# Management Plan For
# Antarctic Specially Protected Area No. 154
## BOTANY BAY, CAPE GEOLOGY, VICTORIA LAND

### Introduction

Botany Bay, Cape Geology is situated in the south western corner of Granite Harbour, southern Victoria Land (77° 0.230' S, 162° 32.870' E; Map 1, Inset 1 and 2). The Area is extremely rich botanically for such a high-latitude location and is one of the richest sites in the whole of continental Antarctica. There is a high diversity and abundance of lichens (at least 30 species) and mosses (9 species) with abundant growths of algae (at least 85 taxa). The Area also has a diverse community of invertebrates (collembola, mites, nematodes, rotifers and protozoa) and a colony (in excess of 40 pairs) of South polar skua (*Catharacta maccormicki*). The Area is the type locality for the collembola *Gomphiocephalus hodgsoni* Carpenter, the lichen *Caloplaca coeruleofrigida* Sochting and Seppelt and the lichen *Buellia frigida*.

In addition to the biological values described, the Area contains within it the remains of a rock shelter and associated artefacts of historical importance (from the British Antarctic Expedition 1910-1913), known as Granite House, designated as Historic Site and Monument (HSM) No. 67 in Measure 4 (1995).

Botany Bay, Cape Geology was originally designated in Measure 3 (1997) as Site of Special Scientific Interest (SSSI) No. 37. New Zealand proposed the designation on the grounds that the Area is an extremely rich botanical refuge for such a high latitude location, with a lichen and moss species diversity and abundance that is unique for southern Victoria Land. The site was re-designated Antarctic Specially Protected Area (ASPA) No. 154 in Decision 1 (2002). The Management Plan was revised and adopted in Measure 2 (2003), Measure 11 (2008), and Measure 12 (2013).

The primary reason for the designation of Botany Bay, Cape Geology as an Antarctic Specially Protected Area is to protect the Area's unusual ecological features and its exceptional scientific and historic values.

### 1. Description of values to be protected

In the Ross Sea region, areas of abundant mosses and lichens have been identified at Cape Bird, Ross Island (ASPA 116), Beaufort Island (ASPA 105), Canada Glacier in the Taylor Valley (ASPA 131), Kar Plateau in Granite Harbour, Edmonson Point (ASPA 165) and Cape Hallett (ASPA 106). While these sites have a high vegetation ground cover and biomass, the diversity of species present is considerably lower than that found at Botany Bay.

Botany Bay is extremely rich botanically and is also one of the most diverse sites in the whole of continental Antarctica. The terrestrial lichen and moss flora of Botany Bay comprises one liverwort, nine mosses and at least 30 lichens (Annex 1). There are abundant growths of algae (at least 85 taxa), although the algal flora is not considered particularly unusual for the locality.
The Area also has large populations of invertebrates (collembola, mites, nematodes, rotifers and protozoa). The genetic diversity of springtails on the continent vary between refugia which is in contrast with Ross Island and Beaufort Island where separate populations share the genetic

structure. Analysis has found the population at Granite Harbour shares some haplotypes with the population at Cape Bird, suggesting the Granite Harbour population may have been a colonization source for Ross Island (Stevens and Hogg, 2003).

There is a colony (in excess of 40 pairs) of South polar skua (*Catharacta maccormicki*). No other birds are known to breed in the Area but Adelie penguin (*Pygoscelis adeliae*) have been reported as seen moulting in the Area and have been suggested as possible vectors for transferring populations of springtails between Granite Harbour and Ross Island (Stevens and Hogg, 2003).

The Area is the type locality for the collembolan *Gomphiocephalus hodgsoni* Carpenter, the lichen *Caloplaca coeruleofrigida* Sochting and Seppelt and the lichen *Buellia frigida*.

The structure and development of the moss and lichen communities at Botany Bay is similar to that found more than 10° of latitude further north. The Area contains by far the most southerly record of the liverwort *Cephaloziella varians*, the lichen *Turgidosculum complicatulum* and the mosses *Bryoerythrophyllum recurvirostrum* and possible *Ceratodon purpureus*. Most are about three degrees of latitude further south than the nearest record to the north in the Terra Nova Bay region.

The boulder beach has rich populations of both epilithic and endolithic lichens. Of great significance is the size (up to 15 cm diameter) of some lichen thalli. At high latitudes, macrolichens are rare and scattered. Botany Bay is exceptional as there is an abundance of several macrolichens including *Umbilicaria aprina, Xanthoria elegans, Physcia caesia* and several forms of microlichens.

With regards to chasmoendolithic algae, both green and blue-green growths of the species *Gloeocapsa cf. punctata* and *Chroococcidiopsis* sp. are co-dominant in the area with *Prasiococcus calcarius* and *Desmococcus olivaceus* found close to the shore-line. Additionally, small ribbons of *Prasiola sp.* are present where water was likely to have flushed the rock surface for a sufficient duration.

The formation of thin algal crusts has previously been reported (Broady, 2005) and recent visits (K080-1819-A Antarctica New Zealand Science Report) have found a surprisingly high abundance of biological soil crusts dominated by Cyanobacteria and possibly green algae. The species composition of crusts requires investigation and work is underway to characterize their extent, distribution and persistence.

The rich flora is the result of a comparatively warm microclimate produced by the unusual sheltered nature of the Area being protected from the southerly and easterly polar winds but fully open to the brightest sun to the north. Different species assemblages or associations within the Area are determined by nutrient input from the skua colony, the occurrence of the source of water, whether solely from snowmelt from the ice field or snowfall, or from some form of melt stream, and by the regularity and speed of water flow and the type of substrate, especially whether it is loose gravel or solid rock.

Under the influence of a changing climate (both global and local), increases in volume and shifts in location of water flow through or over the vegetation would inevitably lead to changes in the vegetation distribution, diversity and abundance. The Area would be ideal for assessing the impacts of climate change on continental Antarctic terrestrial ecosystems dominated by moss and lichen vegetation.

In addition to the biological values described, the Area contains within it the remains of a rock shelter and associated artefacts of historical importance, known as Granite House. The shelter was

constructed using a natural hollow in the rocks, with walls built up from granite boulders and a roof of seal skins in 1911 for use as a field kitchen by Griffith Taylor's western geological party during the British Antarctic Expedition of 1910-1913. It was enclosed on three sides with granite boulder walls and used a sledge to support a seal-skin roof. The stone walls of the shelter have since partially collapsed and numerous artefacts have disappeared. In January 2012 parts of the walls remained, but the roof had collapsed and the seal skins had blown some way down the beach. The shelter still contains corroded remnants of tins, a seal skin and some fabrics.

The shelter and associated artefacts are vulnerable to disturbance and therefore access is managed with an Access 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 Access Zone and is subject to access restrictions.

The primary reason for the designation of Botany Bay, Cape Geology as an Antarctic Specially Protected Area is to protect the limited geographical extent of the ecosystem, the unusual ecological features, and the exceptional scientific and historic values of the Area. 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 Botany Bay 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 in the Area provided it is for compelling reasons which cannot be served elsewhere and which will not jeopardize the natural ecological system in the Area;
- preserve a part of the natural ecosystem of the Area as a reference area for future comparative studies;
- prevent or minimise the introduction to the Area of alien plants, animals and microbes;
- allow visits to the historic site Granite House, but under strict control by Permit;
- allow conservation visits to other historic sites, 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 shall be undertaken to protect the values of the Area:

- Information on the location of the Area, stating special restrictions that apply, shall be displayed prominently, and a copy of this Management Plan shall be made available, at National Antarctic Programme stations that operate in the vicinity of the Area.
- Signs illustrating the location and boundaries, with clear statements of entry restrictions, shall be placed at appropriate locations on the boundary of the Area to help avoid inadvertent entry.

- Markers, signs or other structures (e.g. cairns) erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer required.
- The Area shall be visited as necessary, and no less than once every five years, to assess whether it continues to serve the purposes for which it was designated and to ensure that management and maintenance activities are adequate.
- National Antarctic Programmes operating in the Area shall consult together with a view to ensuring the above management activities are implemented.

**4. Period of designation**

Designated for an indefinite period.

**5. Maps**

Map 1: ASPA No. 154 Botany Bay: Regional overview
Map specifications: Projection - Lambert conformal conic. Standard parallels – 1st 77° 35' S; 2nd 77° 38' S. Central Meridian – 163° 00' E. Latitude of Origin – 78° 00' S. Spheroid and horizontal datum: WGS84.

Map 2: ASPA No. 154 Botany Bay: Topography
Map specifications are the same as those in Map 1.

Map 3: ASPA No. 154 Botany Bay: Air access guidance
Map specifications are the same as those in Map 1.

Map 4: ASPA No. 154 Botany Bay: Access Zone
Map specifications are the same as those in Map 1, except: Standard parallels – 1st 77° 00' S, 2nd 77° 02' S; Central Meridian – 162° 34' E.

Map 5A: ASPA No. 154 Botany Bay: Moss Density
Map specifications are the same as those in Map 4.

Map 5B: ASPA No. 154 Botany Bay: Lichen Density
Map specifications are the same as those in Map 4.

**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 77° 0.230' S, 162° 32.870' E approximately 100 km north-west of Ross Island (Map 1, Insets). The Area consists of raised boulder beach terraces, weathered rocky steppes and irregular rock platforms around Cape Geology, rising rapidly to the south to include a well-defined elevated cirque containing a small ice field. The ice field provides a regular supply of meltwater over the Area. The Area faces north and is well protected from strong winds. The intensity of the solar radiation is increased by reflection from the sea ice that normally remains in Granite Harbour until the end of January. Consequently, the site has warmer than expected air temperatures sometimes reaching almost 10°C in January. The most extensive vegetation occurs on the sheltered raised beach terrace known as Botany Bay.

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 boundaries of the Area include the water catchment and encompass the elevated cirque from the small ice field down to the coastline (Map 1). The northwest boundary of the Area is marked by a brass plaque in a boulder along the shoreline (M1, 77° 0.316' S, 162° 31.883' E) 400 m southwest of Cape Geology. The west boundary is defined by a line extending first 260 m south southeast from M1 to a large boulder (marked by a cairn) with terrier bolt (M2, 77° 0.450' S 162° 33.133' E) 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 (77° 0.667' S, 162° 31.767' E) 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 southwest 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 southeast 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, 77° 0.983' S, 162° 33.367' E). The boundary follows the upper edge of this exposure and then crosses the ice field southeast to an elevation of approximately 325 m where the ice-free eastern boundary ridge and the ice field converge, (77° 01.267' S, 162° 34.250' E). The east boundary follows the ridge crest for 1,550 m in a northeast direction to a low point on the ridge approximately 392 m (M4, 77° 0.217' S, 162°36.167' E) where the east boundary turns to descend due north to the coast at the eastern extremity of the boulder beach of Botany Bay (M5, 77° 0.200' S, 162° 36.200' E). The mean high-water mark of the coastline forms the northern boundary of the Area between M1 and M5.

The Area also supports an Access Zone and Restricted Zone (Maps 2 and 4). The Access Zone has been designated to allow access to Granite House while the Restricted Zone has been designated to protect the most extensive area of vegetation in the Area at Botany Bay. The density of moss and lichen is highest in the Access and Restricted Zone of Botany Bay (Map 5A and B) and the Restricted Zone has been designated to preserve part of the Area as a reference site for future comparative studies. A vegetation distribution map for the Restricted Zone can be found in Seppelt et al., 2010.

Under the Environmental Domains Analysis (Resolution 3 (2008)) the Area is Environment S – McMurdo – South Victoria Land geologic. Environment Domain S includes known areas of abundant mosses and lichens at Cape Bird, Ross Island (ASPA 116), Beaufort Island (ASPA 105) and Canada Glacier in the Taylor Valley (ASPA 131).

Under the Antarctic Conservation Biogeographic Region (Resolution 3 (2017)) the Area is in Region 9: South Victoria Land.

*6(ii) Access to the Area*

Access to the Area is generally via helicopter with a designated helicopter landing site 60 m outside of the Area (77° 00.347' S, 162° 31.795' E; Map 2-5) adjacent to the designated camp site. Specific helicopter access requirements are outlined in Section 7(ii).

Vehicles are prohibited within the Area and access shall be by foot. Access should preferably be from the designated camp site following the preferred corridor of the Access Zone, 10 to 20 m from the coast, which is relatively devoid of vegetation. Visitors shall not venture south of Granite House to the Restricted Zone, unless specifically authorised by Permit.

*6(iii) Location of structures within and adjacent to the Area*
The only structures known to exist in the Area are Granite House and the associated artefacts, the boundary survey mark at M1 and other boundary markers (i.e. cairns, iron tube markers). At the designated camp site, there is a large wooden platform with materials stored beneath and an automatic weather station is installed further down the beach. The designated camp site is marked by several circle of rocks and the designated helicopter landing site is marked with rocks and is a cleared section of the beach.

*6(iv) Location of other protected areas in the vicinity*
Botany Bay lies within Antarctic Specially Managed Area (ASMA No. 2), McMurdo Dry Valleys. The nearest protected area to Botany Bay is ASPA 123 Barwick and Balham Valleys, 50km away in a southwest direction.

*6(v) Special zones within the Area*

*Restricted Zone*
The most extensive area of vegetation occurs on the sheltered raised beach terrace known as Botany Bay. This embayment and a portion of the 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. The remainder of the Area, which is similar in biology, features and character, is generally more available for research programmes and sample collection.

The western 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 2), extending southwest 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 2). The southern 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 2 at 165 m). The eastern boundary extends 300 m from there to a large rock at 135 m elevation (marked '3' on Map 2), thence northeast down slope to the northeast boundary point (M5, 5 m). The northern boundary of the Restricted Zone is the mean high water mark of Botany Bay and is coincident with the northern 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.

*Access Zone*
In order to allow access to the rock shelter known as Granite House (HSM No. 67), an Access Zone has been designated to protect historic artefacts and plant communities within the vicinity, while also allowing access to the rock shelter.

The Access Zone is a corridor of 10 to 20 m wide extending from the north western boundary near the campsite to Cape Geology, following parallel to the coast for ~480 m (Map 4).

At Cape Geology, the Access Zone extends southwards for 80 m in a corridor ranging from 20 to 30 m wide, following a low rocky ridge from the coast to the rock shelter. The boundaries are marked on Map 4. 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.

Access to the Access Zone may be allowed by Permit, subject to the conditions of this Management Plan.

## 7. Permit conditions

*7(i) General permit conditions*
Entry into the Area is prohibited except in accordance with a Permit issued by an appropriate national authority. Conditions for issuing a Permit to enter the Area are that:

- outside of the Restricted and Access Zones, access may be permitted 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 may be permitted only for compelling scientific or management reasons that cannot be served elsewhere in the Area;
- access to the Access 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 authorised 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(ii) Access to, and movement within or over, the Area*
Vehicles are prohibited within the Area and all movement within the Area should be on foot.

**Helicopter Access**

- There is a designated helicopter landing site 60 m outside of the Area (77° 0.347' S, 162° 31.795' E Maps 2-5).
- The preferred helicopter approach is over sea ice when present (Maps 1 and 3).
- When approaching over sea ice, where practicable fly at least a ¼ nautical mile (460 m) from the coastline to minimise potential disturbance to breeding birds.
- When necessary to make an overland approach to the designated landing site, the preferred approach is from the west in the New Glacier region when practicable. Should an overland approach from the West in the New Glacier region not be practicable (e.g. owing to fog or other unfavourable conditions), the preferred approach to the designated landing site is over the ASPA although aircraft should maintain an operating elevation of at least 150 ft (50 m) Above Ground Level and avoid hovering within the ASPA (Maps 1 and 3).
- Landings within the ASPA are prohibited unless specifically authorised by permit.
- Helicopter landings are prohibited within the Restricted Zone.
- Use of helicopter smoke grenades within the Area is prohibited unless necessary for safety, and all grenades should be retrieved.

**Access to the Area**

- Access into the Area should preferably be from the designated camp site following the preferred corridor of the Access Zone, 10 to 20 m from the coast, which is relatively devoid of vegetation (Map 4).

- Visitors should avoid walking on visible vegetation, or cause 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.
- Visitors should 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 impacts.

**Access to the Access Zone**

- Access to the Access Zone should preferably be from the northern coast at Cape Geology, following the ridge leading up to Granite House (Map 4), avoiding areas of dense lichen growth to either side and as far as possible, the foliose lichen species which are characterised by flat leafy forms, compared with the crustose forms which adhere very closely to the substrate.
- An alternative route may be used from the designated camp site and helicopter landing site, along a preferred walking route 10 to 20 m from the coast, if sea-ice travel is unsafe (Map 4). Note that several areas of dense lichen growth lie close to and inland from the Access Zone (e.g. approximately halfway between the designated camp site and Cape Geology), and these should be avoided unless access is required for science or management.
- 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 Access Zone.
- Visitors shall not venture south of Granite House, unless specifically authorised by Permit.
- A maximum of 10 people is permitted to enter the Access 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 4).

*7(iii) Activities which may be conducted within the Area*

Activities which may be conducted within the Area include:

- compelling scientific research which cannot be undertaken elsewhere and which will not jeopardise the ecosystem of the Area;
- essential management activities, including monitoring;
- limited visits to the Restricted 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 artefacts within the Area.

*7(iv) Installation, modification, or removal of structures*

No new structures are to be erected within the Area, or scientific equipment installed, except for compelling scientific or management reasons, and for a pre-established period, as specified in a Permit. All markers, structures or scientific equipment installed in the Area must be clearly identified by country, name of the principal investigator or agency, year of installation and date of expected removal. All such items should be free of organisms, propagules (e.g. seeds, eggs of invertebrates) and non-sterile soil, and be made of materials that can withstand the environmental conditions and pose minimal risk of contamination of the Area. Removal of specific structures or equipment for which the Permit has expired shall be a condition of the Permit.

*7(v) Location of field camps*

Camping within the Area is prohibited and should be at a site outside of the Area, 100 m from the northwest corner (Maps 2, 4 and 5) and adjacent to the designated helicopter landing site. This camp site has been disturbed by previous activities and visitors should reoccupy these disturbed positions for tents and other facilities.

*7(vi) Restrictions on materials and organisms which may be brought into the Area*
In addition to the requirements of the Protocol on Environmental Protection to the Antarctic Treaty, restrictions on materials and organisms which may be brought into the Area are:

- No animals, plant material, microorganisms or non-sterile soil shall be deliberately introduced into the Area and precautions shall be taken to prevent 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 into the Area shall be for a stated period only and shall be removed by the end of that stated period, and shall be stored and handled so that risk of their introduction into the environment is minimised.

*7(vii) Taking of, or harmful interference, with native flora or fauna*
Taking of, or harmful interference with, native flora and fauna is prohibited, except in accordance with a Permit issued in accordance with Annex II of the Protocol on Environmental Protection to the Antarctic Treaty. Where taking or harmful interference with animals 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(viii) The collection or removal of materials 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, and which was not brought into the Area by the Permit Holder or otherwise authorised, may be removed from the Area unless the environmental impact of the removal is likely to be greater than leaving the material in situ: if this is the case the appropriate authority must be notified and approval obtained.

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

*7(ix) Disposal of waste*
All wastes, including all human wastes, shall be removed from the Area.

*7(x) Measures that may be necessary to continue to meet the aims of the Management Plan*
Permits may be granted to enter the Area to:

- carry out monitoring and Area inspection activities, which may involve the collection of small samples or data for analysis or review;
- erect or maintain signposts, structures or scientific equipment;
- carry out management and conservation activities, especially those associated with the Historic Sites.

Any specific sites of long-term monitoring shall be appropriately marked on site and on maps of the Area. A GPS position should be obtained for lodgement with the Antarctic Data Directory System through the appropriate national authority.

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, animal or vegetation introductions sourced from soils from other Antarctic sites, including stations, or from regions outside Antarctica. To the maximum extent possible, visitors shall ensure that footwear, clothing and any equipment – particularly camping and sampling equipment – is thoroughly clean before entering the Area.

*7(xi) Requirements for reports*
The principal permit holder for each visit to the Area shall submit a report to the appropriate national authority as soon as practicable, and no later than six months after the visit has been completed.

Such visit reports should include, as applicable, the information identified in the recommended visit report form contained in the Revised Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas appended to Resolution 2 (2011).

If appropriate, the national authority should also forward a copy of the visit report to the Party that proposed the Management Plan, to assist in managing the Area and reviewing the Management Plan.

Parties should, wherever possible, deposit originals or copies of such original visit reports in a publicly accessible archive to maintain a record of usage, for the purpose of any review of the Management Plan and in organising the scientific use of the Area.

## 8. Supporting documentation

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Annex 1: Bryophytes and lichens of the Botany Bay-Cape Geology region, Granite Harbour, Victoria Land, Antarctica (from Seppelt et al., 2010).

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HEPATICAE (Liverwort)
[1]*Cephaloziella varians**

MUSCI (Moss)
*Bryoerythrophyllum recurvirostrum**
[2]*Bryum argenteum var. muticum*
*Bryum pseudo triquetrum*
*Ceratodon purpureus**
[3]*Didymodon brachyphyllus*
*Grimmia plagiopodia*
*Hennediella heimii*
*Schistidium antarctici*
[4]*Syntrichia sarconeurum*

LICHEN
*Acarospora gwynnii*
*Amandinea petermannii*
*Buellia frigida*
[5]*Buellia* cf. *papillata*
[6]*Buellia subfrigida*
*Caloplaca athallina*
*Caloplaca citrina*
*Caloplaca coeruleofrigida*
*Caloplaca* cf. *schofieldii*
*Caloplaca saxicola*
*Candelariella flava*
[7]*Carbonea vorticosa*
*Lecanora expectans*
*Lecanor mons-nivis*
*Lecidea andersonii*
*Lecidea cancriformis*
*Lecidella siplei*
[8]*Leproloma cacuminum*
*Physcia caesia*
*Physcia dubia*
*Rhizocarpon geminatum*
*Rhizocarpon geographicum*
*Rhizoplaca melanophthalma*
*Rhizoplaca* cf. *priestleyi*
*Sarcogyne privigna*
*Turgidosculum complicatulum**
*Umbilicaria aprina*
[9]*Xanthomendoza borealis*
*Xanthoria elegans*

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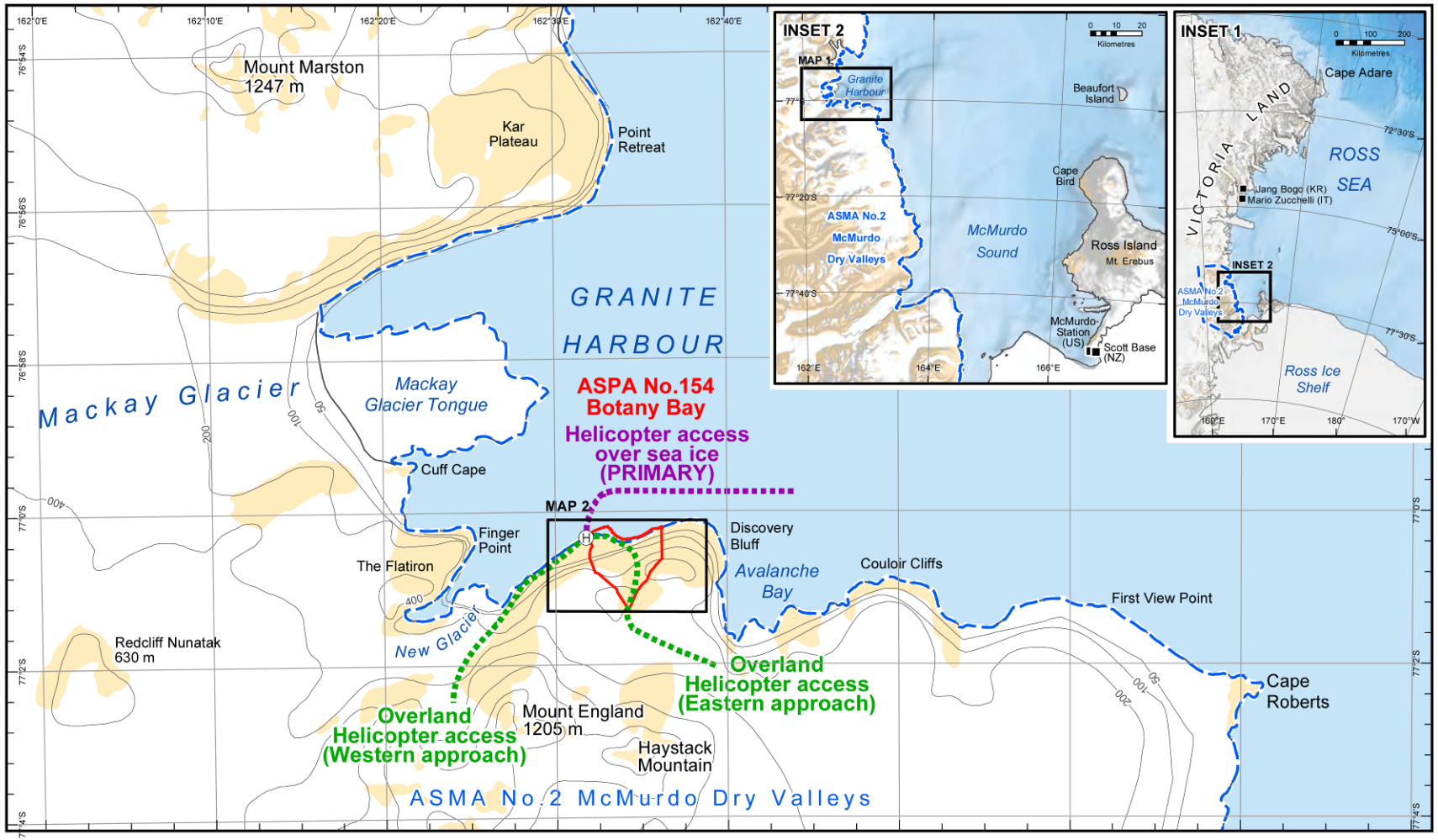
**[1] *Cephaloziella varians* has previously been referred to as *C. exiliflora* (Bednarek-Ochyra et al., 2000).**
**[2] *Bryum argenteum var. muticum* has previously been referred to as *Bryum subrotundifolium* (Ochyra et al., 2008).**
**[3] *Didymodon brachyphyllus* has previously been referred to as *Didymodon gelidus* (Ochyra et al., 2008).**
**[4] *Syntrichia sarconeurum* has previously been referred to as *Sarconeurum glaciale* (Ochyra et al., 2008).**
**[5] *Buellia* cf. *papillata* has previously been referred to as *Buellia grimmiae*.**
**[6] *Buellia subfrigida* has previously been referred to as *Aspicilia glacialis* (Seppelt et al., 1995) and *Hymenelia glacialis* (Ovstedal and Lewis Smith, 2001).**
**[7] *Carbonea vorticosa* has previously been referred to as *Lecidea blackburnii* (Seppelt et al., 1995).**
**[8] *Leproloma cacuminum* has previously been referred to as *Lepraria* sp.**
**[9] *Xanthomendoza borealis* has previously been referred to as *Xanthoria mawsonii* (Lindblom and Sochting, 2008).**
**** The most southerly record of these species.***




## Map 1: ASPA No. 154 Botany Bay: Regional overview

*Environmental Research & Assessment*
*Issued 08 Mar 2019*

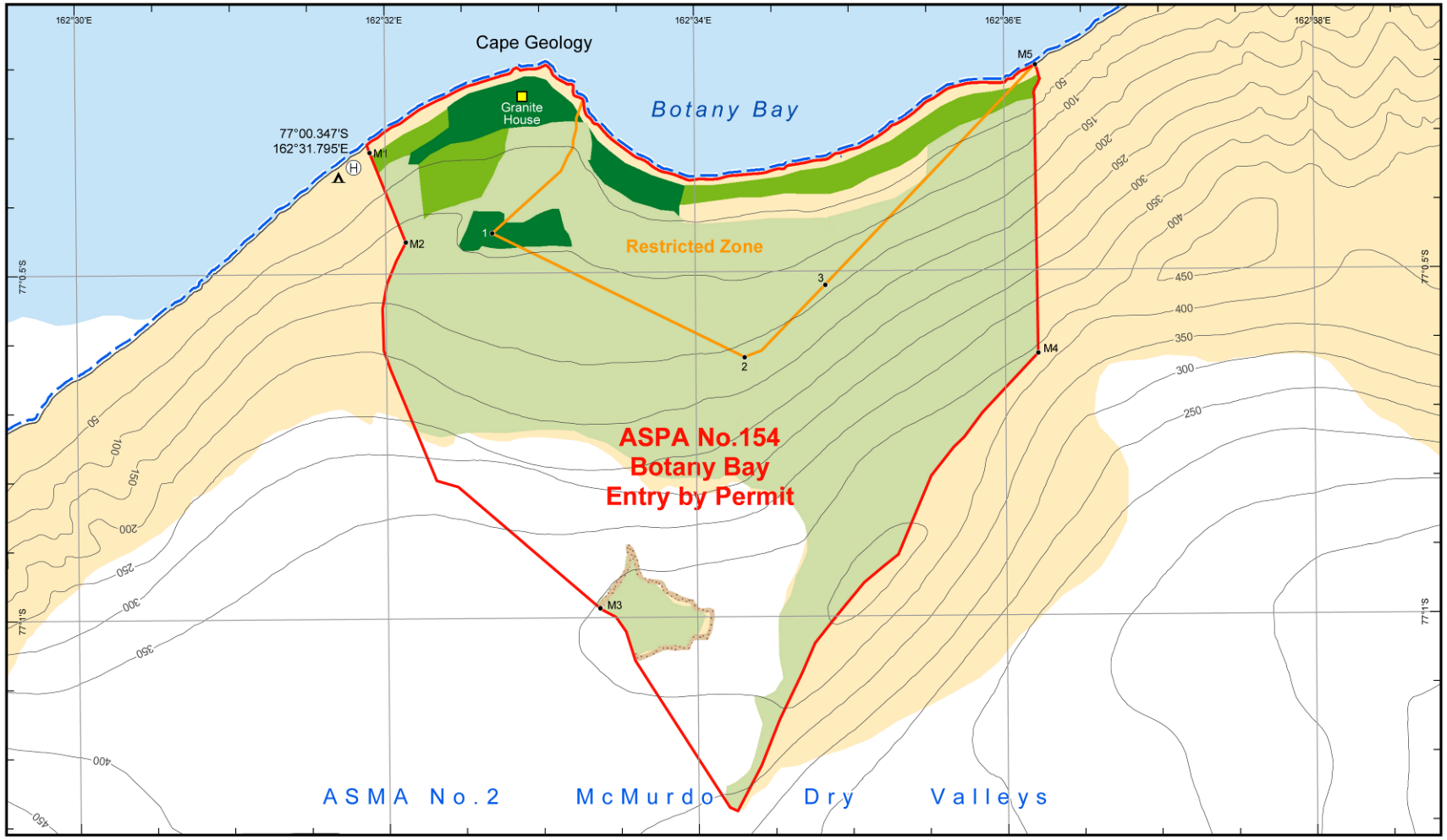
Antarctica New Zealand

Coastline
Contour
Ocean
Permanent ice
Ice free ground
ASMA boundary
ASPA boundary
Station
Helicopter landing site
Preferred helicopter access route over sea ice
Preferred helicopter access route over land

0 5 Kilometres

N

Projection: Lambert Conformal Conic;
Spheroid & horizontal datum: WGS84;
Data sources: ASPA boundary, HLS: Gateway Antarctica;
Contours, Ice free ground: ADD v.5.0;
Helicopter access routes: Jan 2019;
ASMA boundary: ERA Antarctic Protected Area Database v.4.




## Map 2: ASPA No. 154 Botany Bay: Topography

*Environmental Research & Assessment*
*Issued 07 May 2019*

Antarctica New Zealand

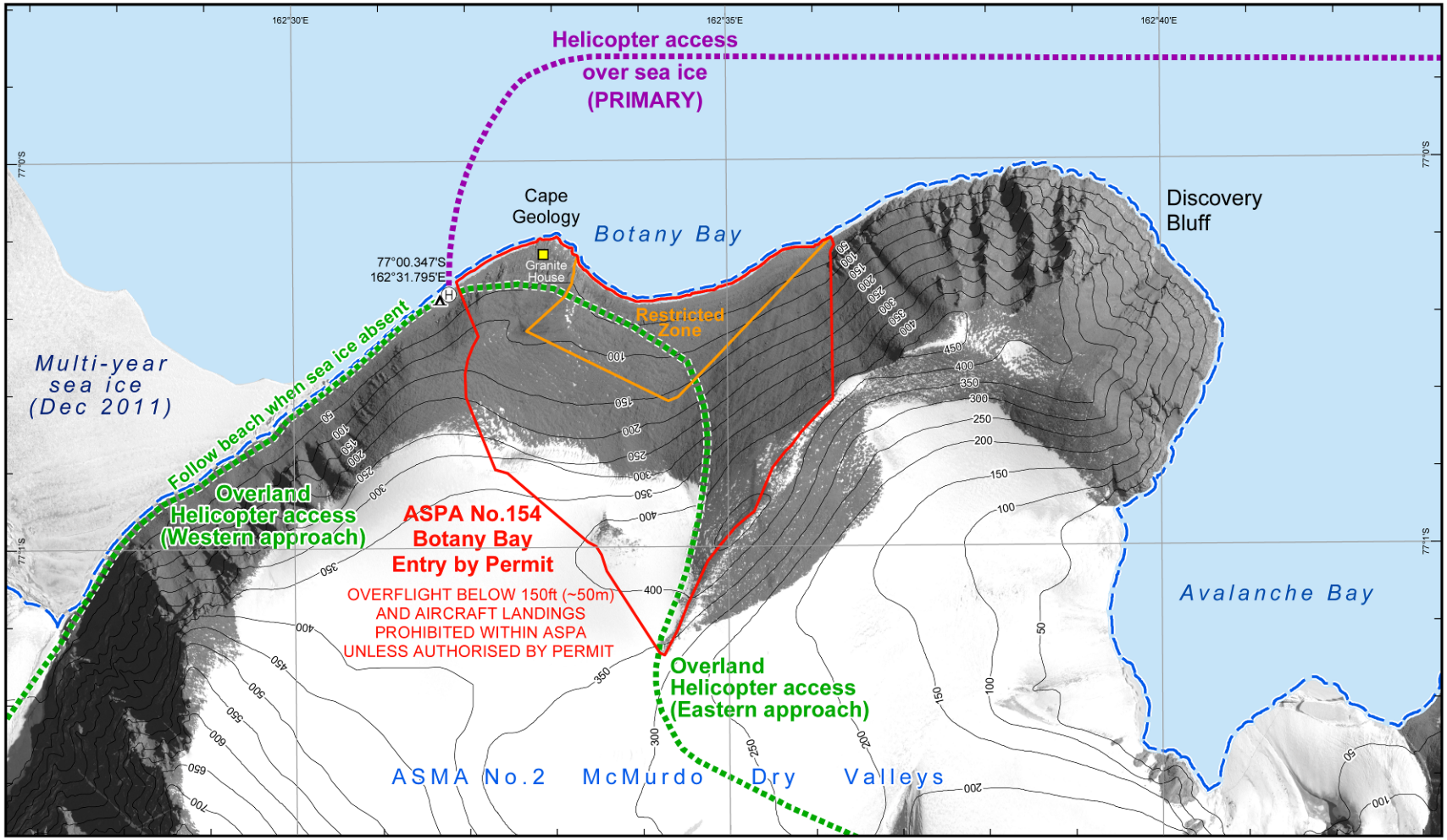
- Coastline
- Contour (50 m)
- Ocean
- Permanent ice
- Ice free ground
- Moraine
- ASMA boundary
- ASPA boundary
- Restricted Zone
- Boundary point
- Helicopter landing site
- Designated camp site
- Historic feature

**Vegetation density** (within ASPA only)

- 0.1% - 23%
- 23.1% - 46%
- 46.1% - 70%

0 500 Metres N

Projection: Lambert Conformal Conic; Spheroid & horizontal datum: WGS84; Data sources: Boundaries, physical, human and historic features: Gateway Antarctica; Vegetation: K518 (07/08); ASMA boundary: ERA Antarctic Protected Area Database v.4.




## Map 3: ASPA No. 154 Botany Bay: Air access guidance

*Environmental Research & Assessment*
*Issued 12 Mar 2019*

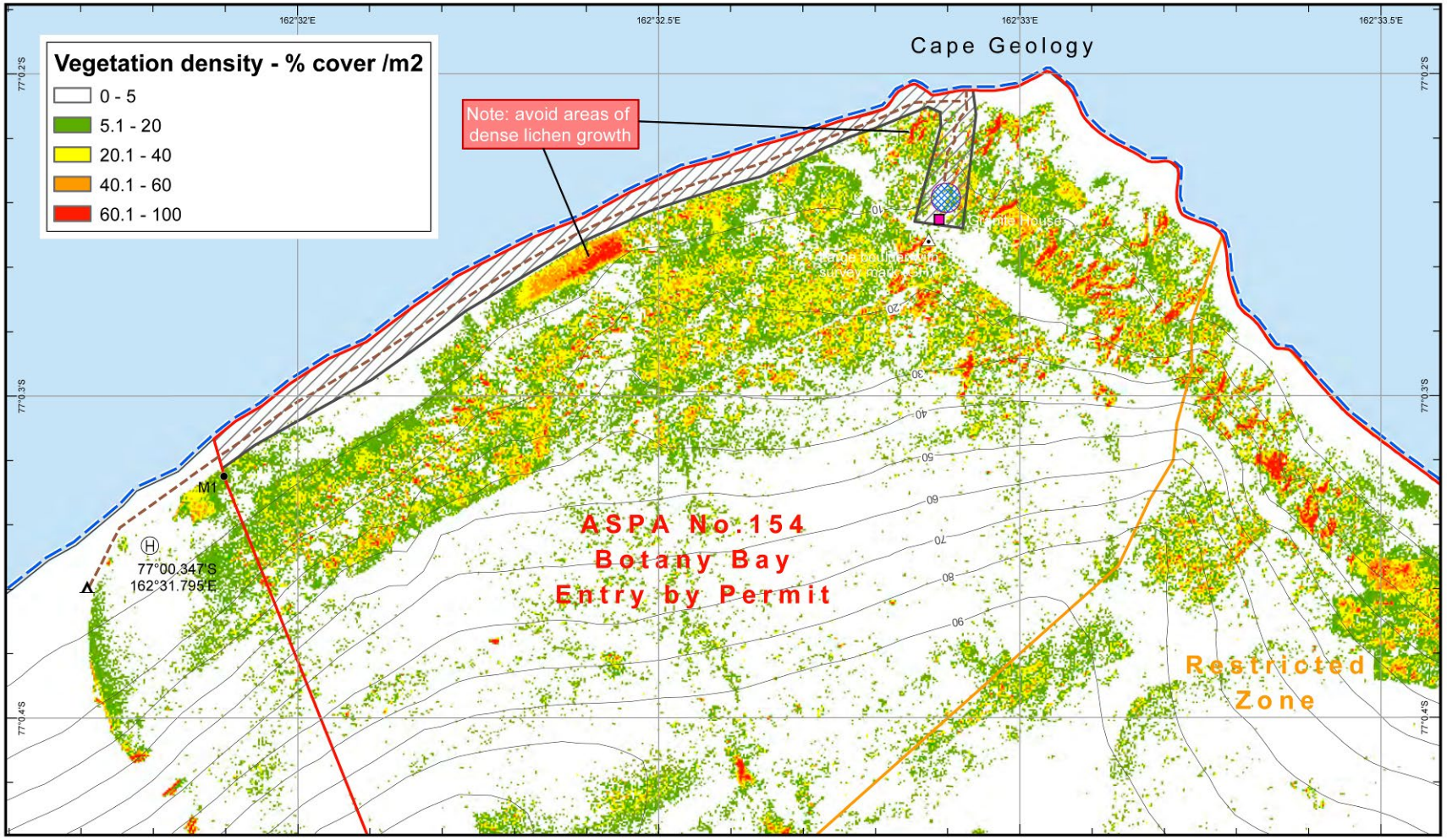
0 500 1000 Metres

N

Antarctica New Zealand

Contour (50 m)
Ocean
ASMA boundary
ASPA boundary
Restricted Zone
Helicopter landing site
Designated camp site
Historic feature
Preferred helicopter access route over sea ice
Preferred helicopter access route over land

Projection: Lambert Conformal Conic;
Spheroid & horizontal datum: WGS84;
Data sources: Boundaries, human & historic features:
Gateway Antarctica; Helicopter access: ERA (Sep 2016);
Contours: USGS 50K series;
ASMA boundary: ERA Antarctic Protected Area Database v.4;
Base imagery: WorldView-2 10 Dec 2011 (Imagery © 2011 Digital Globe).




## Map 4: ASPA No. 154 Botany Bay: Access Zone

*Environmental Research & Assessment*
*Issued 12 Mar 2019*

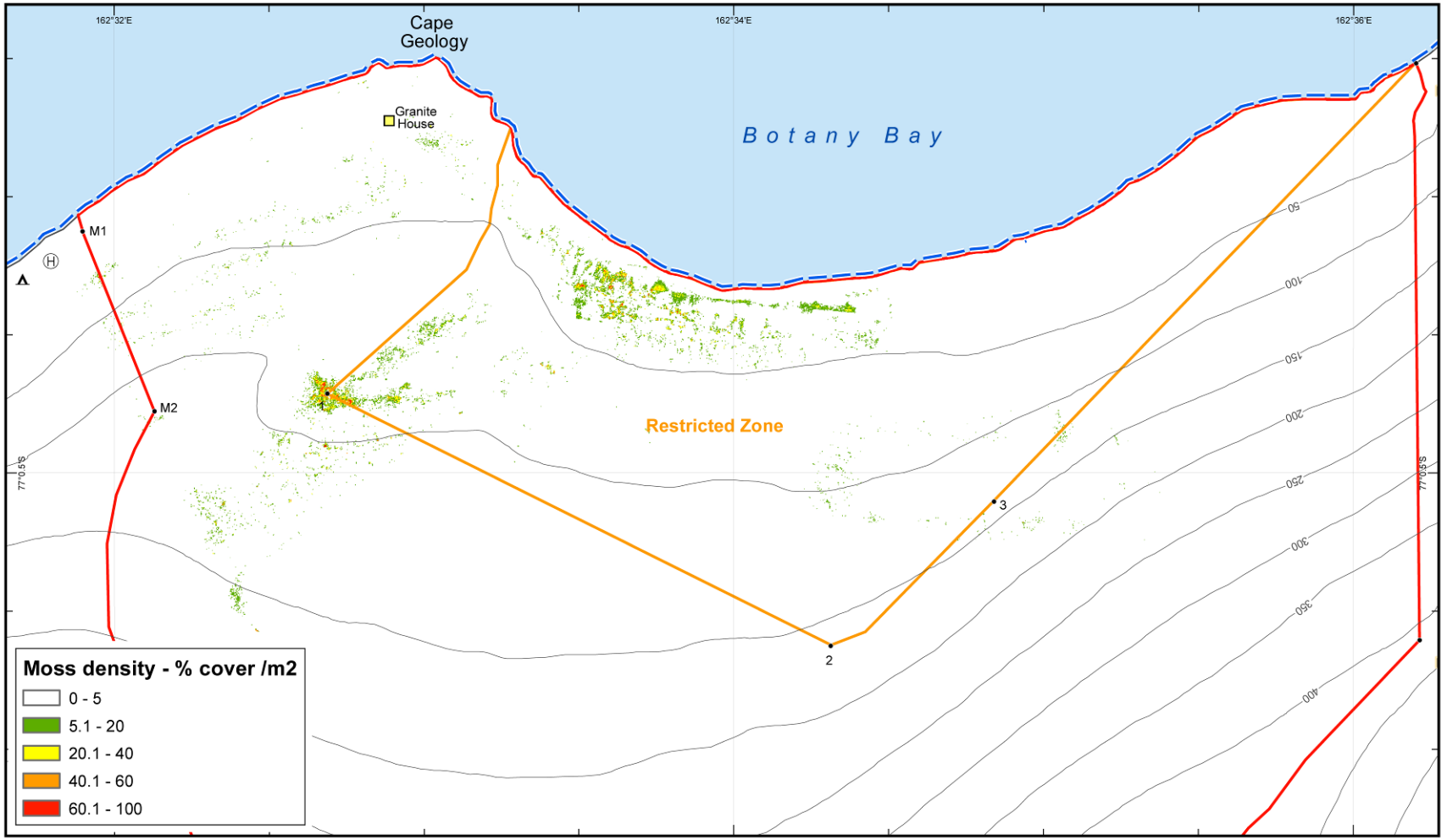
Antarctica New Zealand

- Coastline
- Contour (10 m)
- Ocean
- Ice free ground
- ASMA boundary
- ASPA boundary
- Restricted Zone
- Pedestrian Access Zone
- Boundary point
- Viewing area
- Walking route
- Helicopter landing
- Designated camp site
- Historic feature
- Survey mark

0 50 100 Metres

N

Projection: Lambert Conformal Conic; Spheroid & horizontal datum: WGS84; Data sources: Boundaries, physical, human and historic features: Gateway Antarctica. Access Zone / walking path updated ERA (2019) based on vegetation survey data acquired by Bollard: K500 (17/18); ASMA boundary: ERA Antarctic Protected Area Database v.4.




## Map 5A: ASPA No. 154 Botany Bay: Moss density

*Environmental Research & Assessment*
*Issued 12 Mar 2019*

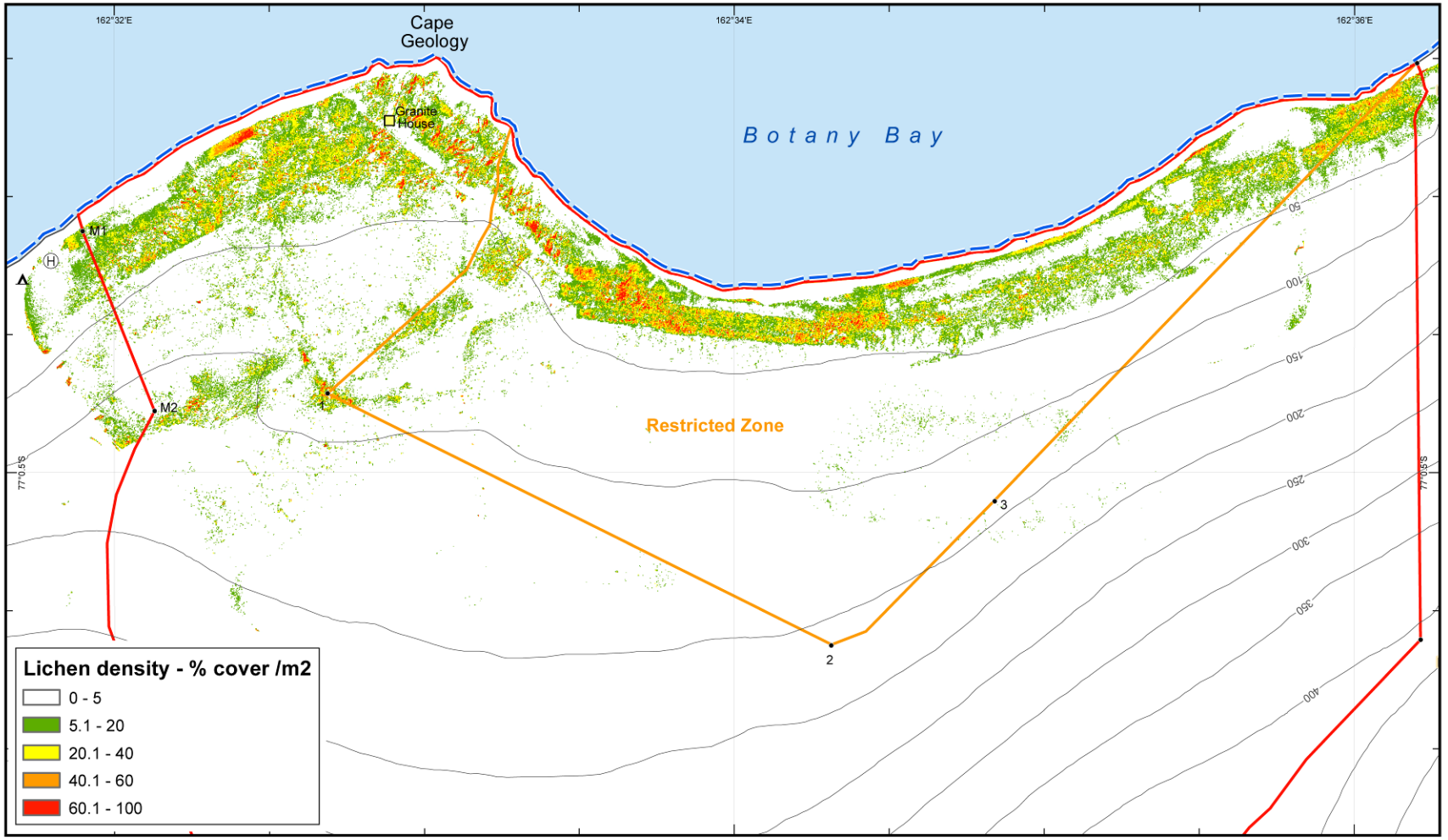
Antarctica New Zealand

Coastline
Contour (50 m)
Ocean
Ice free ground
ASMA boundary
ASPA boundary
Restricted Zone
Boundary point
Helicopter landing site
Designated camp site
Historic feature

0 500 Metres

N

Projection: Lambert Conformal Conic;
Spheroid & horizontal datum: WGS84;
Data sources:
Boundaries, human and historic features: Gateway Antarctica;
Contours: USGS 50K series;
Vegetation: survey data acquired by Bollard, K500 (17/18);
ASMA boundary: ERA Antarctic Protected Area Database v.4




## Map 5B: ASPA No. 154 Botany Bay: Lichen density

*Environmental Research & Assessment*
*Issued 12 Mar 2019*

Antarctica New Zealand

Coastline
Contour (50 m)
Ocean
Ice free ground
ASMA boundary
ASPA boundary
Restricted Zone
Boundary point
Helicopter landing site
Designated camp site
Historic feature

0 500
Metres

N

Projection: Lambert Conformal Conic;
Spheroid & horizontal datum: WGS84;
Data sources:
Boundaries, human and historic features: Gateway Antarctica;
Contours: USGS 50K series;
Vegetation: survey data acquired by Bollard, K500 (17/18);
ASMA boundary: ERA Antarctic Protected Area Database v.4