Miscellaneous No.3 (2008)

The Antarctic Treaty

Measures adopted at
the Thirtieth Consultative Meeting
held at New Delhi 30 April - 11 May 2007

Presented to Parliament
by the Secretary of State for Foreign and Commonwealth Affairs
by Command of Her Majesty
July 2008

Cm 7441 £12.85

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MEASURES ADOPTED AT THE THIRTIETH CONSULTATIVE MEETING HELD AT NEW DELHI 30 APRIL - 11 MAY 2007

The Measures[1] adopted at the Thirtieth Antarctic Treaty Consultative Meeting are reproduced below from the Final Report of the Meeting.

In accordance with Article IX, paragraph 4, of the Antarctic Treaty, the Measures adopted at Consultative Meetings become effective upon approval by all Contracting Parties whose representatives were entitled to participate in the meeting at which they were adopted (i.e. all the Consultative Parties). The full text of the Final Report of the Meeting, including the Decisions and Resolutions adopted at that Meeting, is available on the website of the Antarctic Treaty Secretariat at www.ats.aq.

The approval procedures set out in Article 6 (1) of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty[2] apply to Measures 1 and 2 (2007), and the approval procedures set out in Article 8(2) of Annex V to the Protocol apply to Measure 3 (2007).

[1] As defined in Decision 1 (1995), published in Miscellaneous No. 28 (1996) Cm 3483

[2] Treaty Series No. 15 (2006) Cm 6855

The texts of the Antarctic Treaty together with the texts of the Recommendations of the first three Consultative Meetings (Canberra 1961, Buenos Aires 1962 and Brussels 1964) have been published in Treaty Series No. 97 (1961) Cmnd. 1535 and Miscellaneous No. 23 (1965) Cmnd. 2822. The Final Act of the Eleventh Special Consultative Meeting and the text of the Environmental Protocol to the Antarctic Treaty have been published in Miscellaneous Series No. 6 (1992).

The Recommendations of the Fourth to Eighteenth Consultative Meetings, the Reports of the First to Sixth Special Consultative Meetings and the Measures adopted at the Nineteenth and the Measures adopted at the Twenty-sixth, Twenty-seventh, Twenty-eighth and Twenty-ninth Consultative Meetings were also published as Command Papers. No Command Papers were published for the Twentieth to Twenty-fifth Consultative Meetings.

The Command Paper is not accompanied by an Explanatory Memorandum.

MEASURES ADOPTED AT THE XXXth Consultative Meeting held at New Delhi 30 April - 11 May 2007

Note: The above page numbers have been reproduced from the original Final Report of the meeting

Measure 1 (2007)

Antarctic Specially Protected Areas: Revised Management Plans

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty, providing for the designation of Antarctic Specially Protected Areas and approval of Management Plans for those Areas;

Recalling

- Recommendation IV-13 (1966), which designated Moe Island, South Orkney Islands as Specially Protected Area ("SPA") No. 13 and annexed a map of the site;

- Recommendation XIII-8 (1985), which designated Rothera Point, Adelaide Island as Site of Special Scientific Interest ("SSSI") No. 9 and annexed a Management Plan for the site;

- Recommendation XVI-6 (1991), which annexed a revised description of SPA No. 13 and a Management Plan for the Area;

- Measure 1 (1995), which annexed a revised description and a revised Management Plan for SPA 13;

- Resolution 7 (1995), which extended the expiry date of SSSI 9, and Measure 1 (1996), which annexed a revised description and a revised Management Plan for SSSI 9;

- Decision 1 (2002), which renamed and renumbered SPA No. 13 as Antarctic Specially Protected Area ("ASPA") No. 109 and SSSI No. 9 as ASPA No. 129;

Noting that the Committee for Environmental Protection has endorsed the revised Management Plans for these Areas annexed to this Measure;

Desiring to replace the Management Plans for Antarctic Specially Protected Areas No. 109 and 129 with revised and updated Management Plans, the latter of which includes a revision to the boundaries of ASPA 129;

Recommend to their Governments the following Measure for approval in accordance with Paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:

II. MEASURES

That:

1. the revised Management Plans for the following Areas, which are annexed to this Measure, be approved:

(a) Antarctic Specially Protected Area No. 109: Moe Island, South Orkney Islands;

(b) Antarctic Specially Protected Area No.129: Rothera Point, Adelaide Island;

2. all prior Management Plans for Antarctic Specially Protected Areas No. 109 and 129 shall cease to be effective, or, if any such plans have not yet become effective, they are hereby withdrawn.

Management Plan forAntarctic Specially Protected Area No. 109

MOE ISLAND, SOUTH ORKNEY ISLANDS

1. Description of values to be protected

The Area was originally designated in Recommendation IV-13 (1966, SPA No. 13) after a proposal by the United Kingdom on the grounds that the Area provided a representative sample of the maritime Antarctic ecosystem, that intensive experimental research on the neighbouring Signy Island might alter its ecosystem and that Moe Island should be specially protected as a control area for future comparison.

These grounds are still relevant. Whilst there is no evidence that research activities at Signy Island have significantly altered the ecosystems there, a major change has occurred in the low altitude terrestrial system as a result of the rapidly expanding Antarctic fur seal (*Arctocephalus gazella*) population. Plant communities on nearby Signy Island have been physically disrupted by trampling by fur seals and nitrogen enrichment from the seals' excreta has resulted in replacement of bryophytes and lichens by the macro-alga *Prasiola crispa.* Low-lying lakes have been significantly affected by enriched run-off from the surrounding land. So far Moe Island has only been invaded by fur seals to a limited extent and its topography makes it less likely that seals will penetrate to the more sensitive areas.

The values to be protected are those associated with the biological composition and diversity of a near-pristine example of the maritime Antarctic terrestrial and littoral marine ecosystems. In particular, Moe Island contains the greatest continuous expanses of *Chorisodontium-Polytrichum* moss turf found in the Antarctic. Moe Island has been visited on few occasions and has never been the site of occupation for periods of more than a few hours.

2. Aims and objectives

Management of Moe Island aims to:

- avoid major changes to the structure and composition of the terrestrial vegetation, in particular the moss turf banks;
- prevent unnecessary human disturbance to the Area;
- minimise introduction of locally non-native soils, plants, animals and microorganisms into the Area;
- permit research of a compelling scientific nature which cannot be served elsewhere, particularly research related to determining the differences between the ecology of an undisturbed island and that of an adjacent occupied and fur seal perturbed island.

3. Management activities

Ensure that the biological condition of Moe Island is adequately monitored, preferably by non-invasive methods, and that the sign-boards are serviced.

4. Period of designation

Designated for an indefinite period.

5. Maps

- Map 1. The location of Moe Island in relation to the South Orkney Islands. Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71° S. Central meridian 45° W.
- Map 2. Moe Island in greater detail. Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71° S. Central meridian 45° W.

6. Description of the Area

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

Moe Island, South Orkney Islands, is a small irregularly-shaped island lying 300 m off the south-western extremity of Signy Island, from which it is separated by Fyr Channel. It is about 1.3 km from the northeast to southwest and 1 km from northwest to southeast. It should be noted that the position of Moe Island on Admiralty Chart No. 1775 (60°44'S, 45°45'W), does not agree closely with the more accurate coordinates in Map 2 (60°44'S, 45°41'W).

The island rises precipitously on the north-eastern and south-eastern sides to Snipe Peak (226 m altitude). There is a subsidiary summit above South Point (102 m altitude) and lower hills on each of three promontories on the western side above Corral Point (92 m), Conroy Point (39 m) and Spaull Point (56 m). Small areas of permanent ice remain on the east- and south-facing slopes with late snow lying on the steeply dipping western slopes. There are no permanent streams or pools.

The rocks are metamorphic quartz mica schists, with occasional biotite and quartz-rich beds. There is a thin bed of undifferentiated amphibolite on the north-eastern coast. Much of the island is overlain with glacial drift and scree. Soils are predominantly immature deposits of fine to coarse clays and sands intermixed with gravels, stones and boulders. They are frequently sorted by freeze-thaw action in high or exposed locations into small-scale circles, polygons, stripes and lobes. There are deep accumulations of peat (up to 2 m thick on western slopes), considerable expanses of the surface of which are bare and eroded.

The dominant plant communities are *Andreaea-Usnea* fellfield and banks of *Chorisodontium-Polytrichum* moss turf (the largest known example of this community type in the Antarctic). These moss banks constitute a major biological value and the reason for the designation of the Area. The cryptogamic flora is diverse. The majority of these moss banks have received little damage from fur seals, and show few visible sign of degradation. However, the exception to this observation is the northern-most banks located around Spaull Point. Here, although still extensive, the moss turf was estimated to have suffered about 50 % damage from Antarctic fur seal (*Arctocephallus gazella*) activity during a survey in January 2006. One sub-adult male Antarctic fur seal was present on this area of moss turf during the most recent management survey in January 2006. Almost certainly fur seals gain access to this plant community via the gentle slope leading inland from the small shingle beach located at the north-eastern corner of Landing Cove.

The mites *Gamasellus racovitzai* and *Stereotydeus villosus* and the springtail *Cryptopygus antarcticus* are common under stones.

There were five colonies of chinstrap penguins (*Pygoscelis antarctica*) totalling about 11,000 pairs in 1978-79. A visit in February 1994 noted fewer than 100 pairs on the northern side of Landing Cove and more than a thousand on the southern side. The most recent visit in January 2006 noted ~100 breeding pairs on Spaull Point. Numerous other birds breed on the island, notably about 2000 pairs of cape petrels (*Daption capensis*) in 14 colonies (1966) and large numbers of Antarctic prions (*Pachyptila desolata*).

Weddell seals (*Leptonychotes weddellii*), crabeater seals (*Lobodon carcinophaga*) and leopard seals (*Hydrurga leptonyx*) are found in the bays on the west side of the island. Increasing numbers of fur seals (*Arctocephalus gazella*), mostly juvenile males, come ashore on the north side of Landing Cove and have caused some damage to vegetation in that area. However, it is possible that the nature of the terrain will restrict these animals to this small headland where damage may intensify.

6(ii) Restricted zones within the Area

None.

6(iii) Location of structures within the Area

A marker board is located at the back of the small shingle beach in the northeast corner of Landing Cove, beyond the splash zone on top of a flat rock, to which it is bolted. The board was erected on 2 February 1994. During periods of heavy snowfall, the marker board may be buried and difficult to locate.

There is a cairn and the remains of a survey mast, erected in 1965-66, on Spaull Point. This mast is of interest for lichenometric studies and should not be removed. There are no other structures on Moe Island.

6(iv) Location of other Protected Areas within close proximity

ASPA No. 110, Lynch Island, lies about 10 km north-north-east of Moe Island. ASPA No. 114, North Coronation Island, lies about 19 km away on the northern side of Coronation Island. ASPA No. 111, Southern Powell Island, is about 41 km to the east.

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:

- it is issued only for a compelling scientific purpose which cannot be served elsewhere;
- the actions permitted will not jeopardize the natural ecological system in the Area;
- any management activities are in support of the objectives of the Management Plan;
- the actions permitted are in accordance with this Management Plan;
- the Permit, or an authorised copy, must be carried within the Specially Protected Area;
- a report or reports are supplied to the authority or authorities named in the Permit.

7(i) Access to and movement within the Area

There are no restrictions on landing from the sea, which is the preferred method. No special access points are specified, but landings are usually most safely made at the northeast corner of Landing Cove (60°43'57"S, 45°41'5"W). If Landing Cove is inaccessible due to the ice conditions, an alternative landing site is at the western-most point of Spaull Point (60°43'54"S, 45°41'15"W), directly opposite an offshore rock of 26 m altitude.

Helicopter landings should be avoided where practicable. If a landing is necessary, however, helicopters may land only on the col between hill 89 m and the western slope of Snipe Peak. To avoid overflying bird colonies approach should preferably be from the south, though an approach from the north is permissible.

It is forbidden to overfly the Area below 250 m altitude above the highest point except for access to the landing point specified above.

No pedestrian routes are designated but persons on foot should at all times avoid disturbances to birds or damage to vegetation and periglacial features. Vehicles are prohibited on Moe Island.

7(ii) Activities which are or may be conducted within the Area, including restrictions on time and place

- Compelling scientific research which cannot be undertaken elsewhere and which will not jeopardize the ecosystem of the Area;
- Essential management activities, including monitoring.

7(iii) Installation, modification or removal of structures

No structures are to be erected in the Area, or scientific equipment installed, except for essential scientific or management activities, as specified in the Permit.

7(iv) Location of field camps

Parties should not normally camp in the Area. If this is essential for reasons of safety, tents should be erected having regard to causing the least damage to vegetation or disturbance to fauna.

7(v) Restrictions on materials and organisms that may be brought into the Area

No living animals, plant material or microorganisms shall be deliberately introduced into the Area. All sampling equipment brought into the Area shall have been thoroughly cleaned. To the maximum extent possible, footwear, outer clothing, backpacks and other equipment used or brought into the Area shall be thoroughly cleaned before entering the Area.

No poultry products, including food products containing uncooked dried eggs, shall be taken into the Area.

No herbicides or pesticides shall be brought into the Area. Any other chemicals, which may be introduced for a compelling scientific purpose 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, food and other materials are not to be deposited in the Area, unless required for essential purposes connected with the activity for which the Permit has been granted. All such materials introduced are to be removed when no longer required. Permanent depots are not permitted.

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

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

7(vii) Collection and 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, except that debris of man-made origin may be removed from the beaches of the Area and dead or pathological specimens of fauna or flora may be removed for laboratory examination.

7(viii) Disposal of waste

All non-human wastes shall be removed from the Area. Human waste may be deposited in the sea.

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

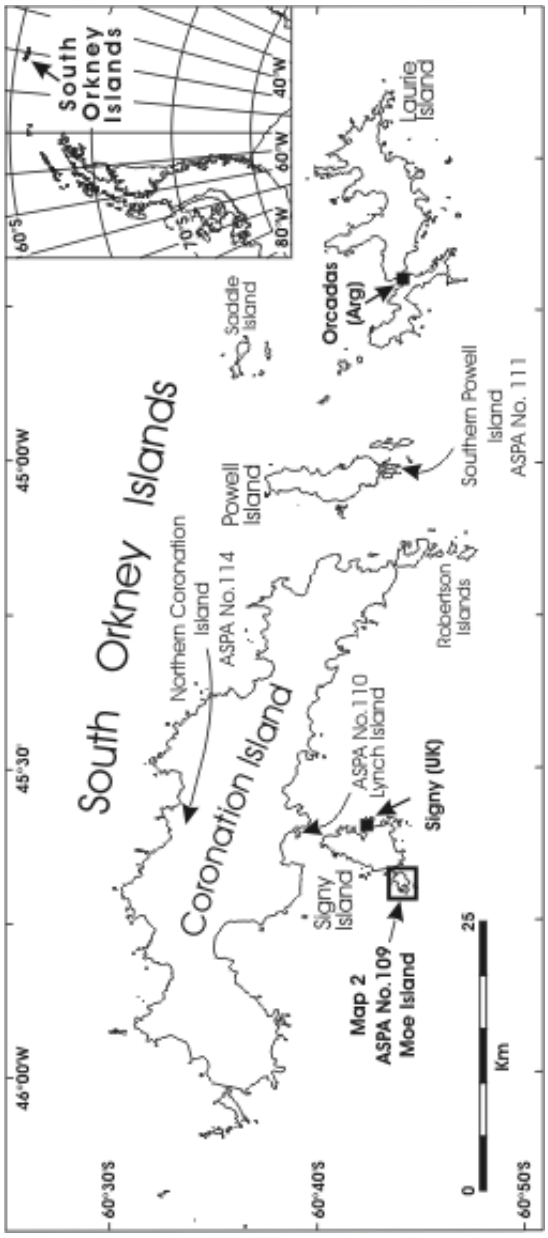
Permits may be granted to enter the Area to carry out biological monitoring and Area inspection activities, which may involve the collection of small amounts of plant material or small numbers of animals for analysis or audit, to erect or maintain notice boards, or protective measures.

7(x) Requirements for reports

The Principal Permit Holder for each issued Permit shall submit a report of activities conducted in the Area using the accepted Visit Report form suggested by SCAR. This report shall be submitted to the authority named in the Permit as soon as practicable, but not later than 6 months after the visit has taken place. Such reports should be stored indefinitely and made accessible to interested Parties, SCAR, CCAMLR and COMNAP if requested, to provide the documentation of human activities within the Area necessary for good management.

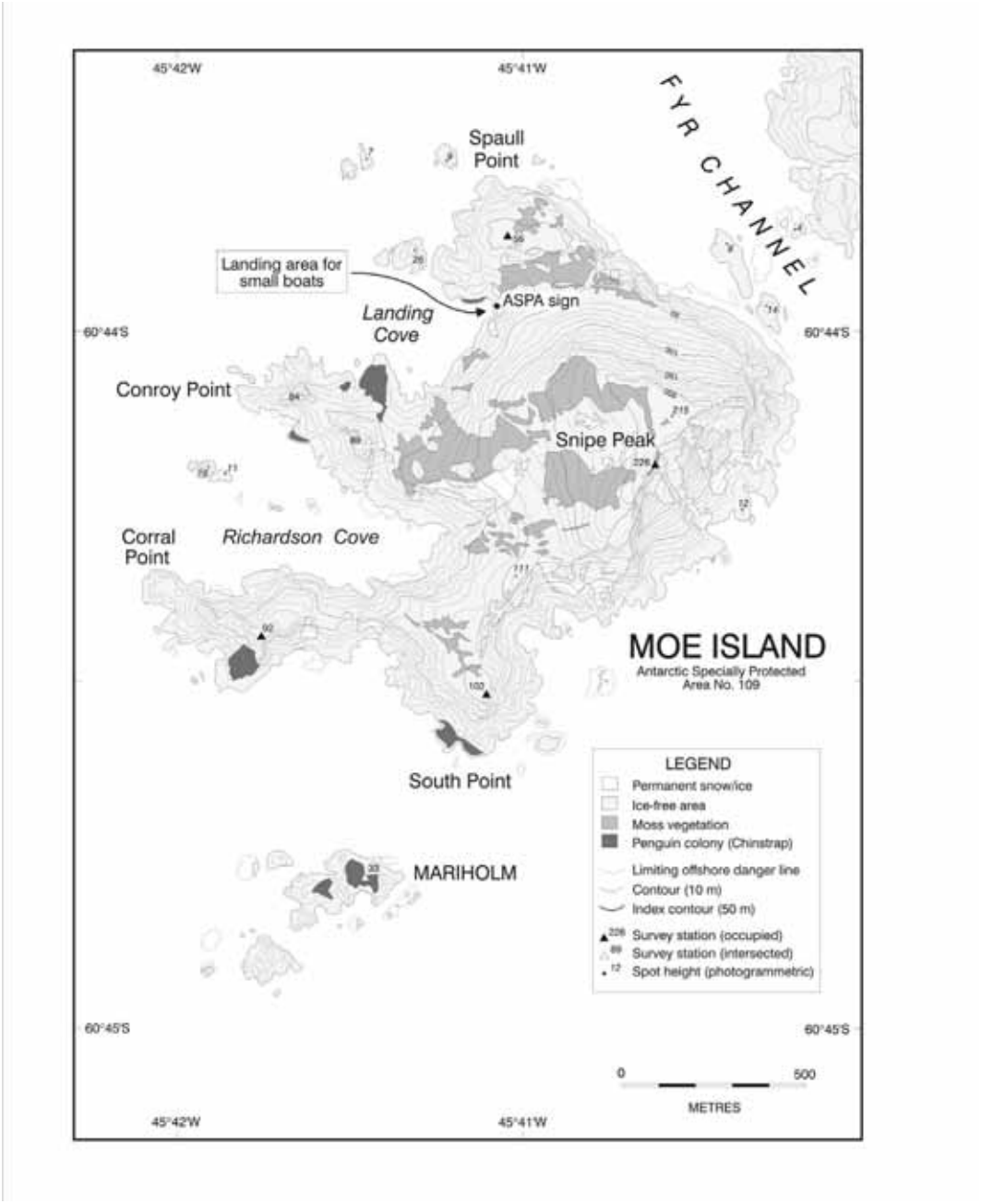
Map 1. The location of Moe Island in relation to the South Orkney Islands.

Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71° S. Central meridian 45° W.



Map 2. Moe Island in greater detail.

Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71° S. Central meridian 45° W.



II. Measures

Management Plan for Antarctic Specially Protected Area (ASPA) No. 129

ROTHERA POINT, ADELAIDE ISLAND

1. Description of values to be protected

Rothera Point was originally designated in Recommendation XIII-8 (1985, SSSI No. 9) after a proposal by the United Kingdom that the Area would serve as a biological research site and control area, against which the effects of human impact associated with the adjacent Rothera Research Station (UK) could be monitored in an Antarctic fellfield ecosystem. The Area itself has little intrinsic nature conservation value.

2. Aims and objectives

2(i) Aims

Management of Rothera Point aims to:

- avoid major changes to the structure and composition of the terrestrial ecosystems, in particular to the fellfield ecosystem and breeding birds, by:
  - preventing physical development within the Area, and;
  - limiting human access to the Area to maintain its value as a control area for environmental monitoring studies;
- allow scientific research and monitoring studies of breeding birds, terrestrial and freshwater biota, and soils, while ensuring as far as possible that the Area is protected from over-sampling; and
- allow regular visits for management purposes in support of the objectives of the management plan.

2(ii) Objectives

The Area is unique in Antarctica as it is the only protected area currently designated solely for its value in the monitoring of human impact. The objective is to use the Area as an unaffected control area in assessing the impact of activities undertaken at Rothera Research Station on the Antarctic environment.

The hypothesis being tested is that the activities undertaken at Rothera Research Station have not caused environmental impact within the Area.

Monitoring studies undertaken by the UK (through the British Antarctic Survey) began at Rothera Point in 1976, before the establishment of the station later that year, and have expanded considerably since 1989. Further long-term development of the station commenced in 2005. The UK plans to continue monitoring studies in the future.

The purposes of the monitoring programme are to:

- survey the distribution of terrestrial flora and invertebrates every decade;
- assess heavy metal concentrations in lichens every five years;

- assess petroleum hydrocarbon and heavy metal concentrations in gravel and soil every 5 years;
- survey the breeding bird population annually.

3. Management activities

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

- signboards illustrating the location and boundary of the Area and stating entry restrictions shall be erected at the major access points and serviced on a regular basis;
- a map showing the location and boundaries of the Area and stating entry requirements shall be displayed in a prominent position at Rothera Research Station;
- visits shall be made as necessary (no less than once every two years) to assess whether the Area continues to serve the purposes for which is was designated and to ensure management activities are adequate.

4. Period of designation

Designated for an indefinite period.

5. Maps

- Map 1. ASPA No. 129 Rothera Point, location map. Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71°S. Central meridian 67°45'W.
- Map 2. ASPA No. 129 Rothera Point, topographic map. Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71°S. Central meridian 67°45'W.

6. Description of the Area

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

Rothera Point (67° 34'S, 68° 08'W) is situated in Ryder Bay, at the south-east corner of Wright Peninsula on the east side of Adelaide Island, south-west Antarctic Peninsula (Map 1).

The Area is the north-eastern one-third of Rothera Point (Map 2), and is representative of the area as a whole. It is about 280 m from west to east and 230 m from north to south, and rises to a maximum height of 36 m. At the coast, the Area boundary is the 5 m contour. No upper shore, littoral or sublittoral areas of Rothera Point are therefore included within the ASPA. The southern boundary of the Area, running across Rothera Point, is partially marked by rock filled gabions, in which are placed ASPA boundary signs. The remaining boundary is unmarked. There are two signboards just outside the perimeter of the Area located at the starting points of the pedestrian access route around Rothera Point (see Map 2).

The Area boundary extends to the 5 m contour at the coast. There is unrestricted pedestrian access below this contour height around Rothera Point. The recommended pedestrians access route follows the Mean High Water Mark (MHWM) and is shown on Map 2. During periods when the ground is

snow-covered and sea ice has formed, pedestrians should ensure that they are at a safe distance from the shoreline and are not in danger of straying onto unreliable sea ice or into tide cracks.

Small areas of permanent ice occur to the north and south of the summit of the ASPA. There are no permanent streams or pools.

The rocks are predominantly heterogeneous intrusions of diorite, granodiorite and adamellite of the mid-Cretaceous-Lower Tertiary Andean Intrusive Suite. Veins of copper ore are prominent bright green stains on the rock. Soil is restricted to small pockets of glacial till and sand on the rock bluffs. Local deeper deposits produce scattered small circles and polygons of frost sorted material. There are no extensive areas of patterned ground. Around prominent rock outcrops used as bird perches by Dominican gulls (*Larus dominicanus*) there are accumulations of recent and decaying limpet (*Nacella concinna*) shells forming patches of calcareous soil. There are no accumulations of organic matter.

There are no special or rare geological or geomorphological features in the Area.

The limited terrestrial biological interest within the Area is confined to the rock bluffs where there is locally abundant plant growth dominated by lichens. The vegetation is representative of the southern «maritime» Antarctic fellfield ecosystem and is dominated by the fruticose lichen *Usnea antarctica*, *Usnea sphacelala*, and *Pseudephebe minuscula*, and the foliose lichen *Umbilicaria decussata*. Numerous crustose lichens are associated, but bryophytes (mainly *Andreaea* spp.) are sparse.

A single very small population of Antarctic pearlwort (*Colobanthus quitensis*) occurs below the northern cliff of the Area, whilst a few plants of Antarctic hair grass (*Deschampsia antarctica*) have become established at two locations since 1989.

The invertebrate fauna is impoverished and consists only of a few species of mites and spring tails, of which *Halozetes belgicae* and *Cryptopygus antarcticus* are the most common.

There are no special or rare terrestrial flora and fauna in the Area.

Brown and south polar skuas (*Catharacta lonnbergii* and *C. maccormicki*) are the most abundant breeding birds found in the Area, with five pairs of skuas recorded nesting in the 2006/7 season. A pair of Dominican gulls (*Larus dominicanus*) nest in the Area. Wilson's storm petrels (*Oceanites oceanicus*) also breed, but only one nest has been found.

Rothera Research Station (UK) lies about 250 m west of the western boundary of the Area (see inset on Map 2).

6(ii) Restricted zones within the Area

None.

6(iii) Location of structures within the Area

A rock cairn marks the summit of the Area (36 m) and 35 m to the east south east of it there is another cairn (35.4) marking a survey station.

6(iv) Location of other Protected Areas within close proximity

ASPA No. 107, Dion Islands, Marguerite Bay, lies about 15 km south of Adelaide Island. ASPA No. 115, Lagotellerie Island, Marguerite Bay, lies about 11 km south of Pourquoi Pas Island. ASPA No. 117, Avian Island, Marguerite Bay, lies about 0.25 km south of the south-west tip of Adelaide Island. The locations of these ASPAs are shown on Map 1.

7. Permit conditions

Entry to the Area is prohibited without a Permit. Permits shall be issued only by appropriate national authorities, and may contain both general and specific conditions.

General conditions for issuing a Permit to enter the Area may include:

- activities limited to scientific research or monitoring purposes;
- the actions permitted will not jeopardize the ecosystem or scientific or monitoring values of the Area;
- any management activities are in support of the objectives of the Management Plan;
- the actions permitted are carried out in accordance with this Management Plan;
- the permit holder must carry the permit, or an authorized copy, within the Area.

National authorities may attach further general and specific conditions to a permit.

7(i) Access to and movement within the Area

Access to the Area shall be on foot.

Landing of helicopters within the Area is prohibited. As far as practicable, helicopter overflight of the Area shall be avoided.

Vehicles are prohibited in the Area.

7(ii) Activities which are or may be conducted within the Area, including restrictions on time and place

Activities which are or may be conducted within the Area are:

- scientific research or monitoring which will not jeopardise the ecosystems of the Area;
- essential management activities.

7(iii) Installation, modification or removal of structures

No structures are to be erected in the Area, or equipment installed, except for essential scientific or management activities (e.g. signboards, monitoring equipment) as specified in the permit.

All scientific and monitoring equipment, including marker stakes, installed in the Area must be approved by Permit and clearly identified to show principal investigator, project and year installation. The Permit holder must remove any scientific or monitoring equipment installed as soon as it is no longer required, or on the expiry of the permit, which ever is the sooner.

7(iv) Location of field camps

Camping in the Area is prohibited. Accommodation may be available at Rothera Research Station.

7(v) Restrictions on materials and organisms that may be brought into the Area

No non-indigenous living animals, plant material, microorganisms or soil shall be deliberately introduced into the Area. All sampling equipment brought into the Area shall have been thoroughly cleaned. To the maximum extent possible, footwear, outer clothing, backpacks and other equipment used or brought into the Area shall be thoroughly cleaned before entering the Area.

Any hazardous substances or chemicals, including radioisotopes, which may be introduced for scientific, monitoring 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, food and other materials must not be stored in the Area, unless required for essential purposes connected with the activity for which the Permit has been granted. All such materials introduced shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted. Permanent depots are not permitted.

No poultry products, including food products containing uncooked dried eggs, shall be taken into the Area.

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

Taking of or harmful interference with native flora and fauna is prohibited, except in accordance with a Permit. Where taking of or harmful interference with animals is involved this should in accordance with the SCAR Code of Conduct for the use of Animals for Scientific Purposes in Antarctica, as a minimum standard.

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

Material may be collected and/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 not brought into the Area by the Permit holder, or otherwise authorised, which is likely to compromise the values of the Area shall be removed unless the impact of removal is likely to be greater than leaving the material *in situ*. In the latter case the appropriate authority shall be notified.

7(viii) Disposal of wastes

All wastes, including all human wastes, must 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

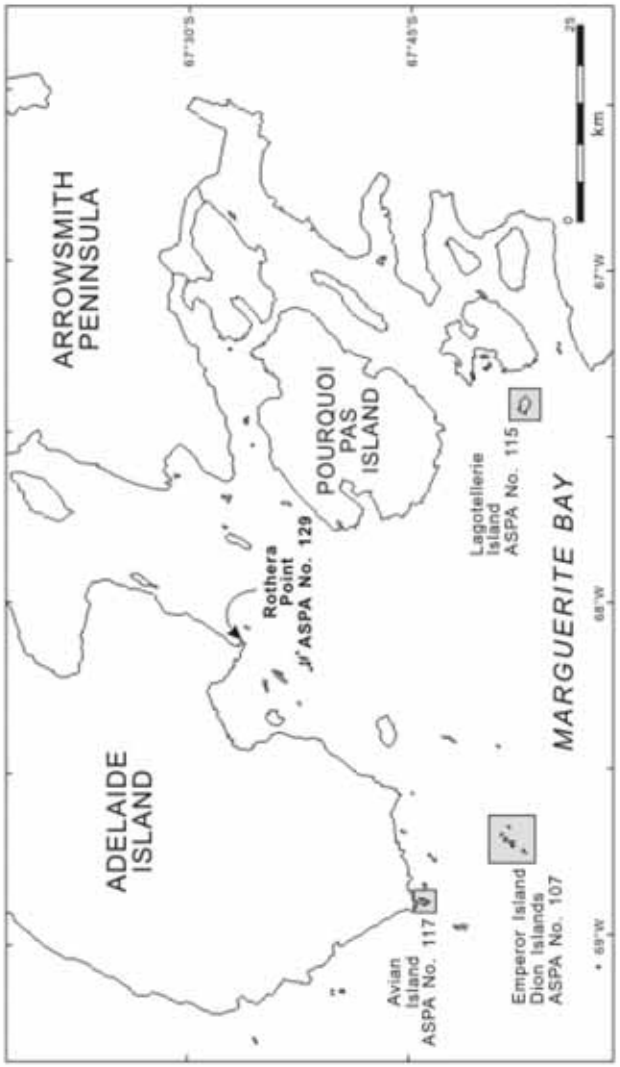
Permits may be granted to enter the Area to carry out scientific research, monitoring and Area inspection activities, which may involve the collection of a small number of samples for analysis, to erect or maintain signboards, or to carry out protective measures.

7(x) Requirements for reports

Parties should ensure that the principal holder of each Permit issued submits 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 description of activities conducted by persons subject to their jurisdiction, 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.

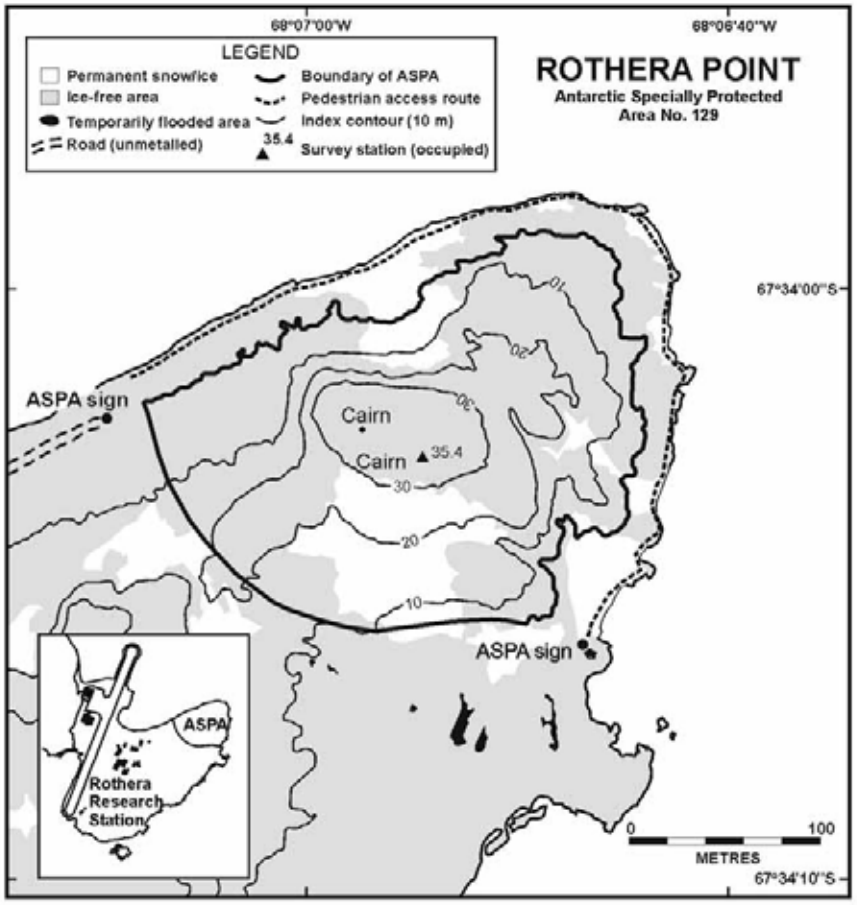
Map 1. ASPA No. 129 Rothera Point, location map.

Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71°S. Central meridian 67°45'W.



Map 2. ASPA No. 129 Rothera Point, topographic map.

Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71°S. Central meridian 67°45'W.



II. Measures

Measure 2 (2007)

Antarctic Specially Managed Areas: Designations and Management Plans

The Representatives,

Recalling Articles 4, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty, providing for the designation of Antarctic Specially Managed Areas ("ASMA") and the approval of Management Plans for those Areas;

Noting that the Committee for Environmental Protection has advised that Amundsen-Scott South Pole Station, South Pole and Larsemann Hills, East Antarctica be designated as Antarctic Specially Managed Areas and has endorsed the Management Plans annexed to this Measure;

Recognising that Amundsen-Scott South Pole Station, South Pole and Larsemann Hills, East Antarctica are areas where activities are being conducted, in which it is desirable to plan and coordinate activities, avoid possible conflicts, improve co-operation between Parties and minimise environmental impacts;

Desiring to designate Amundsen-Scott South Pole Station, South Pole and Larsemann Hills, East Antarctica as Antarctic Specially Managed Areas and to approve Management Plans for these Areas;

Recommend to their Governments the following Measure for approval in accordance with Paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:

That:

1. the following be designated as Antarctic Specially Managed Areas:

   (a) Antarctic Specially Managed Area No 5: Amundsen-Scott South Pole Station, South Pole;

   (b) Antarctic Specially Managed Area No 6: Larsemann Hills, East Antarctica;

2. the Management Plans for these areas, which are annexed to this Measure, be approved.

II. Measures

Management Plan for Antarctic Specially Managed Area No. 5

AMUNDSEN-SCOTT SOUTH POLE STATION, SOUTH POLE

1. Description of Values to be Protected

The Amundsen-Scott South Pole Station (hereafter referred to as "South Pole Station") is located on the polar plateau near the geographic South Pole, at 90° S. An area of approximately 26,400 km^2 encompassing the station and long-term research and monitoring sites is designated as an Antarctic Specially Managed Area (hereafter referred to as "the Area") to manage human activities for the protection of scientific, environmental, and historical values.

The climate at the South Pole Station is extremely cold, windy, arid, and at a high physiological altitude. The mean annual temperature is -49.3°C; annual precipitation is about 7 cm (water equivalent). The elevation at the station is 2,835 m. The landscape of the region is characterized by the flat, white surface of the ice sheet, which rises 2,700 m above the continental landmass (elevation is 135 m above sea level). The ice sheet at the South Pole is constantly shifting, and moves the Area approximately 10 m each year towards the Weddell Sea.

The Area is located in a region of high scientific value and South Pole Station facilitates exceptional scientific research with extensive international collaboration. The unique environmental conditions at South Pole Station provide special opportunities for scientific observation. The air is considered to be the cleanest air on Earth, being far removed from pollution sources and human influence. As such, the Area is an important monitoring and research area for world background levels of natural and anthropogenic atmospheric constituents. Furthermore, conditions in Antarctica reflect global change as well as indicate the regional role of Antarctica in the global climate.

The South Pole's position on the Earth's axis, the Area's climatic conditions and remoteness from light pollution facilitate extended astronomical and astrophysical observations of specific stellar objects. Also, the Area's isolation from sound, vibration, and electro-magnetic interference (EMI) is important for seismological and astrophysical research. The geophysically stable location of the Area and the operation of the Station year-round allow for continuous research of upper atmosphere physics, including solar processes, effects of short term geomagnetic phenomena (auroras, induced electrical currents, and radio wave communications interference), and long term events (relating to the ozone layer, ultraviolet radiation, atmospheric composition, stratospheric winds, weather, and climate). The area also hosts one of the Earth's most important seismic stations, critical for both its location and lack of background noise.

The unique ice conditions in the Area are of high scientific value. The thick ice serves as a storehouse of information about climate and atmospheric constituents. Also, the depth and the clarity of the ice make it an ideal medium for neutrino detection.

The unique community of people living at South Pole Station allows for specialized medical research on small, isolated groups.

The Area has significant historical value. The Ceremonial Pole (HSM No.1), surrounded by the flags of the twelve original Antarctic Treaty nations, commemorates the International Geophysical Year, and is symbolic of all expeditions that have reached the South Pole. Also, although the exact location is unknown today, Amundsen Tent (HSM No.80), is also located within the Area.

Activities conducted in the area include diverse scientific research endeavours, operations in support of science, media, arts, education, and tourism.

2. Aims and objectives

The South Pole area requires special management to ensure that the scientific, environmental, and historical values of the Area are conserved. Increasing human activity has necessitated more effective management and coordination of activities in the Area.

The aim of management at South Pole is to coordinate activities in the Area such that the scientific and environmental values of the Area can be sustained indefinitely, and the historical values preserved to the greatest extent practicable. The specific objectives of management in the Area are to:

- Facilitate scientific research while maintaining stewardship of the environment;
- Prevent conflicts among activities, including different areas of scientific research, science support activities, and non-governmental activities;
- Promote coordination for future activities, including coordination with tour operators visiting the Area;
- Maintain a safe environment in the Area;
- Maintain the historic values of the Area;
- Minimize environmental impacts of human activities;
- Minimize release of pollutants;
- Allow for necessary modifications and expansion of Station facilities in a managed, well-planned manner.

3. Management activities

The following management activities are to be undertaken to achieve the aims and objectives of this plan:

- The National Program(s) operating in the Area shall promote the dissemination of information to all parties operating in the Area to ensure the implementation of the management plan.
- The National Program(s) operating in the Area shall in particular promote, to all parties operating in the Area, general education on safety, risks related to environmental conditions, medical emergencies and incidents, Zone and Sector guidelines, and airport safety issues.
- To prevent conflicts, parties intending to conduct research in the Area shall coordinate activities with the National Program(s) operating in the area well ahead of the planned activity. National Program(s) operating in the Area shall ensure that all personnel in their program visiting the Area have been briefed on the requirements of the management plan.
- Visitation by tour groups and any other non-governmental activities shall be coordinated with the National Program(s) operating in the Area, as outlined in Appendix A. Group leaders shall ensure that all visitors have been briefed on the requirements of the management plan.
- As the operator of Amundsen-Scott South Pole Station, the US has volunteered to take the lead in coordinating activities in the South Pole ASMA.
- Visits to the ASMA shall be made as necessary by the National Program(s) operating in the Area (no less than once every five years) to evaluate whether the management plan is effective and to ensure management measures are adequate.

Additional guidelines for the conduct of specific activities and for specific Zones within the Area are found in the Appendices.

4. Period of designation

Designated for an indefinite period, subject to periodic review by the Antarctic Treaty Parties, as required by Annex V, Article 6.

5. Maps and Photographs

Due to the dynamic nature of the ice sheet and operations supporting science at the South Pole, persons intending to access the Area should contact the National Program(s) operating in the Area for the most current maps and information.

- Map 1 – general map of the Area, with full extent of Zones and Sectors, and location on the Antarctic Continent
- Map 2 – map with designated aerial approach paths
- Map 3 – map with detail of sector intersections
- Map 4 – detailed area map with Non-Governmental Organization (NGO) parking and camping area, access paths, buildings and zones specified

*Note: «Grid North,» as represented on Map 4 is in reference to alignment with the Greenwich Meridian (0 Degrees Longitude).

6. Description of the Area

6(i) Geographical co-ordinates, boundary markers and natural features

The boundary of the Area comprises all structures and areas of current and planned research at South Pole Station and a buffer area for the Clean Air Sector (CAS). The boundary of the Area is a circle around the South Pole Station with a radius of 20 km, and a wedge extending 150 km from the Atmospheric Research Observatory (ARO) building (approximately 0.5 km from the 2005 Geographic South Pole), bounded by 110° and 340° (grid) from the ARO building. The point of origin of the ASMA and sectors (other than the CAS) was designated as the circular aluminum tower staircase on the elevated station, as this is a readily recognizable feature on the maps and on the ground, and the elevated station is expected to be present in the Area longer than any other structure or landmark.

Pollutants from aircraft and other sources in polar regions can travel hundreds of kilometers, affecting measurements of boundary layer air, measurements of gasses and aerosols in the air column, and measurements of contaminants in the snow, thus requiring an extensive area be kept vacant to maintain a site for research on clean air. The ARO building is situated upwind of the station, and the 150 km outer radius of this sector provides the necessary buffer for ensuring accurate measurements.

Snow accumulation has been monitored intermittently at the South Pole since the International Geophysical Year (1957-1958). An extensive network of measurement locations to monitor long-term snow accumulation around the South Pole was established in 1992 (Mosley-Thompson et al. 1999). The network of measurement stakes extends out 20 km in all directions from the pole; it is essential for the research being conducted on snow accumulation that the stakes and the area around the stakes are not disturbed.

Due to the movement of the ice sheet in the area, the geographic location of the ASMA will move approximately 10 m per year; the area is centered on the elevated South Pole Station, and all sectors are relative to this location. Treaty parties may consider shifting the Area if it becomes appropriate in the future.

6(ii) Restricted and managed zones within the area

This management plan establishes four types of managed zones within the Area: Operational Zones, Scientific Zones, Historic Zones, and a Hazardous Zone. The objective of this zoning concept is to manage for multiple uses of and activities in the Area. The Operational Zones encompass areas where science support and the majority of human activity (including tourism) occur, the Scientific Zones bound areas where scientific research occurs, the Historic Zones encompass and preserve historical sites, and the Hazardous Zone restricts all human activity for safety reasons. Each zone has specific guidelines for the conduct of activities, discussed in general in the sections below and in detail in the Appendices.

6ii(a) Operational Zone

The Operational Zone has been established to contain primary human activity in the Area, including science support activities, main station services (e.g. living facilities), ski-way operations, and tourism. Scientific activities may be conducted in the Operational Zone if they will not be in conflict with operational activities.

The following management activities should be undertaken for the Operational Zone:

- Waste management should be considered in the planning, maintenance and decommissioning of facilities within the Operational Zone;
- Standard operating procedures for activities in the Operational Zone by the National Program(s) operating in the Area should be adopted and made available to persons visiting the area where deemed appropriate by the National Program(s) operating in the Area;
- Contingency plans for emergencies in the Operational Zone should be adopted where deemed appropriate by the National Program(s) operating in the Area;
- The installation of any new structures or modernization of existing structures in the Operational Zone may from time to time be necessary. The National Program(s) operating in the area should review and coordinate any plans for construction or installations to ensure that the impact on scientific activities is minimized. Any change is subject to environmental assessment as required by Article 8 of the Protocol on Environmental Protection to the Antarctic Treaty.
- Specific guidelines for visitors not associated with a National Program are described in Appendix A of this management plan.

Map 3 shows the location of the Operational Zone.

6ii(b) Scientific Zone

The Scientific Zone has been established to protect certain types of scientific activity from disturbance. The unique scientific values of South Pole Station require special protection from the interference from sound, light, vibration, EMI, snow drifting, and visual obstruction. South Pole Station has been designed so that scientific activities of particular sensitivity are strategically located and protected from activities causing interference.

The following management activities should be undertaken for the Scientific Zone:

- Standard operating procedures for activities in the Scientific Zone should be adopted and updated as deemed necessary by the National Program(s) operating in the Area.
- The Scientific Zone has been divided into Sectors to address specific scientific requirements. The Scientific Zone Sectors are listed in Appendix B with locations, boundary descriptions and guidelines for conduct in the individual Sectors. Detailed Standard Operating Procedures for some of the sectors are available upon request from the United States Antarctic Program (USAP).

Maps 1 and 2 display the location of the Scientific Zone Sectors. Entry to these Sectors should not interfere with scientific activities.

6ii(c) Historic Zone

The Historic Zone encompasses sites designated for their historic value. Management of this Zone aims to recognize and protect the values of the sites while allowing for visitation to the Zone. The Historic Zone includes the site of the Ceremonial South Pole, located near the Geographic South Pole and is clearly marked. In addition, although the exact location or depth is unknown today, Amundsen's Tent (HSM No.80) and other relics from the 1911-12 era, are also located in the Area. The Historic Zone is located within the Operational Zone. Searching and/or removal of said relics is strictly prohibited within this zone and/or within the historic geographic confines of this zone, unless authorized by the Treaty Parties. In the future, the Treaty Parties may consider expansion of the Historic Zone; there are no restrictions on where the Historic Zone may be designated within the ASMA.

Historic Site and Monument No. 1 (HSM No. 1) is the flag mast at South Pole 90°S, the flag mast was erected in December 1965 at the geographic South Pole by the first Argentine Overland Polar Expedition. The precise location of HSM No. 1 is not currently known due to ice sheet movement, therefore could not be identified on the management plan maps.

The Ceremonial South Pole commemorates the International Geophysical Year (IGY) as well as all expeditions that have achieved the South Pole. At the site is the Ceremonial Pole marker surrounded by the flags of the original twelve Antarctic Treaty nations.

There are no restrictions on visitation to the Historic Zone. However, visitors must abide by guidelines in this management plan and take all appropriate safety precautions.

Map 4 shows the location of the Ceremonial South Pole.

6ii(d) Hazardous Zone

The Hazardous Zone is designated to safeguard hazardous sites found in and around the original (1957) South Pole Station. For reasons of human safety, entrance to the Hazardous Zone is prohibited at all times, except for essential management activities.

The following management activities should be undertaken for the Hazardous Zone:

- The National Program(s) operating in the Area or expedition leaders from all other groups visiting the ASMA should ensure that all visitors to the Area are educated on the boundaries, purpose, and entrance prohibition of the Hazardous Zone.
- Visits to the Hazardous Zone may only be made for essential management purposes.

Map 3 shows the location of the Hazardous Zones.

6(iii) Location of structures within and adjacent to the site

Structures within the Area are identified on Map 4. Various structures have been installed in the Area since the 1950s; all were constructed by the United States. No building should be entered without permission from the National Program(s) operating in that building. For restrictions on

access to specific structures and their surrounding areas, see detailed descriptions of Zones and their Sectors in the Appendices of this plan. A new US station facility is being constructed in the Area. The 1975 US dome station and other facilities that are beyond their useful life will be removed from the Area when practicable.

When the current phase of construction is completed at the South Pole Station, the footprint of buildings remaining on site will total approximately 14,800 m^2, in the following divisions:

- Elevated Station: 5,575 m^2
- Sub-surface Arches: 5,575 m^2
- Ancillary Science Buildings: 3,715 m^2

6(iv) Location of Antarctic Specially Protected Areas within or around the Area

None.

7. Code of Conduct

7(i) Access to and movement within the Area

All approaches to the Area should be made along a route approximately 204° east of grid north to avoid restricted sectors. Access to the Area is usually by ski-equipped fixed-wing aircraft, but may be by overland vehicle traverse. Occasional access to the Area is made by helicopter, on foot, or by ski. Entry into the Area is permissible, but notification must be given to the National Program(s) operating in the Area prior to entering the Area, and specific requirements are provided below for access to the area via aircraft. Coordination with National Program(s) operating in the Area in no way implies liability of any Treaty Party or National Program for any accident or injury incurred at any time during the expedition. Pilots should refer to the Antarctic Flight Information Manual (AFIM) for specific details regarding access to the area via aircraft and requirements for prior approval for ski-way use.

Care should be taken when approaching on the ground to avoid the Very Low Frequency (VLF) antenna. Movement within the Area is usually by foot or by vehicle. Vehicles and pedestrians should stay on marked trails as much as practicable. The ski-way should not be crossed unless absolutely necessary and all crossings should be made at the designated crosswalks, adjacent to, and in accordance with the status indicated by the "crossing beacons." The ski-way shall not be crossed when the beacons' rotating lights are on, signaling an imminent aircraft landing or take-off. Restrictions exist for access into and movement within some of the Zones within the Area; refer to the Appendices of this management plan for additional movement and access guidelines in the Zones.

7i(a) Access to the Area via aircraft – National Programs

National Program(s) intending to fly into the Area should coordinate with National Program(s) operating in the area to ensure there will be no conflicts with ongoing activities. Advance planning and communication, consistent with the Antarctic Treaty's Information Exchange requirements, with confirmation at least 24 hours prior to arrival, is necessary to avoid conflicts. Pilots approaching the area should notify South Pole communications (COMMs) 30 minutes prior to landing at the South Pole to allow time to clear the ski-way, and should confirm again their approach 10 minutes before landing. Pilots should observe the flight-restricted areas defined in this management plan to preserve the integrity of the Clean Air Sector research.

7i(b) Access to the Area via aircraft – Other Expeditions

The ski-way and infrastructure are maintained by the National Program(s) in the Area and use of these resources is generally restricted to activities supported by them. Access to the South Pole ASMA via any type of aircraft is limited to activities supported by National Programs and activities granted prior approval by the National Program(s) that maintain the ski-way and associated air traffic control facilities. The ski-way is essential to the operations and safety of researchers in the Area. Use of wheeled aircraft on the ski-way or an airplane crash would have substantial deleterious impacts on the scientific research being conducted in the Area and threaten the safety of all personnel in the Area.

Approval of ski-way use for an activity not associated with a National Program does not need to include a full safety review of an expedition or its flight plan, and in no way implies liability of any Treaty Party or National Program for any accident or injury incurred at any time during the expedition. If a person or organization not associated with a National Program intends to request prior approval to access to the Area via aircraft or use of the ski-way, they should refer to the requirements and procedures for approval in the AFIM and contact the appropriate National Authorities.

7(ii) Activities that may be conducted in the Area

All activities in the Area should be conducted in a manner that will preserve the values of the Area to the greatest extent practicable. There are no restrictions on types of activities that may be conducted in the Area; however, all activities in the Area should be conducted in accordance with the guidelines in this management plan. Activities should be conducted in as energy efficient manner as possible, and renewable energy should be used as much as practicable to minimize fuel usage.

Tour operators and other non-governmental visitors to the Area should provide visitation schedules to National Program(s) operating in the Area in advance of their visits. All visitors to the Area that are not sponsored by a National Program should be educated on and follow the guidelines in this management plan, especially Appendix A.

7(iii) Installation, modification, or removal of structures

The installation of new structures, or modification or removal of existing structures should be reviewed by the National Program(s) operating in the Area. Any change is subject to environmental assessment as required by Article 8 of the Protocol on Environmental Protection to the Antarctic Treaty.

7(iv) Field camps

- For visitors to South Pole not sponsored by a National Program, field camps in the Area should be located at the designated site described in Appendix A.
- All materials and equipment should be removed from field camps upon departure.
- Solid wastes, including human wastes should be brought out of field camps to the maximum extent practicable.

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

Not applicable.

7(vi) Collection or removal of material found in the Area

Aside from removal of snow and ice for scientific purposes or for drinking water supply and cooking water during expeditionary activities, nothing should be removed from the Area that was not brought

in by the visiting party, unless approved by the National Program(s) operating in the area or mandated (i.e. for environmental protection purposes).

7(vii) Waste management

- For the National Program(s) operating in the Area,
  - All waste should be removed from the Area with the following exceptions: human waste and liquid from bathing, laundry and dishwashing.
  - Human waste, garbage disposal waste, liquid from bathing, laundry and dishwashing may be deposited into deep sewer bulbs, or disposed of by other methods in accordance with the Protocol.
- For other expeditions to the Area,
  - All waste brought in or generated is to be containerized and removed from the area upon departure.

7(viii) Requirements for reports

The National Program(s) operating in the Area shall provide a record of visitations to the Area to the depository Nation annually.

8. Provisions for the Exchange of Information in Advance of Proposed Activities

Prior notification of a visit to the ASMA by visitors not sponsored by a National Program must be provided to the appropriate National Authorities. In addition to the normal exchange of information by means of the annual national reports to the Parties of the Antarctic Treaty, Scientific Committee on Antarctic Research (SCAR), and Council of Managers of National Antarctic Programs (COMNAP), Parties operating in the Area will exchange information annually. All National Programs, NGOs, and other individuals or organizations intending to visit or conduct research in the ASMA should contact the National Program(s) operating in the Area sufficiently in advance of the activity to allow for coordination of planned activities with ongoing activities in the Area.

9. Supporting Documentation

Additional guidelines for activities in the ASMA are found in the Appendices of this plan. Detailed operating procedures for some Zones and their Sectors have been written and are updated yearly; current versions may be available upon request from the USAP.

10. References

Standing Committee on Antarctic Logistics and Operations (SCALOP) and the Council of Managers of National Antarctic Programs (COMNAP). Antarctic Flight Information Manual: A Handbook of Antarctic Aeronautical Information. (See most recent update)

Mosley-Thompson, E., J.F. Paskievitch, A.J. Gow, and L.G. Thompson. 1990. Late 20th century increase in South Pole snow accumulation. Journal of Geophysical Research 104(D4):3877-3886.

APPENDIX A

Additional Guidelines for Non-Governmental Organizations at the South Pole

Guidelines for tourist activities have been established to improve coordination between the National Program(s) operating in the Area and non-governmental visitors to South Pole Station. Each austral summer, the South Pole Station receives a number of visitors associated with private expeditions and other Non-Governmental Organizations (NGOs). These visitors are most frequently associated with private companies that provide transportation, guides, and logistical support. The purpose of this Appendix is to inform NGO visitors about on-site resources, expectations, and hazards. In addition to these procedures, every person at the South Pole is expected to comply with the Antarctic Treaty and policies governing their respective National Program(s).

- For the purpose of this management plan, "Non-governmental organizations" includes all individuals or organizations that are not sponsored by a National Antarctic Program.
- The U.S. Antarctic Program (USAP) operates Amundsen-Scott South Pole Station. The USAP is not authorized to provide support for NGOs except in an emergency situation.
- All approaches to the Area should be made along a route approximately 204° east of grid north to avoid restricted sectors. Approaches from the north, east, or west would interfere with ongoing scientific activities in the Area.
- Overland approaches to the area should remain at least 10 meters to the south (grid) of the Very Low Frequency (VLF) antenna. If a group does walk under the antenna, care should be taken not to touch the masts or cables. Because of this antenna's location across the historical approach path for NGO surface expeditions, future expeditions should be warned that anyone who approaches this antenna does so at his or her own risk. The location of the VLF antenna is noted in Map 3.
- Overland approaches should also be aware of ski-way visibility markers located various distances from the geographic South Pole in four directions around the station (Table 1). All markers are four feet high by eight feet wide, except the 1 mile markers which are eight feet by eight feet, and mounted four feet off the snow surface.

Table 1. Visibility markers located around South Pole Station.

Direction (° E of grid N)	Marker 1 (miles)	Marker 2 (miles)	Marker 3 (miles)	Marker 4 (miles)	Marker 5 (miles)	Marker 6 (miles)
113	0.5	1	1.5	2	-	-
204	0.5	1	1.5	2	3	4
270	0.75	1	2	3	-	-
353	0.5	1	1.5	2	-	-

- NGOs that intend to fly aircraft into the Area or land on the ski-way must obtain prior approval to do so from the National Program(s) that maintain the ski-way and associated air traffic control equipment. If prior approval is granted, NGO pilots should refer to and follow guidance in the AFIM and information provided by the National Program(s) operating in the Area. NGOs may not conduct a parachute operation from an aircraft and no pilot in

command of an aircraft may allow a parachute operation to be conducted from that aircraft over or near the ski-way or other infrastructure in the Area.

- No access to email, telephones, or radios will be provided except as authorized by the appropriate National Program.
- The ideal timeframe for visits to the South Pole Station is on Sunday from 13:00 to 17:00 South Pole Station Time [00:00 to 04:00 GMT/UTC]. This time period is recommended to minimize disruption to station science, construction, and operational activities. Services and access to the station at other times are highly unlikely.
- When NGO visitors are required to spend the night in the Area, they must use their own provisions for food and camping.
- Except for emergency situations, unescorted guests are expected to stay within the designated camping area, the NGO parking area, or the area immediately surrounding the Pole markers, unless otherwise authorized by the National Program(s) operating in the area.
- The designated camping area has been chosen for the following reasons: it is located near the NGO parking area, it is close to medical or other emergency services (if needed), it does not usually interfere with vehicle traffic or USAP aircraft operations, and it is far removed from most hazardous areas and construction areas.
- To avoid disruption of official USAP activities, all South Pole Station buildings and operation and science areas are off limits to NGO personnel except when guided by an individual designated by the USAP or when within the aforementioned areas.
- In the event of an aircraft or medical emergency in the Area, NGOs shall notify COMMS immediately by any means possible. COMMS staff will notify the on-site National Science Foundation (NSF) Representative and other personnel as necessary.
- South Pole Communications personnel will record NGO arrivals and departures; this information may be made available to Antarctic Treaty Party members upon request.

APPENDIX B

Additional Guidelines for the Scientific Zone

The Scientific Zone encompasses the Clean Air Sector, the Quiet Sector, the Downwind Sector, and the Dark Sector (Maps 1-4). The Clean Air Sector (CAS) ensures a pristine air- and snow-sampling environment for climate systems research. The Quiet Sector is an area where noise and equipment activities are limited for seismology and other vibration-sensitive pursuits. The Downwind Sector provides an area free from obstructions for balloon launches, aircraft operations, and other "downwind" activities. The Dark Sector provides an area free from light pollution and electromagnetic noise for astronomy and astrophysics research. Following are descriptions of the objectives of and special guidelines for activities in each sector of the Scientific Zone. For ease of description, the Sectors, with exception of the Clean Air Sector, originate at the Elevated Station. The Scientific Sectors and their guidelines apply to the area beyond the Operations Zone out to the edge of the ASMA.

1. Clean Air Sector

The Clean Air Sector (CAS) was established to preserve the unique conditions that are required for atmospheric research at the South Pole Station. The Earth's atmosphere near the South Pole is remote from worldwide human influence, and a predominant northerly (grid) wind means the Atmospheric Research Observatory (ARO) is situated upwind of all other facilities more than ninety percent of the time. These natural conditions allow for nearly continuous measurement of important trace constituents of the atmosphere in a location remote from anthropogenic inputs. The air sampled at the South Pole is representative of the background atmosphere of the planet and is essentially the "cleanest air on Earth."

Geographic Boundaries of the Clean Air Sector

The Clean Air Sector is a wedge-shaped area upwind (grid northeast) of the main station complex. Restricted areas on land and in the air have been designated to maintain the scientific value of the CAS.

The restricted area on the ground is defined by the following boundaries:

- On the ground, a line extending grid 340º from the SW corner of ARO building
- On the ground, a line extending grid 110º from the SW corner of ARO building
- On the ground, extending out to 150 km/80 nautical miles NE of the ARO building
- The De-Motorized Zone is an additional, semi-circular area extending 50 meters (m), or 150 feet (ft), downwind of the ARO building into which vehicle access is prohibited unless authorization is given by the National Program(s) operating in the area. All vehicles should approach ARO on the groomed trail and park at the "turnaround" where there is a sign stating "No Vehicles Beyond This Point."
- No aircraft operations are allowed within 2 km of the snow surface in the Clean Air Sector.

The National Oceanic and Atmospheric Administration (NOAA) has conducted many hours of aircraft air pollutant measurements and data show that plumes can be traced for hundreds of miles in stable air. To protect measurements at the ARO and in the snow it was recommended that aircraft fly above 2 km to stay out of the boundary layer air and to limit deposition of particles and gas into

the snow surface. The 150 km radius was selected as a reasonable buffer distance. However, Arctic studies suggest that twice that distance is justifiable.

Additional guidelines for the Clean Air Sector

- Where the Clean Air Sector overlaps the Dark Sector or the Quiet Sector, the procedures for all applicable sectors shall apply.
- The National Program(s) operating in the Area will document all pedestrian/surface vehicle excursions into the Clean Air Sector.
- Aircraft flying above the Clean Air Sector (above 2 km or 6,000 ft) should notify the National Program(s) operating in the Area.
- Access to the roof of the ARO building is restricted. Please contact the USAP if access is required for your project. Users of the roof area must note all roof excursions in the Clean Air Sector Log. Structures, objects, etc. are not allowed on the roof of the ARO building in a location that would interfere with air sampling intakes or at a height exceeding 1.3 m (4 ft) above the roof surface, due to interference with the current solar and terrestrial radiation instruments. Do not obstruct the roof hatches with equipment or materials.
- Access to the orange and white meteorological tower and to the snow surface near the tower is restricted. Objects and activity on the tower and on the snow surface in its vicinity (particularly within a distance of approximately three times the tower's height) can interfere with measurements conducted from the tower. Please contact the USAP if access is required.
- Activities, structures, and instrumentation located within the Clean Air Sector should not interfere with projects already established, except as specifically authorized by the appropriate National Authority.
- Structures should not be placed in a manner that they could cause drifting upwind of, under, or near the ARO building.
- All instrumentation within ARO and the Clean Air Sector must meet the criteria set for current instrumentation as determined by the appropriate National Authority.
- Due to the electromagnetic (EM) sensitivity of solar and thermal atmospheric radiation measurements being conducted at and nearby ARO, the use of EM transmitters near ARO is prohibited except for infrequent but necessary use of handheld radios.
- Any individual or organization wishing to establish an experiment within ARO and/or the Clean Air Sector must coordinate with the National Program(s) operating in the area.
- Transit within the Clean Air Sector is prohibited with few exceptions, outlined below:
  - In the event of an emergency, access will be unlimited.
  - Established experiments sometimes require access to the ARO roof and entrance into the Clean Air Sector (to clean/replace albedo instruments, take air/snow samples, etc.).
  - Occasional cleaning and maintenance to the ski-way visibility markers located along 353° east of grid north (Table 1).
  - Ski-way Maintenance: the ski-way requires frequent maintenance using heavy equipment.
  - National Program aircraft are permitted to enter the No-Fly Zone as necessary for both official activities and essential purposes, including but not limited to USAP-directed missions, FAA checks, aerial photographs, emergency flight paths, approaches, etc. In all cases, pilots are asked to minimize potential contamination of the Clean Air Sector when flying within or above the No-Fly Zone.

- The Mass Accumulation Network consists of established spokes of snow stakes radiating several km from the South Pole in all directions; snow depth is measured here annually.
- Snow/trail Maintenance: occasional excavation of the Met Tower and ARO will be required. Maintenance of the trail to ARO occurs during the austral summer. This typically requires several passes using heavy equipment and chain drags to remove snowdrifts.

Restricted Chemical Use

Below is a partial list of specific chemical substances, the atmospheric concentrations of which are currently being measured at the Clean Air facilities. Most of these substances are being measured to a precision of parts per trillion, and the measurements are particularly susceptible to contamination from local sources.

The use of chemicals listed below, or of products and equipment that contain or emit them, is prohibited at ARO and in the CAS (this includes the area beneath the building, the roof of the building, and near the orange and white NOAA meteorological tower). Please contact the National Program(s) operating in the area for help in finding alternatives to their use.

Chlorofluorocarbons (CFCs)

Used as refrigerants, solvents, foam blowing agents, aerosol propellants, and heat exchange medium (no longer manufactured in the U.S.)

CCl_3F	trichlorofluoromethane	CFC-11
CCl_2F_2	dichlorodifluoromethane	CFC-12
CCl_2FCClF_2	trichlorotrifluoroethane	CFC-113

Hydrochlorofluorocarbons (HCFCs)

Used as refrigerants, solvents, foam blowing agents, aerosol propellants, and heat exchange medium (HCFCs are found in the "blueboard" at South Pole)

$CHCl_2F$	dichlorofluoromethane	HCFC-21
$CHClF_2$	chlorodifluoromethane	HCFC-22
CF_3CHClF	chlorotetrafluoroethane	HCFC-124
CCl_2FCH_3	dichlorofluoroethane	HCFC-141b
$CClF_2CH_3$	chlorodifluoroethane	HCFC-142b

Hydrofluorocarbons (HFCs)

Used as refrigerants, foam blowing agents, and aerosol propellants

CF_3CH_2F	tetrafluoroethane	HFC-134a
CH_3CHF_2	difluoroethane	HFC-152a

Halons

Used in fire suppression and extinguishing systems (no longer manufactured in the U.S.)

$CBrClF_2$	bromochlorodifluoromethane	halon-1211
$CBrF_3$	bromotrifluoromethane	halon-1301

Chlorocarbons

Used as solvents, cleaning agents, degreasing agents, and in other less common applications

CH_3Cl	chloromethane, methyl chloride
CH_2Cl_2	dichloromethane, methylene chloride
$CHCl_3$	trichloromethane, chloroform
CCl_4	tetrachloromethane, carbon tetrachloride
CH_3CCl_3	trichloroethane, methyl chloroform
C_2Cl_4	tetrachloroethene, perchloroethene

Bromocarbons

CH_3Br	bromomethane, methyl bromide
CH_2Br_2	dibromomethane, methylene bromide
$CHBr_3$	tribromomethane, bromoform

Idocarbons

CH_3I	iodomethane, methyl iodide

Others

N_2O	nitrous oxide (commonly used as an oxidizer)
SF_6	sulfur hexafluoride (commonly used in electric transformers)
COS	carbonyl sulfide
C_6H_6	benzene

2. Quiet Sector

The "Quiet Sector" is an area where noise and equipment activities are limited for seismology and other vibration-sensitive pursuits. Measurement of the Earth's vibrations is the observational goal of the science of seismology. Seismographic facilities have been operated continuously at the South Pole since the International Geophysical Year in 1957. To provide a remote laboratory for experiments requiring quiet settings, the USAP has established SPRESSO—the South Pole Remote Earth Science and Seismological Observatory—located 8 km grid SE of the South Pole Station.

Geographic Boundaries of the Quiet Sector

The Quiet Sector is surrounded (clockwise, from grid North) by the Operations Sector, the Clean Air Sector, and the Downwind Sector (Map 2). The Quiet Sector extends out to 20 km from the Elevated Station. The Quiet Sector also includes the Quiet Circle, with a radius of 7.25 km from the SW corner of the SPRESSO facility (Map 2). The Treaty parties may consider changes to this Sector in the future, if there is scientific or operational need.

Additional Guidelines for the Quiet Sector

The Quiet Sector is reserved for scientific experiments that require quiet conditions or can operate under stringent quiet conditions. Sections of the Quiet Circle overlap the Clean Air Sector, Operations Sector, and the Downwind Sector; activities in this Circle should abide by the guidelines established here for the Quiet Sector as far as practicable. The Operational Communications Area overlaps the

Operations Zone and Quiet Circle. Communications equipment has been installed in this area, and additional communications equipment may be added in the future if it would not have a substantial impact on the ongoing science in the Quiet Sector.

- The Quiet-sector has the lowest measured values of seismic noise anywhere on the Earth at periods less than 1 sec. Activities, structures, and instrumentation located within the Quiet Sector should not produce seismic vibrations at levels greater than the United States Geological Survey (USGS) low noise model (LNM) at periods greater than 1 sec. At periods less than 1 second, levels should not be greater than 12 dB below the LNM (Figure B.1).

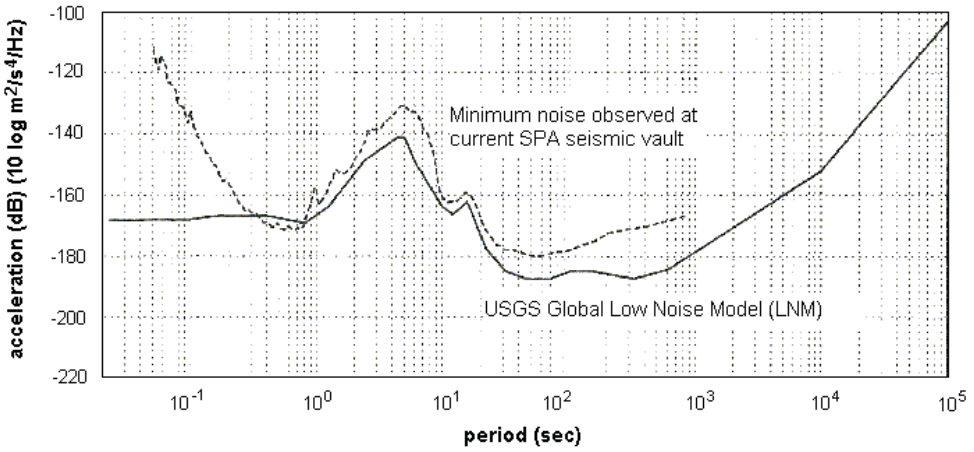


Figure B.1. Noise thresholds for the Quiet Sector. The lowest noise levels achievable at the SPA seismic vault (in 2000) and the USGS LNM based upon quietest noise conditions globally. The seismic band of interest is from 80 Hz to tidal frequencies (<0.001 MHz).

- Structures that potentially may be buffeted by the wind, producing extraneous detectable vibrations should be located below the snow surface.
- All instrumentation located in SPRESSO must meet the quiet criterion established by the National Program(s) operating in the area for seismological instrumentation.
- All instrumentation located in SPRESSO shall be remotely operable from the South Pole, particularly during the austral winter.
- Any individual or organization wishing to establish an experiment within the Quiet Sector must coordinate with the National Program(s) operating in the Area.
- Transit of motorized vehicles within or across the Quiet Zone circle within the Quiet Sector for purposes other than logistical support of SPRESSO is prohibited with few exceptions, outlined below:
  - In the event of an emergency, access will be unlimited.
  - Trail Maintenance: if a hard-packed route to SPRESSO is required, the trail may be maintained through the austral summer. This typically requires several passes using heavy equipment and chain drags to knock down drifts caused by windstorms.
  - Snow Mine: the South Pole Station snow mine is located just within the NW edge of the Quiet Sector. Snow is no longer harvested for drinking water; however, the snow mine may be maintained as a backup source of clean snow.
  - The USAP Meteorological Team requires monthly access to a snow stake field, which is located within the Quiet Circle. Snow machines and/or tracked vehicles are typically used to traverse to the field, and measurements of the stakes usually take 4-5 hours.

- Mass Accumulation Network: In addition to the meteorological snow stake field, established spokes of snow stakes to measure snow accumulation radiate several km from the South Pole in all directions. Snow depth is measured here annually.
- Antenna Field: several communications antennas are located within the Quiet Sector. These antennas require frequent maintenance and inspection, often accomplished on foot, but sometimes requiring vehicle support.
- Authorized USAP personnel may occasionally traverse the line extending 110º from ARO (the boundary between the Clean Air Sector and the Quiet Sector), passing through the Quiet Circle.
- National Program(s) operating in the Area may enter the Quiet Sector to remove scientific equipment that is no longer in use, if it will not interfere with other scientific research.

• The National Program(s) operating in the area shall document all excursions into the Quiet Sector.

3. Downwind Sector

The Downwind Sector was established to provide an area free from obstructions for balloon launches, aircraft operations, and other activities. Both scientific activities and operations activities are permitted in the Downwind Sector.

Geographic Boundaries of the Downwind Sector

Bounded by Dark Sector, Operations Sector, and Quiet Sector, the Downwind Sector extends 20 km from the Elevated Station.

Additional Guidelines for the Downwind Sector

• Activities in the Downwind Sector should not require any maintenance (e.g., snow removal) and should not otherwise obstruct scientific balloon launches or aircraft operations.

4. Dark Sector

The Dark Sector was established to preserve the conditions of low light pollution and low electromagnetic interference at South Pole Station that allow for important research in astrophysical, astronomical, and aeronomical observations.

Geographic Boundaries of the Dark Sector

The Dark Sector is surrounded by the Downwind Sector, Ski-way, Hazardous Zone, and Clean Air Sector (along 340° grid line from ARO), and extends 20 km from the Elevated Station.

Additional guidelines for activities in the Dark Sector

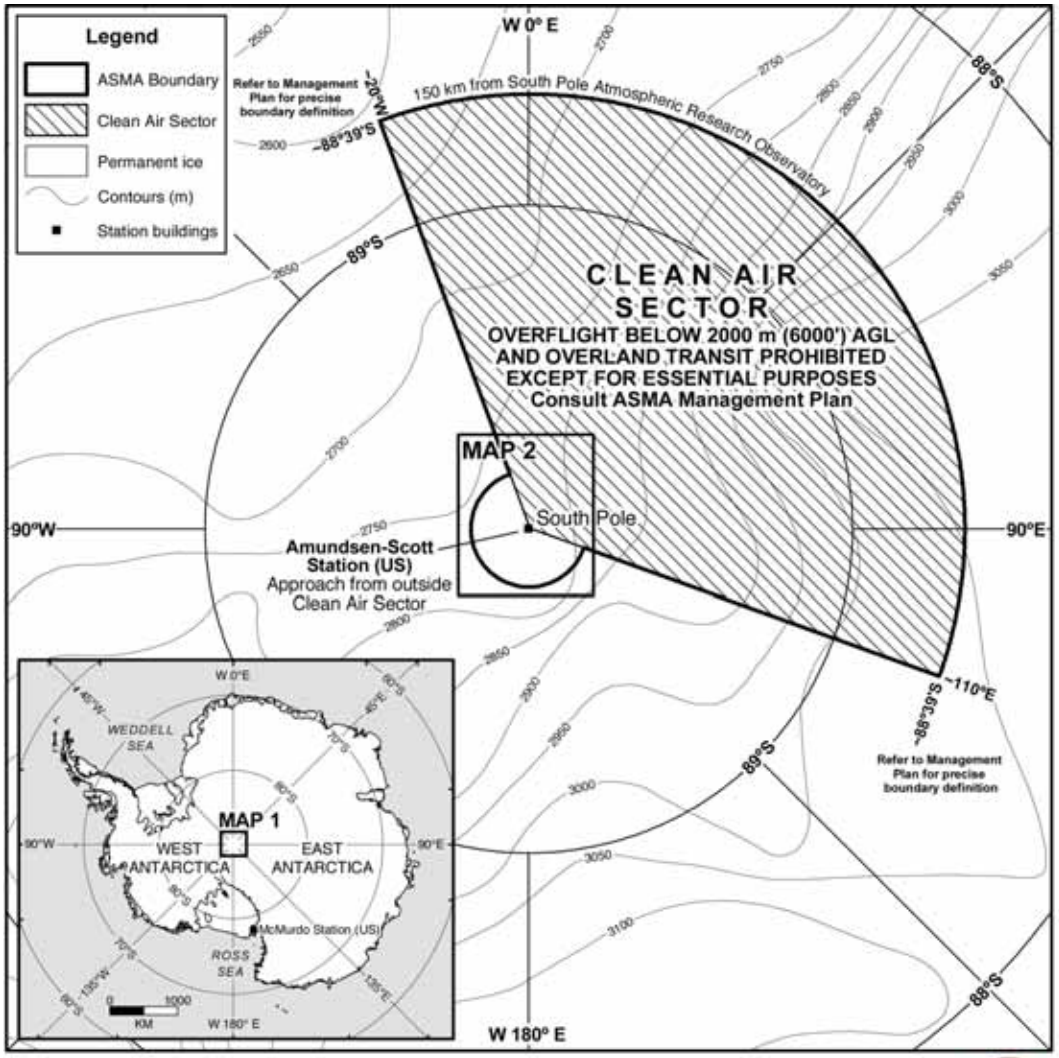
• Science activities in the Dark Sector are restricted to experiments that do not emit light or electromagnetic interference (EMI) above approved levels.
• Telescopes and other scientific instruments that are light and EMI sensitive should be contained in the Dark Sector.

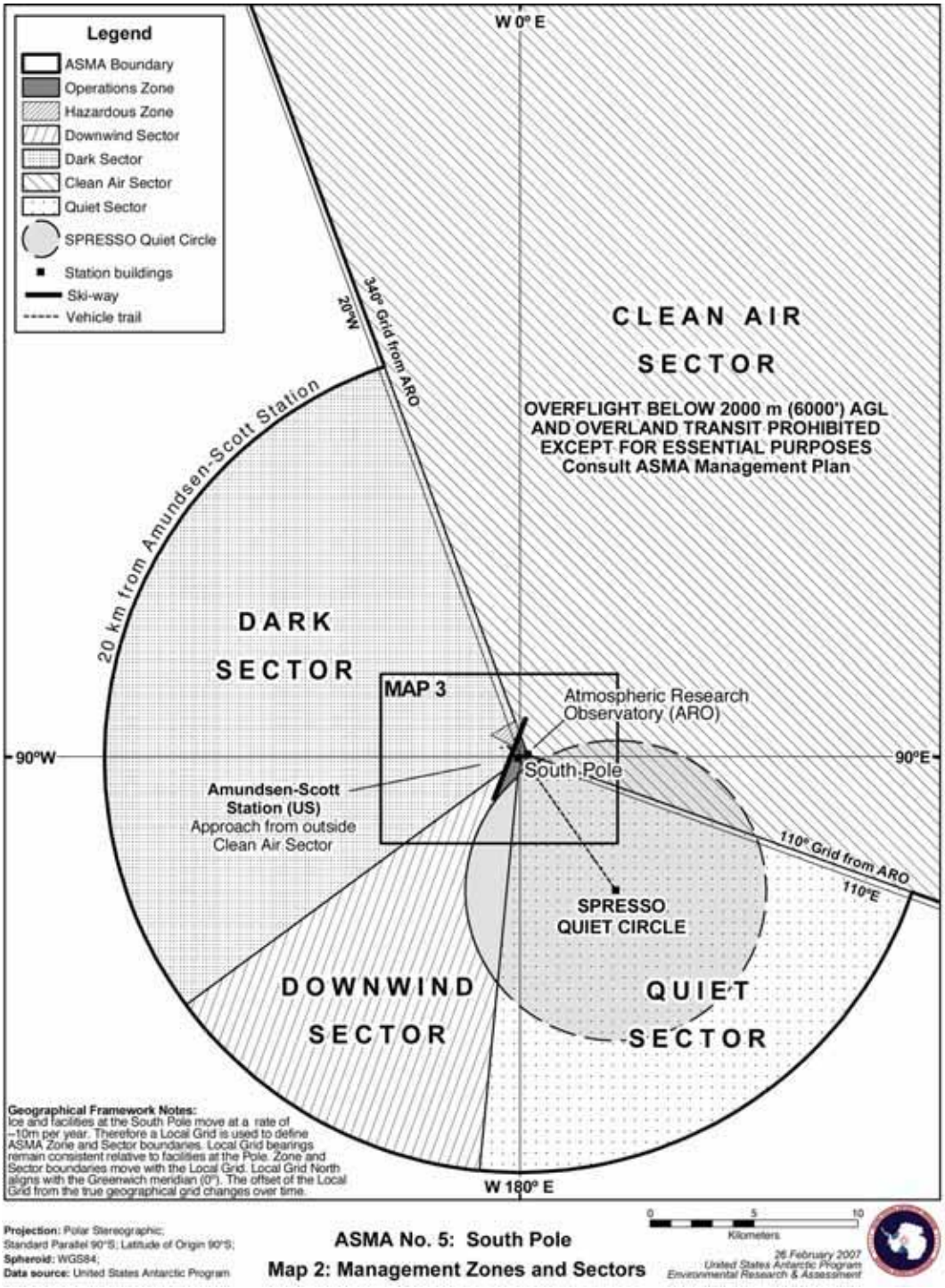
- The geographic location of the South Pole Very Low Frequency (VLF) antenna will vary slightly from year to year as the polar cap slides across the continent (grid NW @ 10 m/ year). In November 2003 the antenna was located at the following GPS coordinates:

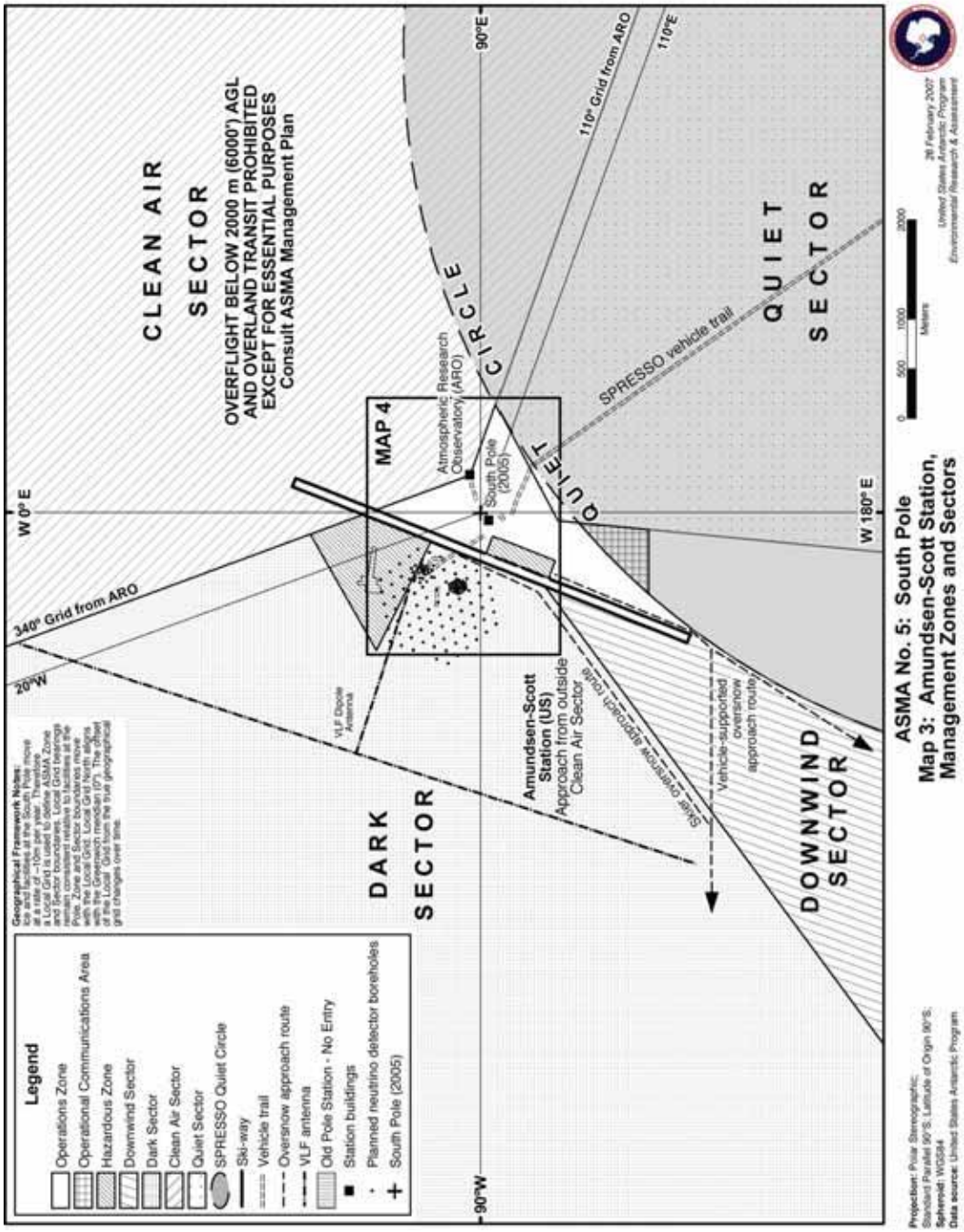
	Latitude	Longitude
North End	89° 57.3813’ S	15° 45.1500’ W
South End	89° 57.7733’ S	121° 11.3000’ W

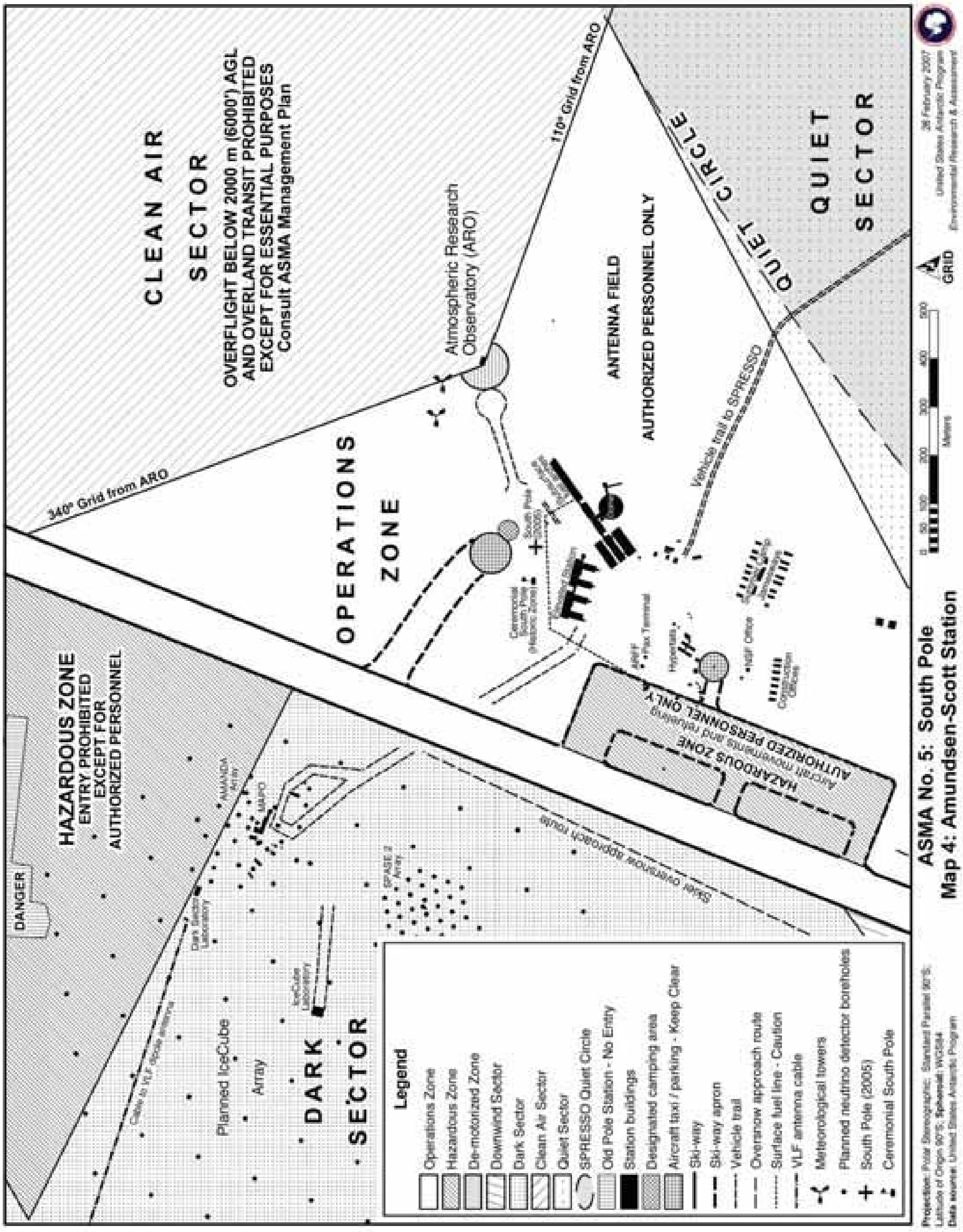
- The VLF 7-km beacon antenna is supported by upright aluminum masts held in place with guy wires.

  The masts are spaced 61 m apart and have “Danger High Voltage” signs on each side.The antenna cable is strung atop clamp-top insulators mounted on each of the antenna masts. The maximum “droop” between masts is approximately 0.6 m. It is recommended that no one touch any component of the line or masts, and do not pass under, but circle around the entire antenna line.


Legend
ASMA Boundary
Clean Air Sector
Permanent ice
Contours (m)
Station buildings
Refer to Management Plan for precise boundary definition
~88°39'S
~20°W
150 km from South Pole Atmospheric Research Observatory
W 0° E
88°S
89°S
CLEAN AIR SECTOR
OVERFLIGHT BELOW 2000 m (6000') AGL AND OVERLAND TRANSIT PROHIBITED EXCEPT FOR ESSENTIAL PURPOSES
Consult ASMA Management Plan
MAP 2
South Pole
90°W
90°E
Amundsen-Scott Station (US)
Approach from outside Clean Air Sector
~110°E
~88°39'S
Refer to Management Plan for precise boundary definition
W 180° E
MAP 1
WEDDELL SEA
WEST ANTARCTICA
EAST ANTARCTICA
McMurdo Station (US)
ROSS SEA
KM
Projection: Polar Stereographic; Standard Parallel 90°S; Latitude of Origin 90°S; Spheroid: WGS84; Contour interval: 50 m.
Data source: SCAR Antarctic Digital Database v.4.1 (2005)
ASMA No. 5: South Pole
Map 1: Location and topography
Kilometers
26 February 2007
United States Antarctic Program
Environmental Research & Assessment


Legend
ASMA Boundary
Operations Zone
Hazardous Zone
Downwind Sector
Dark Sector
Clean Air Sector
Quiet Sector
SPRESSO Quiet Circle
Station buildings
Ski-way
Vehicle trail
W 0° E
20°W
340° Grid from ARO
CLEAN AIR SECTOR
OVERFLIGHT BELOW 2000 m (6000') AGL AND OVERLAND TRANSIT PROHIBITED EXCEPT FOR ESSENTIAL PURPOSES
Consult ASMA Management Plan
20 km from Amundsen-Scott Station
DARK SECTOR
MAP 3
Atmospheric Research Observatory (ARO)
90°W
90°E
South Pole
Amundsen-Scott Station (US)
Approach from outside Clean Air Sector
110° Grid from ARO
110°E
SPRESSO QUIET CIRCLE
DOWNWIND SECTOR
QUIET SECTOR
W 180° E
Geographical Framework Notes:
Ice and facilities at the South Pole move at a rate of ~10m per year. Therefore a Local Grid is used to define ASMA Zone and Sector boundaries. Local Grid bearings remain consistent relative to facilities at the Pole. Zone and Sector boundaries move with the Local Grid. Local Grid North aligns with the Greenwich meridian (0°). The offset of the Local Grid from the true geographical grid changes over time.
Projection: Polar Stereographic; Standard Parallel 90°S; Latitude of Origin 90°S;
Spheroid: WGS84;
Data source: United States Antarctic Program
ASMA No. 5: South Pole
Map 2: Management Zones and Sectors
0 5 10
Kilometers
26 February 2007
United States Antarctic Program
Environmental Research & Assessment


CLEAN AIR SECTOR
OVERFLIGHT BELOW 2000 m (6000') AGL AND OVERLAND TRANSIT PROHIBITED EXCEPT FOR ESSENTIAL PURPOSES
Consult ASMA Management Plan
DARK SECTOR
QUIET SECTOR
DOWNWIND SECTOR
MAP 4
Atmospheric Research Observatory (ARO)
South Pole (2005)
QUIET CIRCLE
SPRESSO vehicle trail
110° Grid from ARO
340° Grid from ARO
W 0° E
90°E
110°E
W 180° E
90°W
20°W
VLF Dipole Antenna
Amundsen-Scott Station (US)
Approach from outside Clean Air Sector
Vehicle-supported oversnow approach route
Legend
Operations Zone
Operational Communications Area
Hazardous Zone
Downwind Sector
Dark Sector
Clean Air Sector
Quiet Sector
SPRESSO Quiet Circle
Ski-way
Vehicle trail
Oversnow approach route
VLF antenna
Old Pole Station - No Entry
Station buildings
Planned neutrino detector boreholes
South Pole (2005)
Geographical Framework Notes:
Projection: Polar Stereographic;
Standard Parallel 90°S; Latitude of Origin 90°S;
Spheroid: WGS84
Data source: United States Antarctic Program
ASMA No. 5: South Pole
Map 3: Amundsen-Scott Station, Management Zones and Sectors
0 500 1000 2000
Meters
28 February 2007
United States Antarctic Program
Environmental Research & Assessment


CLEAN AIR SECTOR
OVERFLIGHT BELOW 2000 m (6000') AGL AND OVERLAND TRANSIT PROHIBITED EXCEPT FOR ESSENTIAL PURPOSES
Consult ASMA Management Plan
340° Grid from ARO
110° Grid from ARO
Atmospheric Research Observatory (ARO)
OPERATIONS ZONE
ANTENNA FIELD
AUTHORIZED PERSONNEL ONLY
Vehicle trail to SPRESSO
QUIET CIRCLE
QUIET SECTOR
HAZARDOUS ZONE
ENTRY PROHIBITED EXCEPT FOR AUTHORIZED PERSONNEL
DANGER
HAZARDOUS ZONE
Aircraft movements and refueling
AUTHORIZED PERSONNEL ONLY
Planned IceCube Array
DARK SECTOR
Legend
Operations Zone
Hazardous Zone
De-motorized Zone
Downwind Sector
Dark Sector
Clean Air Sector
Quiet Sector
SPRESSO Quiet Circle
Old Pole Station - No Entry
Station buildings
Designated camping area
Aircraft taxi / parking - Keep Clear
Ski-way
Ski-way apron
Vehicle trail
Oversnow approach route
Surface fuel line - Caution
VLF antenna cable
Meteorological towers
Planned neutrino detector boreholes
South Pole (2005)
Ceremonial South Pole
ASMA No. 5: South Pole
Map 4: Amundsen-Scott Station

II. Measures

Management Plan for Antarctic Specially Managed Area No. 6

LARSEMANN HILLS, EAST ANTARCTICA

1. Introduction

1.1 Geography

The Larsemann Hills is an ice-free area of 40 km^2, located approximately halfway between the Vestfold Hills and the Amery Ice Shelf on the south-eastern coast of Prydz Bay, Princess Elizabeth Land, East Antarctica (69°30'S, 76°19'58"E) (Map A). The ice-free area consists of two major peninsulas (Stornes and Broknes), four minor peninsulas, and approximately 130 near shore islands. The eastern-most peninsula, Broknes, is further divided into western and eastern components by Nella Fjord. The closest significant ice-free areas are the Bølingen Islands (69°31'58"S, 75°42'E) 25 km to the south-west and the Rauer Islands (68°50'59"S, 77°49'58"E) 60 km to the north-east.

1.2 Human presence

1.2.1 History of human visitation

The Larsemann Hills area was first charted by a Norwegian expedition led by Christensen in 1935, and brief visits were made by several nations during the following 50 years, but human activity of a significant or sustained nature did not occur until the mid-1980s. The three year period from 1986 to 1989 saw rapid infrastructure development in the area: an Australian summer research base (Law Base), a Chinese year-round research station (Zhongshan) and two Russian research stations (Progress I and Progress II) were established within approximately 3 km of each other on eastern Broknes. During this period a 2000 m skiway was also operated by Russia on the ice plateau south of Broknes, and used for over 100 inter-continental and intra-continental flights. The Chinese station has been occupied continuously since, whilst Russian activities in the area have been intermittent. The Australian base has been occupied during most subsequent summers.

1.2.2 Science

Substantial station-based research is undertaken, including meteorology, seismology, geomagnetics, atmospheric chemistry, Global Positioning System (GPS) tracking, atmospheric and space physics, and human physiology. Field-based research in the Larsemann Hills has focused on geology, geomorphology, Quaternary science, glaciology, limnology, biology, biodiversity (including molecular), biotechnology and human impacts. Land traverses to locations further afield have also been supported.

1.2.3 Tourist visits

Several ship-based tourist visits have been made to the area since 1992. These have comprised half-day trips, during which passengers were transported to shore by helicopter and then able to view station areas, lakes, bird colonies and other features around eastern Broknes while on foot. An increase in tourism Antarctica-wide has the potential over time to promote continued tourist visits to the Larsemann Hills, and the proposed establishment of a compacted snow airstrip near the site of the previous skiway may facilitate increased numbers of visits and visits of greater duration, including the potential for land-based (overnight) tourism.

1.2.4 Associated human impacts

The initial period of intensive human activity between 1986 and 1989 and the subsequent conduct of science and support operations in the area have resulted in notable localised alteration of the environment, concentrated on eastern Broknes. The construction of station buildings, associated facilities and access routes on eastern Broknes has caused physical degradation of the ice-free surface. Breakdown of rocks and exposure of the permafrost layer through repeated vehicle use has caused surface erosion and altered drainage patterns. Chemical contamination of some lakes and soils has occurred through the accidental spillage of hydrocarbons, and the disposal of wastewater on the ground surface. Several introduced floral species have been detected (and removed), and there is evidence of ingestion of human-derived food by wildlife. There is also some evidence on western Broknes of wind-blown litter and surface disturbance through repeated pedestrian access. Stornes, and the minor peninsulas and near shore islands, have been infrequently visited and are less disturbed.

1.2.5 Future activities

Continuing human activity in the Larsemann Hills is promoted by the coastal location, ice-free landscape, the potential for further scientific research, and the potential for tourist visits. Commitment to ongoing use by the Parties currently active in the area is evident both in the planned and current redevelopment of station facilities and transport routes between the facilities, and plans for future science programs. The proposed establishment of a compacted snow airstrip on the plateau south of Broknes for both inter-continental and intra-continental flights may give rise to increased activity, particularly in support of other East Antarctic locations.

1.3 Period of designation

The ASMA is designated for an indefinite period. The Management Plan is to be reviewed at least every 5 years.

2. Values of the Area

The Prydz Bay region contains a number of rock outcrops and offshore islands, which represent a significant fraction of the ice-free component of the East Antarctic coastline. Comprising an ice-free area of approximately 40 km^2, the Larsemann Hills represent the southernmost coastal "oasis" (69^{o}30'S) in this geographic sector, and the second largest after the Vestfold Hills (~410 km^2), 110 km to the north-east. Such coastal oases are particularly rare in Antarctica. As such, the Larsemann Hills represents a significant biogeographical location, and exhibits associated environmental, scientific and logistical values.

2.1 Environmental and scientific values

Much of the scientific research in the Larsemann Hills depends on the natural environment being in a relatively undisturbed state, and for this reason the protection of scientific values will to a large extent contribute to the understanding and protection of the abundant environmental values of the Area.

With their geology significantly different from that of other outcrops in the Prydz Bay region, the Larsemann Hills provide one of few geological windows into the history of the Antarctic continent. Widespread exposed geological and geomorphological features provide a valuable insight into landscape formation, and the history of the polar ice-sheet and sea level. Many of these features are particularly vulnerable to physical disturbances.

Broknes is one of very few coastal areas of Antarctica that remained partially ice-free through the last glaciation, and sediments deposited there contain continuous biological and palaeoclimate records dating back c. 130,000 years.

The Larsemann Hills contain more than 150 lakes. Although some of the most scientifically important lakes are on eastern Broknes, the lakes of the Larsemann Hills are collectively recognised as the Area's most important ecological feature. The lakes are particularly valuable for their relatively simple natural ecosystems. However, they are susceptible to physical, chemical and biological modification within their catchment boundaries. A catchment-based approach to management of human activities is therefore appropriate to protect scientific values.

The comparatively benign microclimate and the occurrence of freshwater in summer provide a relatively hospitable environment able to support Antarctic life forms. Three species of breeding seabird are present (Snow petrels, Wilson's storm petrels and South polar skuas), and Weddell seals haul out close to shore to breed and moult. Mosses, lichens and cyanobacterial mats are widely distributed, and found in high concentrations in some locations. The accessibility of these biological sites from the station areas on eastern Broknes makes them a valuable and vulnerable characteristic of the Area.

Due to the short and well-documented history of human activity concentrated in a relatively small area, the Larsemann Hills also presents an excellent opportunity for human impacts studies.

2.2 Logistical values

The Larsemann Hills is an important logistical support base for access to the southern Prydz Bay region and the Antarctic interior. Australia and China have conducted substantial inland traverses supported by facilities in the Larsemann Hills. Russia plans to relocate the support base for the resupply of Vostok from Mirny to the Larsemann Hills, and is undertaking works at Progress involving the construction of a new living/laboratory building to accommodate up to 30 people, bulk fuel tanks and a garage/workshop. In the 2004/05 summer Russia started the airborne resupply of Vostok using aircraft based at Progress runway. The existence of a compacted snow airstrip in the area, capable of facilitating both inter-continental and intra-continental flights, also presents the region as a major hub for the access and support of other East Antarctic operations.

China is also to upgrade Zhongshan in order to make it suitable for supporting long term scientific monitoring and inland operations of the Chinese Antarctic Expeditions. A project of infrastructure improving has been launched, which mainly includes refitting of the old buildings and facilities, the construction of a new garage/workshop, a new administrative and communications centre, new scientific research quarters, new laboratories, new observatory fields, a new pier, a new road to the pier, and a new heliport.

Romania plans to establish research and biological laboratory space within Law-Racovita.

India plans to establish a permanent research station in the Larsemann Hills.

There have previously been several instances of logistical cooperation between Australia, China, Russia and Romania, involving the transfer of personnel, fuel, supplies and equipment, and this Management Plan promotes such initiatives.

2.3 Wilderness and aesthetic values

Stornes, the minor peninsulas and near shore islands have seldom been visited and many show little sign of past or current human presence. The aesthetic value of the rugged ice-free hills interspersed by lakes and fjords, with a backdrop of the Dålk Glacier, near shore islands, icebergs or the plateau is noteworthy.

3. Aims and objectives

The Larsemann Hills are designated as an ASMA in order to protect the environment by promoting coordination and cooperation by Parties in the planning and conduct of all human activities in the Area.

With the adoption of this Management Plan, the Treaty Parties commit to:

- providing guidance on the appropriate conduct of activities to all visitors (including personnel involved in national research programs, transitory national program visitors and participants in non-governmental activities);
- minimising cumulative and other environmental impacts by encouraging communication and a consistent, cooperative approach to environmental protection in the conduct of research and support activities;
- minimising physical disturbance, chemical contamination and biological impacts, primarily through appropriately managing vehicle usage;
- preventing contamination of the environment through the implementation of comprehensive waste management practices and the appropriate handling and storage of harmful substances;
- maintaining the wilderness and aesthetic values of the Area;
- safeguarding the ability to conduct scientific research by not compromising the scientific values of the Area; and
- improving the understanding of natural processes in the Area, including through the conduct of cooperative monitoring and recording programs.

4. Description of the Area

4.1 Geography and Area boundary

The ASMA comprises the ice-free area and near-shore islands collectively known as the Larsemann Hills (see Map A), and the adjacent plateau. The ASMA includes the land:

beginning at	69°23’20"S, 76°31’0"E east of the southern tip of Dalkoy and from there,
north to	69°22’20"S, 76°30’50"E north of Dalkoy
north-west to	69°20’40"S, 76°21’30"E north of Striped Island
north-west to	69°20’20"S, 76°14’20"E north-east of Betts Island
south-west to	69°20’40"S, 76°10’30"E north-west of Betts Island
south-west to	69°21’50"S, 76°2’10"E north-west of Osmar Island
south-west to	69°22’30"S, 75°58’30"E west of Osmar Island
south-west to	69°24’40"S, 75°56’0"E west of Mills Island
south-east to	69°26’40"S, 75°58’50"E south of Xiangsi Dao
south-east to	69°28'10"S, 76°1’50"E south-west of McCarthy Point
south-east to	coastline at 69°28’40"S, 76°3’20"E
north-east to	69°27’32"S, 76°17’55"E south of the Russian airstrip site
south-east to	69°25’10"S, 76°24’10"E on the western side of the Dålk Glacier
north-east to	69°24’40"S, 76°30’20"E on the eastern side of the Dålk Glacier
north-east returning to	69°23’20"S, 76°31’0"E.

The intention is however to manage, in accordance with this management plan, the conduct of all substantial human activity associated with the Larsemann Hills.

No artificial boundary markers are in place.

4.2 Climate

A major feature of the climate of the Larsemann Hills is the existence of persistent, strong katabatic winds that blow from the north-east most summer days. Daytime air temperatures from December to February frequently exceed 4°C and can exceed 10°C, with the mean monthly temperature a little above 0°C. Mean monthly winter temperatures are between –15°C and –18°C. Pack ice is extensive inshore throughout summer, and the fjords and bays are rarely ice-free. Precipitation occurs as snow and is unlikely to exceed 250 mm water equivalent annually. Snow cover is generally deeper and more persistent on Stornes than Broknes, due to north-easterly prevailing winds and the perennial sea ice held in by the islands offshore from Stornes.

4.3 Natural features

4.3.1 Bedrock geology

Bedrock exposures in the Larsemann Hills are composed of supracrustal volcanogenic and sedimentary rocks metamorphosed under granulite facies conditions (800–860°C, 6–7 kbar at peak) during the early Palaeozoic "Pan-African" event (~500-550 Ma). Peak metamorphic conditions were followed by decompression. The rocks were subjected to extensive melting and several deformational episodes, and have been intruded by several generations of pegmatites and granites. The supracrustal rocks are underlain by, and possibly derived from, a Proterozoic orthopyroxene-bearing orthogneiss basement. The Larsemann Hills (and neighbouring Bolingen Islands and Brattstrand Bluffs) differ from other parts of Prydz Bay, mainly due to the absence of mafic dykes and large charnockite bodies.

4.3.2 Geomorphology

The elongated form of large-scale topographic features of the Larsemann Hills results from compositional layering, folds and faults (lineaments) in the metamorphic bedrock. The landscape is dissected by large, structurally controlled, steep sided fjords and valleys rarely exceeding 100 m in depth on land; the maximum is 3 km in length (Barry Jones Bay). The maximum elevation above mean sea level is 162 m (Blundell Peak).

The coastline is generally bedrock, and beaches occur only at the heads of fjords or in isolated sheltered bays. There are several examples of sequences of ice-dammed lakes and associated gorges and alluvial fans. The offshore islands are likely to be roches moutonnees, isolated by the current sea level.

Numerous geomorphological features are found within the area. Landforms produced by wind are common, though ice and salt wedging clearly play a considerable role in grain detachment with wind primarily acting as a transporting agent. Periglacial landforms are also widespread, but not particularly abundant or well developed.

True soils are virtually absent due to a lack chemical and biological soil-forming processes. Surficial deposits are widespread but confined to lower areas and include snowpatch gravels, wind deposited materials, talus and fluvially deposited materials. Very thin soils (less than 10 cm) are also found in association with scattered moss beds and discontinuous lichen. A permafrost layer exists 20–70 cm below the surface in areas.

On north-eastern Stornes at approximately 69°31'48"S, 76°07'E there is an outcrop of post-depositionally placed marine Pliocene (4.5–3.8 Ma) sediment. These sediments, with a maximum thickness of 40 cm, occupy a narrow bench approximately 55 m above sea level and have yielded abundant well preserved foraminifera, less well preserved diatoms and molluscs.

On Broknes, areas that have remained ice-free through the Last Glacial Maximum contain sediment deposits (in lakes) that record climate, biological and ecological changes spanning the last glacial cycle.

4.3.3 Lakes

The Larsemann Hills contains more than 150 lakes ranging in salinity from freshwater to slightly saline, and in size from shallow ponds to large ice-deepened basins, although most are small (5000–30 000 m^2) and shallow (2–5 m). The surfaces of all the lakes freeze during winter, and most thaw for up to 2 months in summer, allowing them to be well-mixed by the regular katabatic winds. Most lakes are fed by snow melt and some have entrance and exit streams that flow persistently during the summer, and provide habitat for crustaceans, diatoms and rotifers; such streams are particularly evident on Stornes.

Small catchment areas and the near pristine waters make the Larsemann Hills lakes particularly susceptible to impacts resulting from human activities. Research has shown that several lakes on eastern Broknes in the immediate vicinity of the station areas and interlinking road network have experienced modified water chemistries, and inputs of nutrients, meltwater and sediment. Whilst these lakes clearly exhibit human impacts, the majority of the lakes on Broknes, and those elsewhere in the Area appear largely unmodified.

The lakes on east Broknes have the longest sediment record of any surface lakes in Antarctica. It appears that the ice sheet did not advance beyond Lake Nella and did not scour Progress Lake so these and lakes towards the north end of the peninsula are particularly valuable to the science community.

4.3.4 Lake and stream biota

Most of the phytoplankton comprises autotrophic nanoflagellates, though dinoflagellates occur in many lakes, and a desmid belonging to the genus *Cosmarium* is a major component of at least one lake. Heterotrophic nanoflagellates are more common than autotrophic nanoflagellates, though exhibiting low species diversity (only three or four species in most lakes), and particularly abundant in shallow lakes (*Parphysomonas* is very common). Ciliates are found in low numbers, with *Strombidium* the most common species, and a species of *Holyophyra* also found in most lakes. Rotifers occur sporadically in a number of lakes and the cladoceran *Daphniopsis studeri* is widespread, but found in low numbers.

The most obvious biotic feature observed in almost all the lakes are extensive blue-green cyanobacterial mats, which have accumulated since ice retreat, in places being up to 130 000 years old. These cyanobacterial mats are found to exceptional thicknesses of up to 1.5 m, not normally observed in other Antarctic freshwater systems, and are also widely distributed in streams and wet seepage areas.

4.3.5 Seabirds

Three species of seabird breed within the Larsemann Hills (South polar skuas, Snow petrels and Wilson's storm petrels). Approximate numbers and locations of breeding pairs are documented for Broknes, and particularly eastern Broknes, but their distribution throughout the remainder of the area is uncertain.

South polar skuas (*Catharacta maccormicki*) are present between mid-late October and early April, with approximately 17 breeding pairs nesting on Broknes and similar numbers of non-breeding birds.

Snow petrel (*Pagodroma nivea*) and Wilson's storm petrel (*Oceanites oceanicus*) nests are found in sheltered bedrock fragments, crevices, boulder slopes and rock falls, and are generally occupied from October until February. Approximately 850–900 pairs of Snow petrel and 40–50 pairs of Wilson's storm petrel are found on Broknes, with concentrations of Snow petrels at Base Ridge and on rocky outcrops adjacent to the Dålk Glacier in the east and the plateau in the south.

Despite the apparent suitable exposed nesting habitat, no Adelie penguin (*Pygoscelis adeliae)* breeding colonies are found at the Larsemann Hills, possibly due to the persistence of sea ice past the hatching period. However birds visit from colonies on nearby island groups between the Svenner Islands and Bolingen Islands, during summer to moult. Emperor penguins (*Aptenodytes forsteri*) also occasionally visit from the Amanda Bay rookery 30 km to the north-east.

4.3.6 Seals

Weddell seals (*Leptonychotes weddelli*) are numerous on the Larsemann Hills coast, using the sea ice in the area to pup from October, and to moult from late December until March. Little is currently known about locations and numbers, although pupping has been observed on the sea ice adjacent to small islands north-east of eastern Broknes, and groups of moulting seals have been observed hauled out near the Broknes shore adjacent to the stations and in tide cracks in the fjords to the west. Aerial surveys during the moulting period have observed greater than 1000 seals, with multiple large groups (50–100 seals) hauled out in Thala Fjord and on rafted ice immediately to the west of Stornes, and numerous smaller groups amongst offshore islands and ice to the north-east of Broknes. Crabeater seals (*Lobodon carcinophagus*) and Leopard seals (*Hydrurga leptonyx*) are also occasional visitors.

4.3.7 Terrestrial micro fauna

Little research has been conducted with regard to terrestrial invertebrates in the Larsemann Hills. Five genera of terrestrial tardigrade (*Hypsibius*, *Minibiotus*, *Diphascon*, *Milnesium* and *Pseudechiniscus*), which include six species, are known to be present in localities associated with vegetation. The lakes and streams provide a series of habitats that contain a rich and varied fauna very typical of the Antarctic region. Seventeen species of rotifer, three tardigrades, two arthropods, protozoans, a platyhelminth and nematodes have been reported. The cladoceran *Daphniopsis studeri*, one of few species of freshwater crustacea known to occur in the lakes of continental Antarctica, has been identified in most Larsemann Hills lakes and represents the largest animal in these systems.

4.3.8 Terrestrial vegetation

Sampling of the coastal areas from the Vestfold Hills to the Larsemann Hills indicate that the flora of the Ingrid Christensen Coast is relatively uniform, and restricted to a similar distribution of bryophytes, lichens and terrestrial algae. Although few collections have been undertaken, it is believed that the nature of the basement rock, the relatively recent exposure from the ice cap, and the prevailing wind direction in the greater Prydz Bay area contribute to the fact that less than 1% of the Larsemann Hills has vegetative cover. Five introduced vascular species have been observed in the vicinity of station buildings, indicating that the environment will support introduced species.

Most terrestrial life, including mosses, lichens and accompanying invertebrates are found inland from the coast. Nevertheless, large moss beds are known to occur in sheltered sites on the larger islands (particularly Kolløy and Sigdøy), associated with Adelie penguin moulting sites, and nunataks in the southwest. There are seven positively identified moss species in the region: *Bryum*

pseudotriquetum, which is most abundant*, Grimmia antarctici, Grimmia lawiana, Ceratodon pupureus, Sarconeurum glaciale, Bryum algens* and *Bryum argentum*.

The bryophyte flora also comprises one species of liverwort *Cephaloziella exiliflora,* which is found on an unnamed outcrop south of Stornes and known from only four other Antarctic localities. Lichen coverage is considerable on north-eastern Stornes and Law Ridge on Broknes and the lichen flora of the region comprises at least 25 positively identified species. Although no systematic studies have been undertaken in the area, similar work conducted in nearby locations on the Ingrid Christensen Coast suggest that it would not be unreasonable to expect the Larsemann Hills to exhibit close to 200 non-marine algal taxa, and 100–120 fungal taxa.

4.4 Human impacts

Past and ongoing human activities in the Larsemann Hills are concentrated on eastern Broknes where three stations are in close proximity to each other.

Areas outside Broknes exhibit very little evidence of human impact, with survey/photo control marks comprising the only obvious introduced features. Maintaining this well-preserved state is a major priority for management of the Larsemann Hills.

4.5 Access to the Area

4.5.1 Land access

In total, 15 km of unsealed roads, formed of local material, have been established on eastern Broknes. A principal road, 6.7 km in length, runs from Zhongshan in the north, through the centre of eastern Broknes, linking each of the stations and providing access to the continental plateau in the south. This road closely follows the most appropriate route with regard to avoiding lake catchments and steep slopes. There are four particularly steeps sections: a ridge approximately 0.5 km south of Zhongshan; a series of steep slopes between Progress II and Law-Racovita; the section of road which traverses the slope to the west of Lake Sibthorpe; and the ascent to the plateau near the Dålk Glacier. At present a survey is being conducted to identify a better route between Law-Racovita and Progress. The alternative of flattening the slope is also being investigated. The final kilometre of the route before entering the plateau proper is marked by marker canes every 50–100 m. There are also vehicle routes within the immediate station areas of Zhongshan and Progress II and a short access route connecting Law-Racovita to the main road. Vehicle access over ice-free surfaces within the Area is to be restricted only to roads, and particular care must be taken when traversing the noted steep sections.

Sea ice travel within the Area is possible, with ice persisting in the fjords and between the shore and numerous near-shore islands until late in the summer season. Ice conditions are variable at the eastern and western margins of the Area due to the presence of glaciers, and sea ice travel must take account of these conditions. In winter, sea ice access to the Zhonghan and Progress II is also feasible via the beach west of Zhongshan (69°22’30"S, 76°21’33"E) or the beach adjacent to Progress II (69°22’44"S, 76°23’36"E), depending on highly variable ice conditions. From the sea ice, it may then be possible to access the main road south of the steep section south of Progress II via either the easternmost bay of Nella Fjord (69°22’58"S, 76°22’44"E) or via Seal Cove (69°23’6"S, 76°23’49"E).

The Area can be approached on the plateau ice from Davis in the north-east (approximately 330 km) and Mawson in the west following the Lambert Glacier traverse route (approximately 2200 km). This comprises a caned route, which turns north from a marker at 69°55’23"S, 76°29’49"E then follows series of canes and drum beacons north to connect with the major access route on eastern Broknes.

4.5.2 Sea access

No established shipping anchorages or barge landings are designated for the Area due to the variable sea ice conditions present to the north-east of eastern Broknes. Vessels usually anchor approximately 5 nautical miles offshore, depending on ice conditions. Three main sites have been used in previous years:

- the bay ~250 m NNE of Zhongshan at 69°22'12"S, 76°22'15"E has been most frequently used in the past, and consists of a ~15 m opening between rock outcrops, and a large flat area on shore for vehicle operations;
- the beach adjacent to Progress II (69°22'44"S, 76°23'53"E); and
- the beach west of Zhongshan opening into Nella Fjord (69°22'30"S, 76°21'25"E).

Access from ships to the eastern shore of Broknes by small boat is difficult and sometimes impossible due to ice debris up to hundreds of metres off shore, blown by the prevailing north-easterly winds. Helicopters are therefore the only reliable means by which persons and supplies can be transported ashore quickly.

4.5.3 Air access

Designated helicopter landing and refuelling sites located at Zhongshan, Progress II, Law-Racovita and Progress I are to be used preferentially for general helicopter operations.

The Zhongshan helicopter-landing site (69°22'44"S, 76°21'32"E) consists of a circular concrete pad of 15 m diameter showing a painted map of Antarctica, and is located approximately 40 m west of the main administration / mess building (Map D). There are other possible (unconsolidated) landing sites nearby, although loose surface rocks and gravel make the use of the pad preferable. Landings are usually made travelling towards the main building from the direction of the lake, due to the north-east prevailing winds.

The usual helicopter-landing site at Progress II (69°22'40"S, 76°24'10"E) consists of a flat area (~20 x 20 m) of bare ground cleared of large rocks, and is adjacent to a large depot of 200 L fuel drums, approximately 250 m north of the largest building in the station area (Map E). The complex under construction will include a concrete helicopter pad.

The Law-Racovita helicopter-landing site (69°23'20"S, 76°22'55"E) is a flat area located approximately 60 m east of the base. Helicopters would normally land facing into the north-east prevailing winds.

There is no defined helicopter-landing site at Progress I, but Australian helicopters usually land adjacent to the fuel depot (69°24'S, 76°24'10"E).

Small ski/wheeled fixed-wing aircraft operations have previously been conducted infrequently in the region and may be possible on the sea ice adjacent to the stations, though ice conditions vary annually, and the proximity to wildlife colonies make such operations on the plateau preferable. Landings have been conducted near the site of the previous Russian runway, and proposed compacted snow airstrip at 69°25'59"S, 76°10'25"E Prevailing winds from the north-east and a slight rise in the surface suggest that landing and taking off towards the north-east is preferable. Flight paths should be selected to avoid wildlife.

4.5.4 Pedestrian access

Pedestrian access within the Area is not restricted, but is to be conducted in accordance with the accompanying Environmental Code of Conduct (see Appendix 1). Where established routes are apparent for frequently visited locations, these routes should be utilised to minimise physical

disturbance of the land surface and to prevent further track formation. Where surface modification is not apparent, the most direct route between points should be taken, with consideration given to avoiding repetitive use of the same route and avoiding vegetation and other sensitive features.

4.6 Location of structures in or near the Area

There are currently two permanent year-round research stations (Zhongshan and Progress II) and one seasonal research facility (Law-Racovita) in the Area (Map C).

4.6.1 Zhongshan (People's Republic of China)

General

Zhongshan is located on the north-eastern tip of eastern Broknes at 69°22'24"S, 76°22'40"E at approximately 11 m above sea level. The station was established in the 1988/89 summer season and has operated continuously since, to facilitate the conduct of year-round scientific research activity by the Chinese Antarctic program.

Station infrastructure

Station populations are approximately 60 personnel in summer and 20–25 in winter, with a maximum capacity to accommodate 76. The station consists of five main and several smaller buildings (Map D). Vehicle access to Zhongshan is via the main road from the plateau, and a network of routes link the main buildings within the station area. A concrete helicopter-landing pad is located west of the main station building, at 69°22'22"S, 76°22'8"E (see Section 4.5.3).

Power, fuel delivery and storage

Electrical power is provided by diesel generators. Fuel is transferred from the ship by barge or pipeline, depending on sea ice conditions, and stored in bulk tanks at the southern end of the station area. Between 200–300 cubic metres of fuel are delivered to the station each year.

Water

Water for generator cooling and shower facilities is drawn from a large tarn immediately west of the station area, and potable water is drawn from a smaller adjacent snowmelt-fed tarn in summer and obtained by melting ice or snow in winter. Wastewater is discharged to the ocean after passing through a series of gravity-driven settlement tanks.

Waste management

Combustible wastes are separated and burnt in a high temperature, diesel-fuelled incinerator. The quantity of combustible wastes produced requires an incinerator burn every three to four days on average, and incinerator ash is collected and stored for return to China. Non-combustible wastes are sorted into waste categories and stored south of the power house for removal by ship at the next opportunity.

Vehicles

Vehicles are used in the immediate station area and to transport materials to other sites on eastern Broknes via the main road. Maintenance of vehicles, generators and instruments is undertaken in the powerhouse or vehicle workshop. All waste oil is returned to China.

Resupply

Resupply is generally undertaken once a year in summer. Cargo is brought to shore using either barges, or sleds towed behind traverse vehicles.

Communications

Verbal communication with China is largely by short-wave radio and INMARSAT A, B and C systems equipped for sending and receiving telephone calls, faxes, emails and scientific data. HF radio is used for communications in the Prydz Bay area and VHF radio is used for local communications. A radio-telephone link also provides contact with Davis (and via Davis to anywhere in the world), and this is used for conveying meteorological data on a daily basis.

Science

Science programs conducted from Zhongshan are largely of a station-based nature and include: meteorology, ozone monitoring, upper atmosphere physics, auroral observations, geomagnetic observations (some in cooperation with the Australian Antarctic Program), gravimetric observations, seismology, NOAA polar orbiting satellite image processing, atmospheric chemistry, remote sensing, GPS measurement and human physiology. Activities away from the immediate station area during seasons with summer research programs include environmental evaluation and monitoring of snow-ice, soil, seawater, freshwater, moss, lichen, wildlife, geology, glaciology and sea ice ecosystems. Inland traverses have also been undertaken to conduct geology, geodesy, glaciology and meteorite studies.

4.6.2 Progress II (Russia)

General

Progress II is located on eastern Broknes, approximately 1 km south of Zhongshan, at 69°21’57"S, 76°20’59"E. The station was established in 1988 on a plateau 300 m from the western shoreline of Dålk Bay, to allow greater ease of ship-based resupply and a more sheltered location than the location of Progress I (adjacent to the ice plateau). Progress II was occupied sporadically and shut down during the 1993/94 summer, but reopened in the 1997/98 summer season for operation as a year-round research facility.

Station infrastructure

The station accommodates a population of approximately 15 people year round, but occupation has been sporadic since 1989, with a maximum population over summer of 58. The station consists of a two-storey living/office building and 12 older huts (Map E). Vehicle access to Progress II is via the main road from the plateau, and a network of routes links the main buildings within the station area. A helicopter-landing site is located north-west of the main station building, at 69°22’40"S, 76°24’10"E (see Section 4.5.3).

The station is being rebuilt within the existing station boundaries. At the time of its planned completion in 2012, the station’s facilities will include a helicopter pad, living/laboratory building providing accommodation for 30 people, a garage/workshop/diesel power station, and fuel storage.

The renovated buildings will be equipped with waste treatment facilities.

The existing routes will mostly be used to access the site. Following completion of the rebuilding program the old buildings and facilities are to be demolished and removed from the Antarctic Treaty area.

Power, fuel delivery and storage

Electrical power is provided by three diesel generators. The generators are supplied with fuel from two tanks adjacent to the power station, which are filled by wheeled tank from bulk tanks on the shore between Progress II and Zhongshan. Gas is used for cooking, and electric heaters are used to heat the buildings.

Water

Drinking water is drawn from a small lake to the north-west of the station area in summer, and from Progress Lake near the plateau in winter. Water from either lake is transported to the station in a water tank, and stored in a large tank adjacent to the mess building. In past years some fresh water has also been obtained by melting sea ice and small bergs near the station. Washing water is drawn from Stepped Lake during summer. A water condition plant has been installed, providing for the use of the lake's slightly brackish water.

Waste management

Small, non-combustible wastes are separated and compacted for removal. Kitchen wastes and combustibles are burnt in a high temperature incinerator. Sewage water from the main building is treated by an electro-chemical unit and discharged into the bay. The smaller old buildings do not have sewage treatment units; human wastes and kitchen scraps from these are stored in drums for return to Russia.

Larger wastes are stored in 200 L drums on the beach adjacent to the station, for return to Russia.

Vehicles

Vehicles are used in the proximity of the station for collecting water and transferring fuel and wastes, and to transport personnel and equipment to Progress I and to the plateau. Some vehicles are stationed at Progress I and a small outpost to the south, for use in compacted snow runway operations. Several large unused vehicles are also stored west of the main Progress II station area.

Resupply

Resupply is conducted by ship-shore helicopter operations following the summer season (April – May). Thick ice conditions are preferred, to also allow cargo to be deployed onto vehicles and driven directly to shore on the sea ice.

Communications

HF communications are used to contact other Russian stations. VHF communications are used for local aircraft, ship and field operations. INMARSAT B and C and Iridium systems are used to contact Russia and occasionally, other Russian stations.

Science

Progress II is primarily intended as a support base for inland geological and glaciological operations.

4.6.3 Law-Racovita (Australia – Romania)

General

Law-Racovita is located towards the southern end of eastern Broknes, approximately 1 km south of Progress II and 2 km south of Zhongshan at 69°23'16"S, 76°22'47"E. The Base was established in the 1986/87 summer season.

Station infrastructure

Law-Racovita consists of one prefabricated multi-purpose building, five fibre-glass huts and a small ablutions shed. All wastes generated are drummed and removed. Plans are being made to upgrade the station's infrastructure, and to relocate it to the Facilities Zone, by 2010.

Power, fuel delivery and storage

A small petrol generator is used to provide electrical power and operated only when required to charge batteries etc. A small solar panel mounted on the roof of the main hut charges batteries to power the HF and VHF radios. Gas is used for cooking and heating the main hut.

Water

Drinking and washing water is generally obtained during summer by collecting and melting snow from a nearby snow bank. Drinking water is also collected from a small tarn adjacent to the section of road connecting Law-Racovita with the main route between north-eastern Broknes and the plateau.

Logistics

Four-wheeled motorbikes are occasionally stationed at Law-Racovita for the support of science programs during summer. Use of these vehicles is strictly restricted to the designated access routes.

Law-Racovita may be supported opportunistically from Davis (by helicopter), stations in the immediate area, or from ships resupplying any of these facilities.

Communications

Law-Racovita is equipped with VHF radios.

Science

Summer research projects have included studies of the glacial history of the area, geology, geomorphology, hydrology, limnology and biology, plus human impacts studies including the contamination and eutrophication of lakes and soils, and introduced species.

4.6.4 Compacted snow runway site and associated facilities (Russia)

The proposed site of a runway approximately 5 km south of Progress II and running SW-NE at 69°25'43"S, 76°20'36"E to 69°26'51"S, 76°17'18"E is accessed by the ice-free plateau access route and the beginning of the inland traverse route. Two field huts are presently located on the southernmost rock outcrop adjacent to the route, approximately 2 km north of the runway site at 69°24'39"S, 76°20'15"E.

4.6.5 Minor structures

Progress I (Russia)

Progress I (69°24'S, 76°24'E) supported a wintering population of 16 in 1987 and 1988 and was partially dismantled and removed in 1991/92. One functional building remains at the site which is also used to store Russian airstrip construction equipment and fuel drums. Chinese traverse sleds, traverse vans, and a depot of fuel drums for traverse vehicles are stored in the immediate vicinity. Australia also maintains a depot of aviation fuel near Progress I (69°23'56"S, 76°24'37"E). A further Russian hut and airstrip construction vehicle storage area is located on the southernmost rock outcrop west of the caned vehicle route to the plateau, approximately 1 km past Progress I (69°24'43"S, 76°24'35"E).

Field hut (India)

Three fibreglass huts with basic provisions for emergency needs are currently sited on an un-named promontory at 69°24'S, 76°11'E. The huts were positioned by India in the 2004/05 and 2006/07 summers.

Monitoring sites

A long-term monitoring site, approximately 250 m north-east of Law-Racovita, was established in 1990 to measure the rate of surface lowering caused by wind abrasion and salt weathering. The site is situated on exposed coarse-grained yellow gneiss, and consists of 24 micro-erosion sites marked by painted yellow rings. Due to the nature of this study, the site should not be crossed on foot, as this will affect the measurements of natural erosion. The practice of using paint or other such permanent means of marking sites is discouraged, and collection of a GPS location is preferable.

A tide gauge, for measuring variation in the mean sea level, is located in the easternmost bay of Nella Fjord, 41.8 m from a known benchmark on shore (69°23'2"S, 76°22'19"E).

Monuments

A rock cairn laid on 8 February 1958 to mark the first Australian National Antarctic Research Expeditions (ANARE) visit to the Larsemann Hills, is located at the highest point on Knuckey Island (69°23'12"S, 76°3'55"E), the largest of a group of three islands lying approximately 1.1 km north-west of Stornes. The cairn contains a note, stored in a plastic sleeve within a glass jar, outlining the names of the landing party.

The gravesite of a Russian expeditioner who died in July 1998 is located on the hill overlooking the northern shore of Seal Cove at 69°22'58"S, 76°23'49"E. The site comprises a steel chest with affixed plaque, surrounded by a low metal railing. A headstone displaying an image of the expeditioner stands at the foot of the chest.

A small monument is located on the northern side of the hill at the northernmost tip of the eastern Broknes coast, north of Zhongshan. This site is a memorial to a previous Vice President of the Chinese Arctic and Antarctic Administration, and comprises a cement monument facing north towards Manning Island and containing a portion of the previous Vice President's ashes.

Other minor structures

A very small emergency food cache is contained within a plastic box at the summit of Blundell Peak on Stornes (69°6'14"S, 76°6'14"E), the highest peak in the Larsemann Hills.

4.7 Location of other protected areas

The only other protected area in the Prydz Bay region is ASPA 143: Marine Plain (68°3'36"S, 78°6'57"E), located on Mule Peninsula in the Vestfold Hills, approximately 110 km to the north-east. Historic Site and Monument (HSM) 6: Walkabout Rocks (68°21'57"S, 78°31'58"E) and HSM 72: Cairn on Tryne Islands (68°21'57"S, 78°24'E) are also located within the Vestfold Hills.

5. Zones within the Area

All activities within the Area are to comply with the provisions of the Protocol on Environmental Protection to the Antarctic Treaty and the appended Environmental Code of Conduct. In addition four zones are defined with restrictions on certain activities, as deemed necessary to meet the objectives for managing the Area.

5.1 Facilities Zone

The construction of station buildings and associated infrastructure on eastern Broknes has caused the greatest impact on the Larsemann Hills environment. However, these impacts have been largely restricted to the immediate station areas and connecting access routes. As the lakes are recognised as the most important ecological feature of the Area, and are susceptible to the impact of human activities undertaken within their catchment limits, a catchment-based approach is the most appropriate means of managing activities in the Area. The existing permanent stations are well situated to limit the spread of their environmental effects, due to their isolation from the rest of the Area, with most station infrastructure located in drainage basins that discharge into the sea.

To ensure that this situation is maintained, a Facilities Zone is defined within the ASMA boundary, encompassing the majority of eastern Broknes. The boundary of the Facilities Zone is defined by the Dålk Glacier in the east, the sea in the north, the western margin of impacted catchments in the west, and the ice plateau including the airstrip and access route in the south. The installation of infrastructure within the ASMA will generally be restricted to already impacted areas in the Facilities Zone. Additional activity within the ASMA involving the building of new infrastructure elsewhere may be considered based on adequate scientific and/or logistic justification.

5.2 Helicopter Zone

Helicopter operations have the potential to cause disturbance to breeding and moulting wildlife. To minimise such disturbance, it is recommended that helicopters operating in the Area take into account the presence of wildlife and maintain maximum possible separation distances. Pilots are to avoid flying and landing upwind of lakes and vegetated areas.

5.3 Magnetic Quiet Zone

Several magnetometers are operated at Zhongshan. A circular zone of 80 m radius is defined surrounding the induction magnetometer sensors located in the gully north of the station at 69°22’12"S, 76°22’8"E, and a further zone to a radius of 80 m from the magnetometer array located west of the water supply lakes and centred at 69°22’22"S, 76°21’46"E. All ferrous materials are to be excluded from these zones to avoid contamination of magnetic field measurements. Permission to enter the Magnetic Quiet Zone must be obtained from the scientist in charge of the experiment.

5.4 Restricted Zone – Stornes

Designation of Stornes as a Restricted Zone recognises the desirability of protecting this infrequently visited and consequently minimally impacted peninsula, including as a reference site for possible future comparison with Broknes.

Stornes is also geologically and mineralogically unique for the extensive development of a diverse suite of borosilicate and phosphate minerals, five and nine species, respectively. The relatively rare borosilicates prismatine and grandidierite are found abundantly in spectacular crystals and segregations over a wide area, while the ferromagnesian fluorphosphate wagnerite forms spectacular nodules locally and microscopic grains regionally. Stornes is the type locality for four new minerals. The aluminium borosilicate boralsilite was described in 1998 and subsequently found at several localities on the peninsula in 2003; to date it is known only from one other locality worldwide. Three new phosphate minerals were discovered in samples collected in 2003; description of these minerals is underway. The borosilicate and phosphate assemblages are considered scientifically significant both in their variety and origin. A major question being addressed in ongoing research is what geologic processes concentrated boron and phosphorus to such an extent.

The sediments on north-eastern Stornes at approximately 69°25'S 76°0'E contain abundant well preserved foraminifera, diatoms and molluscs. This location represents one of only two recorded sites in East Antarctica displaying sediment from this time interval. The sediments are thin and friable and thus require protection from human disturbance. Recent attempts to accurately locate and delimit the site have however been prevented by substantial snow cover.

Preparatory work on Stornes' possible designation as an Antarctic Specially Protected Area is underway.

6. Management activities

Communication between Parties, between on-ground personnel, and between on-ground personnel and national offices will be the key to the successful implementation of management measures in the Larsemann Hills; Parties with research programs in the area commit to ensuring appropriate communication at both a national program and on-ground level. Annual discussions to review the implementation of the management plan will be held during annual Treaty-related meetings.

The relevant station and field base leaders will also meet on an annual basis (logistics permitting) and maintain verbal communications throughout the year on aspects relevant to the management of the Larsemann Hills.

6.1 Logistics, including facilities

- Any further track and infrastructure development in ice-free areas will be restricted to that part of eastern Broknes already modified by human activities and delimited by the Facilities Zone (see Section 5.1), unless a location outside the Zone is justified for adequate scientific and/or logistical reasons. This restriction shall not apply to facilities to be set up for ensuring the safety of field workers.
- Environment impact assessment will proceed as required by Article 8 of the Protocol before constructing or modifying structures, and the Parties proposing to conduct such activities will inform other Parties with active research programs in the Area.
- The cooperative use of infrastructure will be promoted in preference to the construction of new facilities.
- The impacts of man-made structures on wilderness and aesthetics values will be considered and minimised by restricting new structures to already impacted areas wherever possible, and by locating structures so as to minimise their visibility from surrounding areas. Research will be continued to further develop GIS-based models to assist in the evaluation of such impacts prior to construction activities.
- Fuel storage areas will be bunded and located outside lake catchment boundaries wherever possible.
- The use of vehicles will be minimised and essential vehicle use restricted to designated ice-free routes, sea ice and plateau ice.
- Vehicle routes that do not serve the aims of this management plan will be closed with rehabilitation of the impacted area undertaken wherever possible.
- The planning and conduct of vehicle use will take into account the wildlife distances identified in the Environmental Code of Conduct.
- Options for cooperation in the transfer of personnel, supplies, and fuel will be explored.
- As a minimum, waste disposal and management activities will comply with the provisions laid down in Annex II to the Protocol.

- Wastes and disused equipment will be removed from the Antarctic Treaty Area at the earliest opportunity.
- The Parties with active research programs in the Area will jointly develop contingency plans for incidents with potential to adversely impact on the environment.
- Regular and opportunistic collection of wind-dispersed litter will be undertaken.
- All equipment left in the field will be periodically reviewed for potential removal and its interim protection from wind dispersal and the like will be assessed.
- The rehabilitation of modified and disused sites will be investigated and progressed as appropriate.

6.2 Introduced species and wildlife disturbance

- As a minimum, activities will comply with the provisions relating to introduced species and conservation of flora and fauna laid down in Annex II to the Protocol.
- The Parties with active research programs in the Area will jointly develop quarantine policies and procedures for the Area.
- The need to maintain appropriate separation distances from wildlife will be taken into account in the planning and conduct of activities in the Area.

6.3 Data management

- The Parties with active research programs in the Area will jointly develop, and provide input to, a database for recording relevant management information and metadata records to assist the planning and coordination of activities.
- Efforts will be made to increase knowledge of the environmental values of the Area, and the impacts of human activities upon those values, and to apply this knowledge to the environmental management of the Area.

6.4 Science

- Cooperation with, and coordination of, scientific research will be undertaken wherever possible.

6.5 Monitoring

- The Parties with active research programs in the Area will jointly undertake monitoring activities to evaluate the effectiveness of this Management Plan.

6.6 Monuments

- Activities will be managed to ensure the preservation of existing monuments where such action is considered desirable.
- The placement of further cairns or monuments outside the Facilities Zone is prohibited.

6.7 Exchange of information

- To enhance cooperation and the coordination of activities in the Area, avoid duplication of activities, and facilitate the consideration of cumulative impacts, Parties active in the area will:
    - distribute to other such Parties details of activities that may have a bearing on the operation of this management plan (that is, proposals to withdraw from or establish

new research activities, proposals to construct new facilities, information obtained regarding non-governmental visits etc.); and

- provide reports to the CEP on the implementation and maintenance of this management plan.

- Other Parties proposing to conduct activities in the region, including non-governmental groups, will inform at least one of the Parties active in the ASMA of their intentions – in the spirit of the aims and objectives of this management plan.

Appendix 1. Environmental Code of Conduct

The actions of individuals contribute significantly to protecting the Antarctic environment. This Code of Conduct is intended to provide general guidelines to help minimise environmental impacts when in the Larsemann Hills, particularly for activities undertaken away from main station areas.

General principles

- The Antarctic environment is highly susceptible to the impacts of human activities, and as a general rule has much less natural ability to recover from disturbance than the environments of other continents; consider this when undertaking activities in the field.
- Everything taken into the field must be removed. This includes human wastes and also means avoiding the use or dispersal of foreign materials that are difficult to collect and remove. Strip down excess packaging before going off-station, to minimise waste taken into the field.
- The collection or disturbance of any biological or geological specimen or man-made artefact may only be undertaken with prior approval and, if required, in accordance with a permit.
- Wherever possible, accurately record the contact person, location (preferably by GPS) and usage details of all field activities (such as sample sites, field camps, depots, oil spills, markers, equipment etc.) for transfer to the management database.
- This Environmental Code of Conduct is intended as a guide for field activities, but cannot be expected to cover every situation – you should always consider your responsibilities and seek to minimise your impact on all aspects of the environment.

Travel

- Some biological communities and geological formations are especially fragile, even when concealed by snow; be alert and avoid such features when travelling to and between field locations.
- Vehicle and helicopter usage should be restricted to essential tasks to minimise: atmospheric emissions; track formation, physical disturbance of the land surface or biological communities; wildlife disturbance; and the potential for fuel spills.
- When vehicle use is essential, access should be restricted to sea ice, plateau areas and designated ice-free routes. Facilities should be accessed using existing routes.
- Vehicles and other equipment should be fully fuelled on station before departure, to reduce the need for refuelling in the field.
- Avoid refuelling or changing oil in windy conditions or in areas that might direct accidental spillage into lakes, vegetation or other sensitive areas, and always use fuel cans with nozzles/funnels.
- When travelling on foot, use established tracks and designated crossing points wherever possible.
- Avoiding making new tracks. Where established tracks do not exist, take the most direct route that avoids vegetated areas and delicate geological formations such as screes, sediments, streambeds and lake margins.

Wildlife

- Do not feed wildlife.
- Distances from wildlife at which disturbance may be expected to occur are provided in the table following. When moving on foot around wildlife, keep quiet, move slowly, and stay low to the ground – increase your distance if disturbance is evident.

II. Measures

Field camps

- Existing accommodation should be used where possible.
- Where necessary, campsites should be located as far away as practicable from lake shores, streambeds, vegetated sites and wildlife, to avoid contamination and/or disturbance.
- Ensure that equipment and stores are properly secured at all times to prevent foraging by wildlife and dispersion by high winds.
- Collect all wastes produced at field camps, including human wastes and grey water, for return to station and subsequent treatment or disposal.
- Solar or wind powered generators should be utilised wherever possible to minimise fuel usage.

Fieldwork

- All clothing and equipment must be meticulously cleaned before being brought to Antarctica and before moving between sampling locations, to prevent contamination, cross-contamination and the introduction and spread of foreign organisms.
- Do not build cairns, and minimise the use of other objects to mark sites; such markers should be removed on completion of the related task.
- When permitted to collect samples, adhere to the sample size specified in your permit and take samples from the least conspicuous location possible.
- Always use a drop sheet when sampling soils and backfill soil pits to prevent wind erosion and dispersal of deeper sediments.
- Take great care when handling chemicals and fuels, and ensure you have appropriate materials with you to catch and absorb spills.
- Minimise the use of liquid water and chemicals that could contaminate the isotopic and chemical record within lake or glacier ice.
- Scrupulously clean all sampling equipment to avoid cross-contamination between lakes.
- To prevent lake contamination, or toxic effects on the biota at the surface, avoid reintroducing large volumes of water obtained from lower in the water column; excess water or sediment should be returned to station for appropriate disposal or treatment.
- Ensure that sampling equipment is securely tethered, and leave nothing frozen into the ice that may cause later contamination.
- Do not wash, swim or dive in lakes; these activities contaminate the water body and physically disturb the water column, delicate microbial communities, and sediments.

Note: The guidelines laid down in this Environmental Code of Conduct shall not apply in cases of emergency. All activities in the Larsemann Hills must comply with the Antarctic Specially Managed Area (ASMA) management plan for the area. As required by Article 8 of the Protocol, all activities must undergo an environmental impact assessment prior to the activity being undertaken.

Distances at which disturbance may be expected to occur when approaching wildlife on foot

Species	Distance (metres)
Giant petrels and albatrosses, breeding / nesting	100 m
Emperor penguins (in colonies, huddling, moulting, with eggs or with chicks)	50 m
All other penguins (in colonies, moulting, with eggs or chicks)	30 m
Prions, petrels, skuas, on nests Seals with pups and seal pups on their own	20 m
Non breeding penguins and adult seals	5 m

Distance at which disturbance may be expected to occur when approaching wildlife using small vehicles (e.g. quads and skidoos)

All wildlife	150 m

Distance at which disturbance may be expected to occur when approaching wildlife using tracked vehicles

All wildlife	250 m

Distances at which disturbance may be expected to occur when approaching wildlife using aircraft

Birds	**Vertical** Single-engine helicopters 2500 ft (~ 750 m) Twin-engine helicopters 5000 ft (~1500 m) **Horizontal** ½ nm (~930 m)
Seals	**Vertical and horizontal** Single-engine helicopters 2500 ft (~ 750 m) Twin-engine helicopters 5000 ft (~1500 m) Twin-engine, fixed-wing aircraft 2500 ft (~750 m)

Appendix 2: National program contact details

Australia Australian Antarctic Division Channel Highway Kingston Tasmania 7050 Australia **Phone:** +61 (03) 6232 3209 **Fax:** +61 (03) 6232 3357 **E-mail:** epps@aad.gov.au	**Romania** Romanian Antarctic Foundation Romanian Polar Research Institute 1 Libertatii, Blvd Bucharest -4 Romania **Phone/fax:** 0040213372986 **Email:** negoita_antarctic@yahoo.com
People's Republic of China The Chinese Arctic and Antarctic Administration 1 Fuxingmenwai Street Beijing 100860 People's Republic of China **Phone:** +86 10 6804 7750 **Fax:** +86 10 6801 2776 **Email:** chinare@263.net.cn	**Russian Federation** Russian Antarctic Expedition The Arctic and Antarctic Research Institute 38 Bering Street 199397 St Petersburg Russia **Phone:** +7 812 352 2930 **Fax:** +7 812 352 3011 **Email:** lukin@aari.nw.ru pom@aari.nw.ru
India National Centre for Antarctic & Ocean Research Sada, Vasco-da-Gama Goa 403 804 India **Phone:** +91 832 2525 501 **Fax:** +91 832 2525 502 +91 832 2520 877 **Email :** rasik@ncaor.org	

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Appendix 4: Larsemann Hills maps

Map A. Topography and physical features

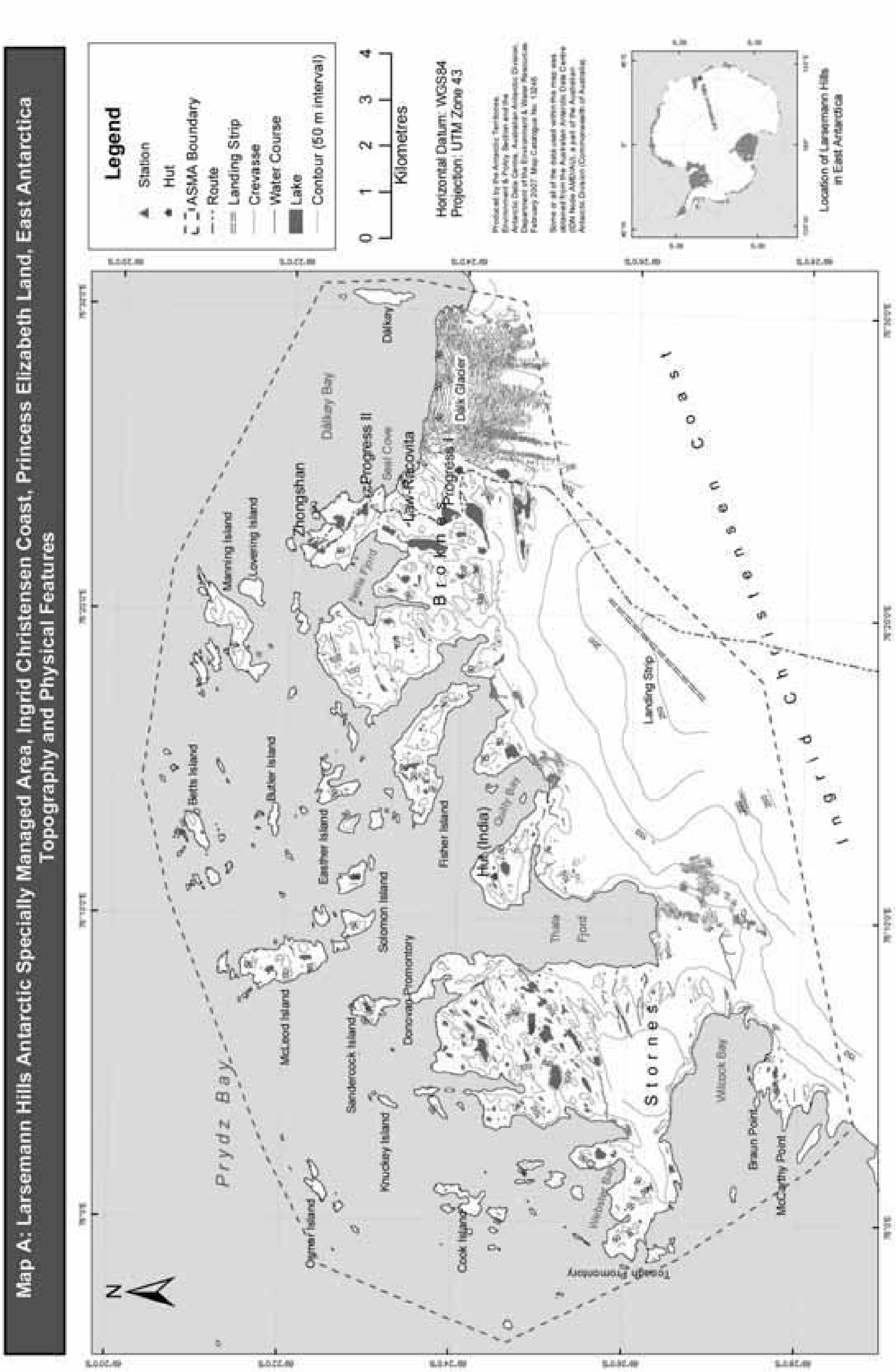
Map B. Management zones and ice free areas

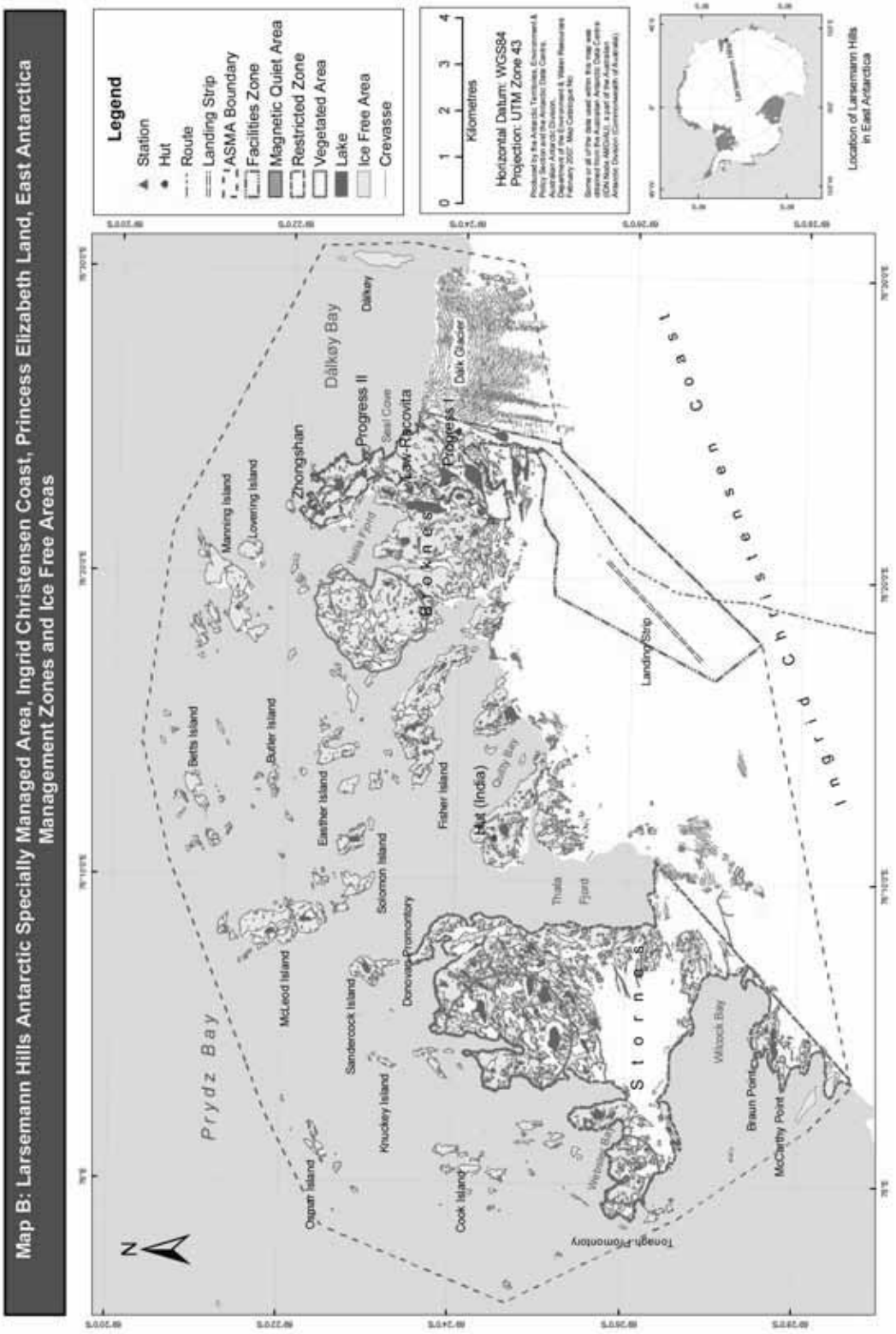
Map C. Detail of northern part of facilities zone

Map D. Zhongshan – buildings, facilities and zones

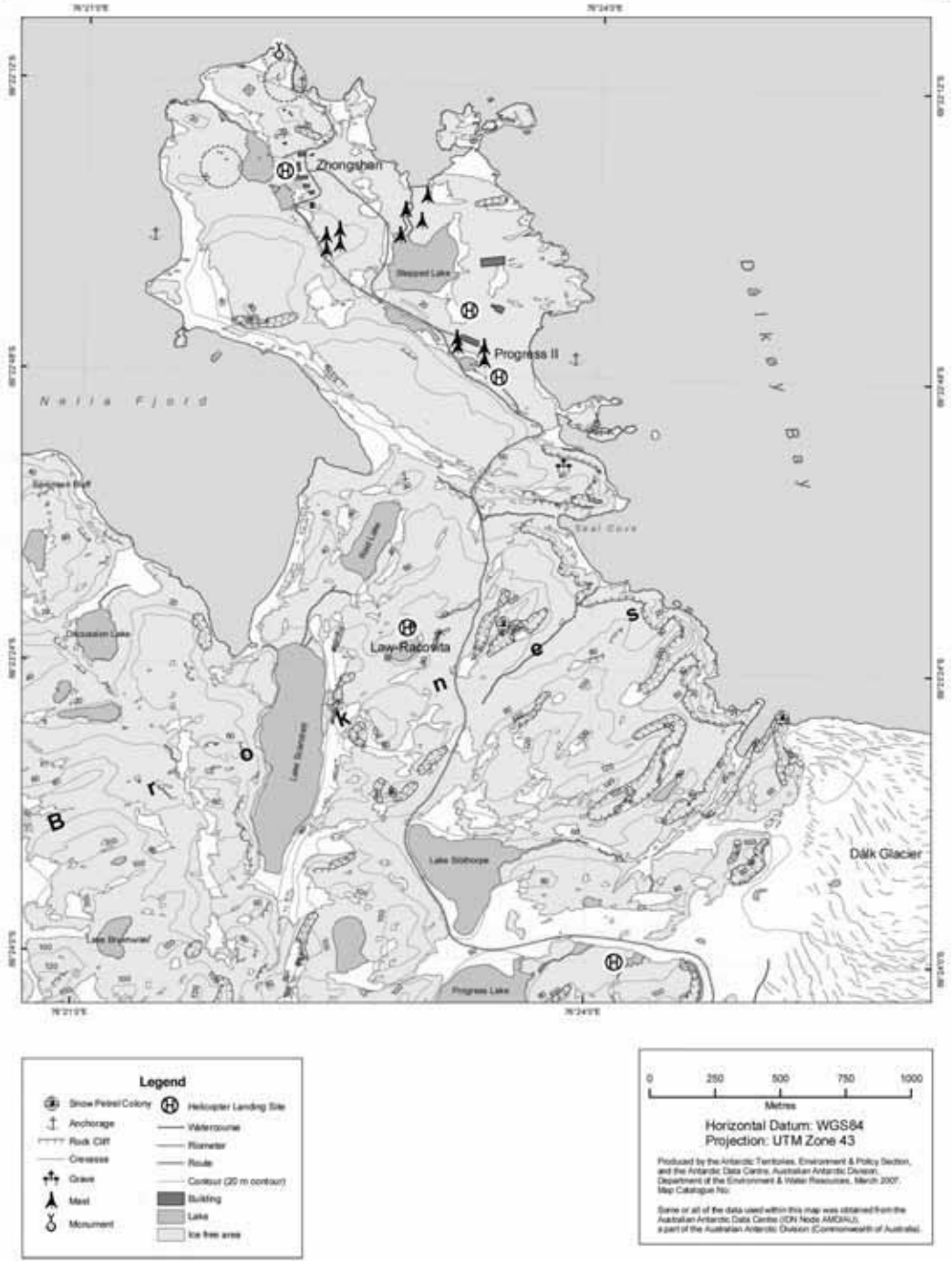
Map E. Progress II – buildings, facilities and zones

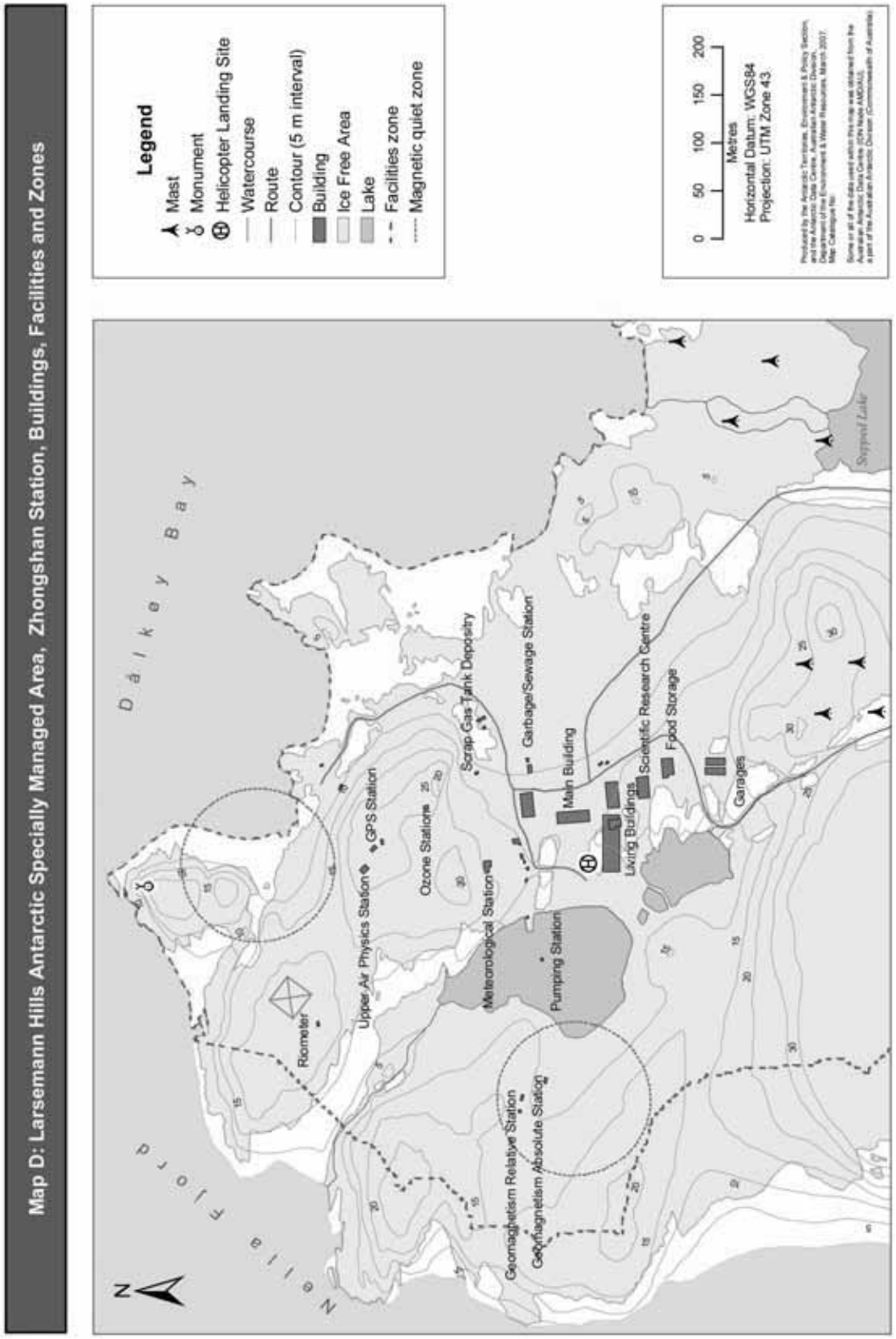
Detailed maps of the region are available via the Australian Antarctic Data Centre website at: http://aadc-maps.aad.you.au/aadc/mapcatsearch_Mapcat.cfm (Map References # 13130 and 13135)


Map A: Larsemann Hills Antarctic Specially Managed Area, Ingrid Christensen Coast, Princess Elizabeth Land, East Antarctica
Topography and Physical Features
Legend
Station
Hut
ASMA Boundary
Route
Landing Strip
Crevasse
Water Course
Lake
Contour (50 m interval)
0 1 2 3 4
Kilometres
Horizontal Datum: WGS84
Projection: UTM Zone 43
Location of Larsemann Hills in East Antarctica
Prydz Bay
Dålkøy Bay
Dålkøy
Dålk Glacier
Zhongshan
Progress II
Progress I
Law Racovita
Broknes
Manning Island
Lovering Island
Betts Island
Butler Island
Easther Island
Fisher Island
Hut (India)
Thala Fjord
Solomon Island
Donovan Promontory
McLeod Island
Sandercock Island
Knuckey Island
Stornes
Wilcock Bay
Braun Point
McCarthy Point
Ogmer Island
Cook Island
Tassah Promontory
Landing Strip
Ingrid Christensen Coast
N

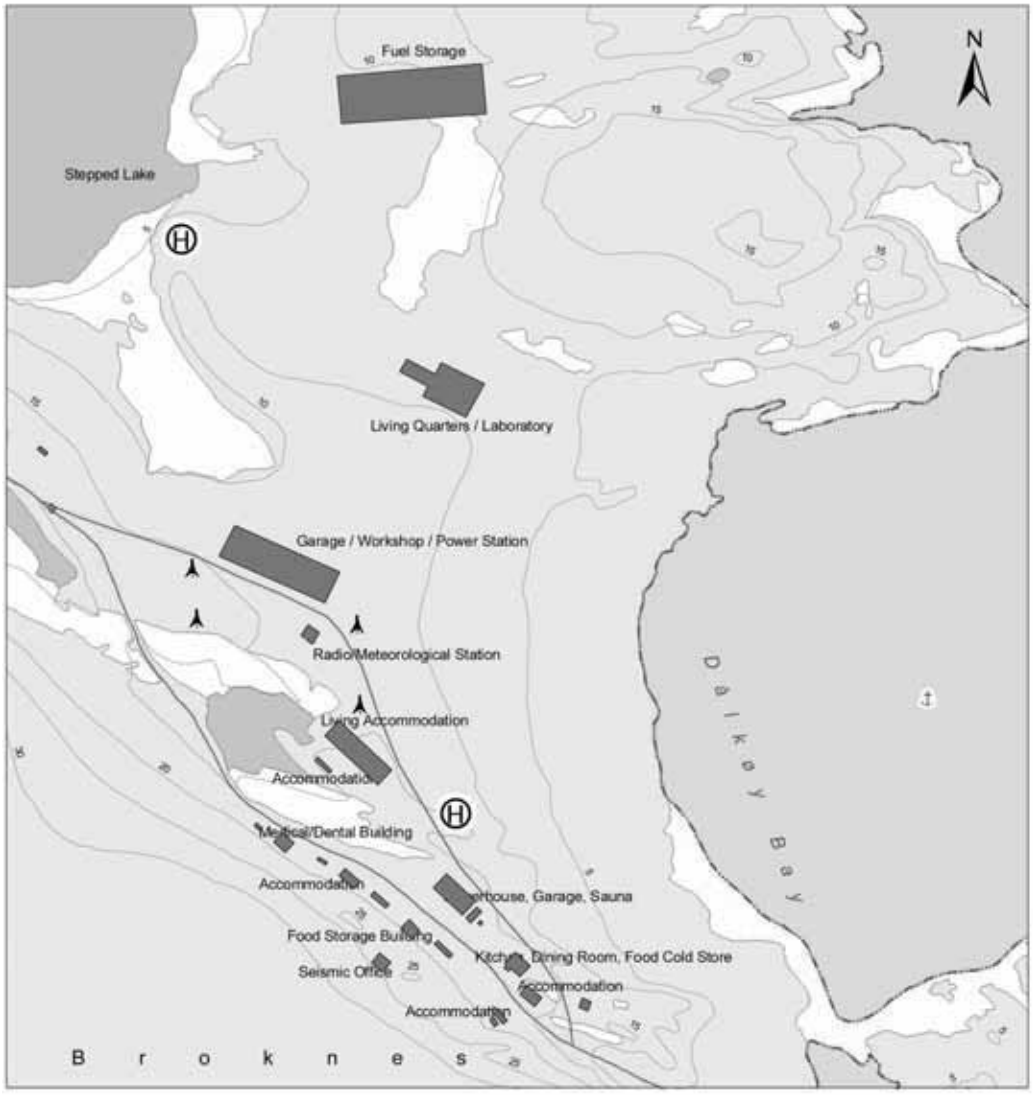

Map B: Larsemann Hills Antarctic Specially Managed Area, Ingrid Christensen Coast, Princess Elizabeth Land, East Antarctica
Management Zones and Ice Free Areas
Legend
Station
Hut
Route
Landing Strip
ASMA Boundary
Facilities Zone
Magnetic Quiet Area
Restricted Zone
Vegetated Area
Lake
Ice Free Area
Crevasse
0 1 2 3 4
Kilometres
Horizontal Datum: WGS84
Projection: UTM Zone 43
Location of Larsemann Hills in East Antarctica
Prydz Bay
Dålkøy Bay
Broknes
Zhongshan
Progress II
Progress I
Law-Racovita
Dalkey
Dalk Glacier
Seal Cove
Manning Island
Lowering Island
Belts Island
Butler Island
Easther Island
Solomon Island
Fisher Island
Hut (India)
Quiet Bay
Thala Fjord
Landing Strip
Ingrid Christensen Coast
McLeod Island
Sandercock Island
Donovan Promontory
Knuckey Island
Ossun Island
Cook Island
Tonagh Promontory
Stornes
Walcott Bay
Braun Point
McCarthy Point

**Map C: Larsemann Hills Antarctic Specially Managed Area,
Ingrid Christensen Coast, Princess Elizabeth Land, East Antarctica.
Detail of Northern Broknes**




Map D: Larsemann Hills Antarctic Specially Managed Area, Zhongshan Station, Buildings, Facilities and Zones
Legend
Mast
Monument
Helicopter Landing Site
Watercourse
Route
Contour (5 m interval)
Building
Ice Free Area
Lake
Facilities zone
Magnetic quiet zone
0 50 100 150 200
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 43.
Produced by the Antarctic Territories, Environment & Policy Section, and the Antarctic Data Centre, Australian Antarctic Division, Department of the Environment & Water Resources, March 2007.
Map Catalogue No:
Some or all of the data used within this map was obtained from the Australian Antarctic Data Centre. (IDN Node AMD/AU).
is part of the Australian Antarctic Division (Commonwealth of Australia)
N
Dalkey Bay
Stoppel Lake
Riometer
Upper Air Physics Station
GPS Station
Ozone Station
Meteorological Station
Pumping Station
Geomagnetism Relative Station
Geomagnetism Absolute Station
Scrap Gas Tank Depository
Garbage/Sewage Station
Main Building
Living Buildings
Scientific Research Centre
Food Storage
Garages

Map E: Larsemann Hills Antarctic Specially Managed Area, Progress II Station, Buildings, Facilities and Zones



Legend

- Mast
- Route
- Contour (5 m interval)
- Building
- Facilities Zone
- Ice Free Area
- Lake
- Helicopter Landing Site

0 50 100 150
Metres

Horizontal Datum: WGS84
Projection: UTM Zone 43

Produced by the Antarctic Territories, Environment & Policy Sections and the Antarctic Data Centre, Australian Antarctic Division, Department of the Environment & Water Resources
March 2007
Map Catalogue No: 13263

Measure 3 (2007)

Antarctic Historic Sites and Monuments: Monument to the Antarctic Treaty

The Representatives,

Recalling the requirements of Article 8 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty to maintain a list of current Historic Sites and Monuments, and that such sites shall not be damaged, removed or destroyed;

Recalling Measure 3 (2003), which revised and updated the "List of Historic Sites and Monuments";

Recalling the Edinburgh Antarctic Declaration on the International Polar Year 2007-2008 ("IPY") which supports the objective of delivering a lasting legacy from the IPY;

Desiring to add a monument to the Antarctic Treaty and a plaque recalling the First and Second International Polar Years, the International Geophysical Year and the International Polar Year 2007-2008, to that list;

Recommend to their Governments the following Measure for approval in accordance with Paragraph 2 of Article 8 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:

That the following monument be added to the "List of Historic Sites and Monuments" annexed to Measure 3 (2003):

No. 82: Monument to the Antarctic Treaty and Plaque

The monument is located close to the Frei, Bellingshausen and Escudero Bases at Fildes Peninsula, King George Island, South Shetland Islands. The plaque at the foot of the monument commemorates the Signatories to the Antarctic Treaty and successive International Polar Years (1882-1883, 1932-1933 and 2007-2008).

Location: 62º 12' 01" S; 58º 57' 41" W, King George Island, South Shetland Islands

Original proposing Party: Chile

Party undertaking management: Chile

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