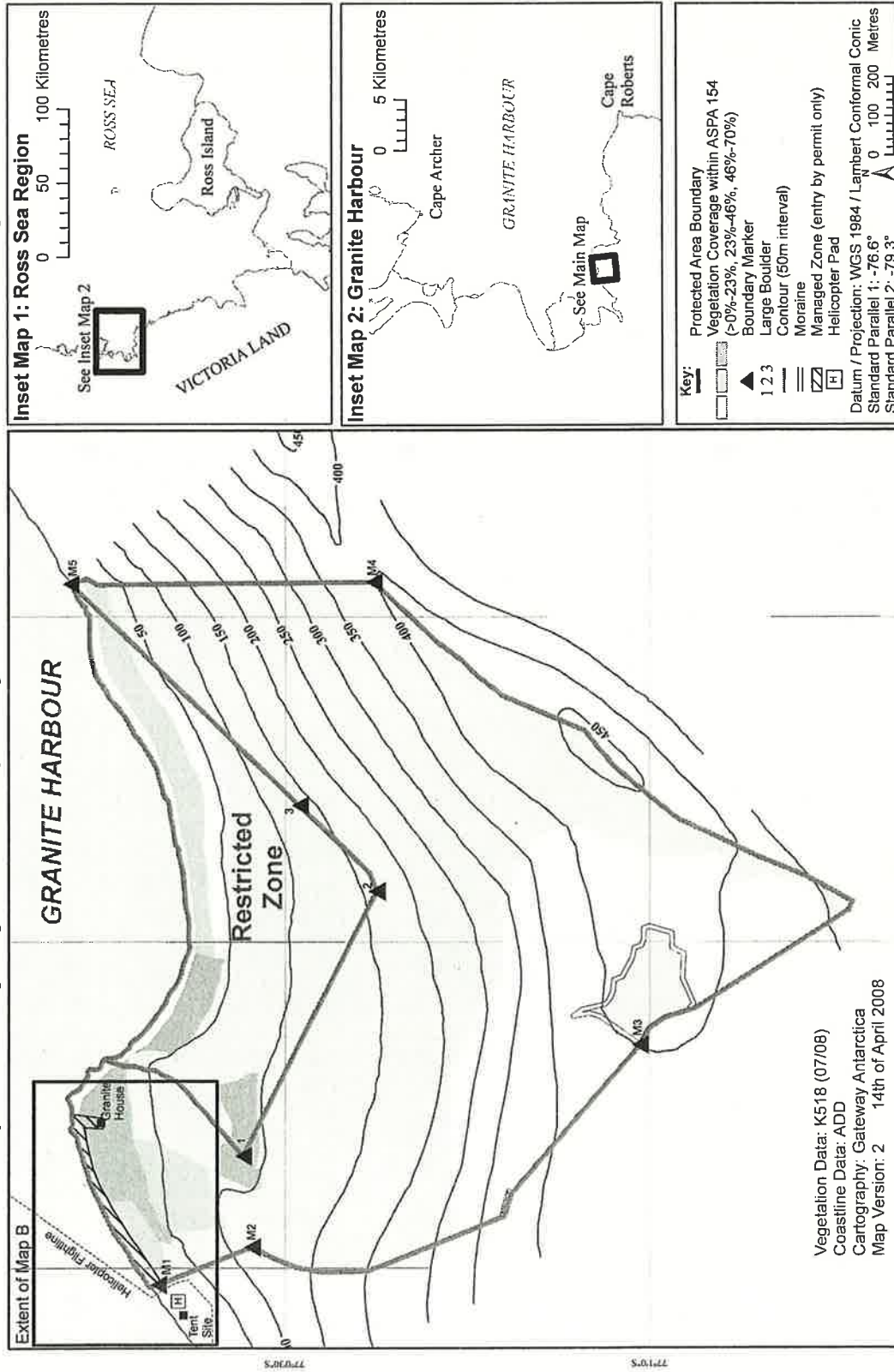
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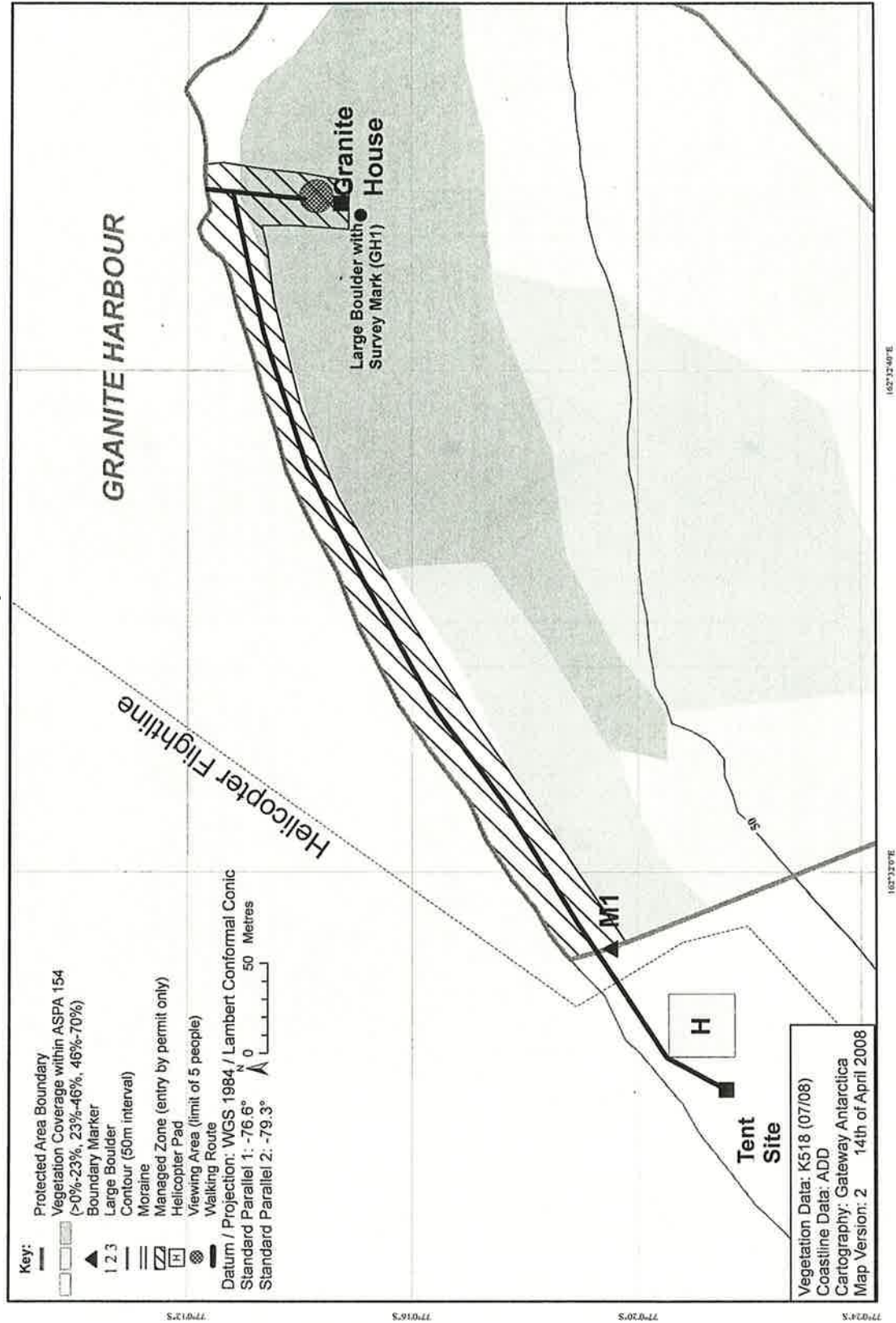
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Map A - Botany Bay Antarctic Specially Protected Area No. 154, Site Topographic Map

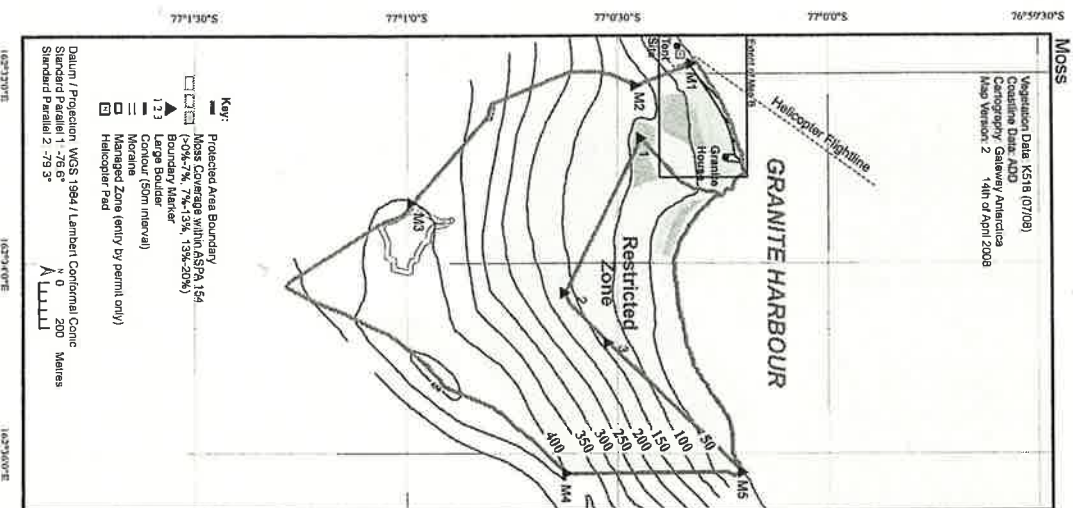


Map B - Botany Bay Antarctic Specially Protected Area No. 154

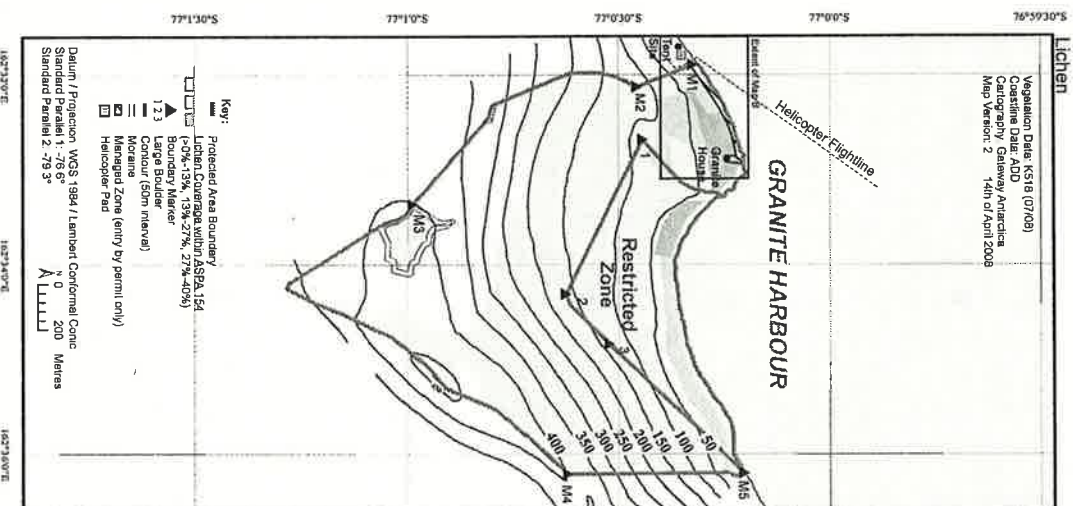


Map C - Botany Bay Antarctic Specially Protected Area No. 154, Vegetation Layers

Moss



Lichen



Algae

