

**Management Plan for
Antarctic Specially Protected Area No. 122
ARRIVAL HEIGHTS, HUT POINT PENINSULA, ROSS ISLAND**

1. Description of values to be protected

An area at Arrival Heights was originally designated in Recommendation VIII-4 (1975, SSSI No. 2), after a proposal by the United States of America on the grounds that it was “an electromagnetic and natural ‘quiet site’ offering ideal conditions for the installation of sensitive instruments for recording minute signals associated with upper atmosphere programs.” While it is now recognized that the electromagnetically ‘quiet’ conditions have to some degree been degraded by base operation and radio communication activities adjacent on the Hut Point Peninsula, the nature, magnitude and extent of these transmissions is such that the original values for which the site was designated are still considered worthy of protection. Moreover, the original geographical characteristics of the site, such as its elevated position and thus broad viewing horizon, the volcanic crater morphology, and the close proximity to the full logistic support of nearby McMurdo Station (US) 1.5 km south and Scott Base (NZ) 3 km SE, continue to render the Area valuable for upper atmospheric studies and boundary layer air sampling studies.

In recent years increases in nearby science and support operations have raised the levels of locally generated electromagnetic noise since the site was first designated. It is recognized that the values of the Area as an electromagnetically ‘quiet’ site are at risk from broad and narrow band electromagnetic interference, particularly from the nearby stations, as identified in SCAR Recommendation XXIII-6 (1994). However, there are scientific, financial and practical constraints associated with any proposed relocation of the Area and the associated facilities. Thus, the current preferred option for management is to minimize both internal and external sources of electromagnetic interference to the maximum extent practicable, and to monitor these levels routinely so that any significant threat to the values of the site can be identified and addressed as appropriate.

Since original designation the site has been used for several other scientific programs that benefit from the restrictions on access in place within the Area. In particular, the broad viewing horizon and relative isolation from activities (e.g. vehicle movements, engine exhausts) has been valuable

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for spectroscopic and air particulate investigations, pollution surveys, as well as auroral and geomagnetic studies. These additional values are also important reasons for special protection at Arrival Heights.

The Area continues to be of high scientific value for a variety of high quality and long-term atmospheric data sets that have been collected at this site.

Despite the acknowledged potential for interference from surrounding sources, the long-term data series, the accessibility of the site for year-round observations, its geographical advantages, and the high cost of relocation, warrant that the site receive ongoing and strengthened protection. The vulnerability of this research to disturbance through chemical and noise pollution, in particular electromagnetic interference, is such that this Area requires continued special protection.

2. Aims and objectives

Management at Arrival Heights aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- allow scientific research in the Area, in particular research on the atmosphere, while ensuring protection from incompatible uses and uncontrolled equipment installation that may jeopardize such research;
- minimize the possibility of generation of excessive electromagnetic noise interference within the Area through regulating the types, quantity and use of equipment that can be installed and operated in the Area;
- encourage the consideration of the values of the Area in the management of surrounding activities and land uses, in particular to monitor the levels, and encourage the minimization of, sources of electromagnetic radiation that may have the potential to compromise the values of the Area;
- allow access for maintenance, upgrade and management of communications equipment located within the Area;

- allow visits for management purposes in support of the aims of the management plan; and
- allow visits for education or public awareness purposes associated with the scientific studies being conducted in the Area.

3. Management activities

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

- Signs showing the location and boundaries of the Area with clear statements of entry restrictions shall be placed at appropriate locations at the boundaries of the Area to help avoid inadvertent entry.
- Signs showing the location of the Area (stating the special restrictions that apply) shall be displayed prominently, and a copy of this management plan shall be kept available, in the principal research hut facilities within the Area and at McMurdo Station and Scott Base.
- Markers, signs or structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition, and removed when no longer necessary.
- Visits shall be made as necessary (no less than once every five years) to assess whether the Area continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate.
- Electromagnetic noise surveys shall be undertaken within the Area bi-annually to detect equipment faults and to monitor levels of interference that may have potential to compromise the values of the Area unacceptably, for the purposes of identification and mitigation of their sources.
- National Antarctic Programs operating in the region shall consult together with a view to ensuring these steps are carried out. Specifically, each such program shall appoint an Activity Coordinator who will be responsible for inter-program consultation regarding all activities within the Area.

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4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

Map A: Arrival Heights regional topographic map.

Map specifications:

Projection: Lambert conformal conic

Standard parallels: 1st 76° 40' 00" S; 2nd 79° 20' 00" S

Central meridian: 166° 10' 00" E

Latitude of Origin: 78° 01' 16.211" S

Spheroid: WGS84

Datum: McMurdo Sound Geodetic Control Network 1992.

Inset: Ross Island region, showing the location of McMurdo Station (US) and Scott Base (NZ), and the location of the other protected areas on Ross Island.

Map B: Arrival Heights site topographic map.

Map specifications are the same as those for Map A. Contours are derived from a digital elevation model.

6. Description of the Area

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

Arrival Heights is a small range of low hills near the SE end of Hut Point Peninsula, SE Ross Island, 1.5 km north of McMurdo Station and 3 km northwest of Scott Base. Hut Point Peninsula is formed by a line of craters that extend south from the flanks of Mt. Erebus. The basaltic rocks are particularly rich in ultramafic inclusions, including dunite, peridotite, pyroxenite, gabbro and sandstone. The soil consists mostly of volcanic scoria overlying volcanic tuffs from Mt Erebus, with rocky and weathered volcanic magma. Arrival Heights is exposed to frequent strong winds, and is generally colder and windier than nearby McMurdo Station and Scott Base, with consequently minimal snow cover.

The highest elevation within the Area is Second Crater at 255 m, one of two inactive volcanoes that are apart of the boundaries of the Area. The boundary of the Area extends in a straight line

from Trig T510 NW over First Crater to the 150 m contour. The boundary follows this contour north to a point immediately west of Second Crater. The boundary extends east to Second Crater, the lip of which forms the NE corner of the Area. The boundary then extends south in a straight line to Trig T510.

The research facility is at approximately 220 m (700 ft) above sea level, and has excellent views of McMurdo Sound, Mount Erebus and the Royal Society Range. The majority of McMurdo station is hidden from view, enhancing the radio-quiet characteristics of the area.

Arrival Heights is located at a geomagnetic latitude of about 80 degrees, right above the boundary between the auroral zone and the polar cap. It is also close enough to the geographic pole for total darkness to occur at local noon for a significant part of the year. This allows low intensity auroral events to be observed. Its location near the geomagnetic pole also means that Arrival Heights lies inside the polar cap at all times.

The Area is an electromagnetically quiet site offering good conditions for the installation of sensitive instruments to record high-resolution (less than a minute) signals associated with upper atmosphere research programs.

It is also the site closest to McMurdo Sound and Scott Base with these conditions that still allows good access and logistics support year-round. A 1993 electromagnetic interference survey of Hut Point Peninsula and surrounding regions found that noise levels at Arrival Heights lacked the impulsive character of interference in noisier areas, eliminating the occasional bursts of high amplitude noise prevalent in these areas.

Research teams from McMurdo Station and Scott Base use the Area extensively. Science programs being conducted at Arrival Heights laboratories examine natural phenomena occurring in the earth's atmosphere and magnetosphere. The broad focus of these science programs is toward improved understanding of the mechanisms that couple solar processes with those of the terrestrial environment. These include investigations of phenomena associated with short-term environmental effects (auroras, induced electrical currents, radiowave communications interference), as well as those associated with longer-term effects (solar forcing on climate, changes in the ozone layer, atmospheric composition, stratospheric winds, and weather).

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Instruments for these tasks include optical and radio devices for remote sensing, as well as sensors that monitor changes in the electric and geomagnetic fields.

The instruments that measure local fields, including geomagnetic field sensors and very low frequency receivers, are sensitive to perturbations that propagate from remote generation regions. Apart from natural sources, there are sources of radio noise detected within the Area both within the Area itself and outside the Area. Sources of noise from within the Area include power lines, vehicle ignition systems, and equipment within the laboratories. Sources from outside the Area include HF (2-30 MHz), VHF (30-300 MHz) and UHF (300-3,000 MHz) communications, fire and tank level alarms that use radio transmissions, entertainment broadcast systems, ship, aircraft, or satellite radio transmissions, and aircraft surveillance radars. Sources of noise from both within and outside of the Area include household and operational appliances and equipment.

The VLF antennas are located in the crater of the larger cone, which provides shielding from local radio transmissions and station noise.

6(ii) Restricted and managed zones within the Area

None.

6(iii) Structures within and near the Area

Both the New Zealand and United States programs have research and living facilities within the Area. The New Zealand program is planning to replace its laboratory facility in the near future. A Satellite Earth Station (SES) is located on First Crater.

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

The nearest protected areas to Arrival Heights are on Ross Island: Cape Evans (ASPA 155) is the closest at 22 km north; Backdoor Bay (ASPA 157) is 32 km north, Cape Royds (ASPA 121) is 35 km NNW; Tramway Ridge (ASPA 130) near the summit of Mt. Erebus is 40 km north; Lewis Bay (ASPA 156) the site of the 1979 DC-10 passenger aircraft crash is 50 km NE; New College Valley (ASPA 116) is 65 km north at Cape Bird; and Cape Crozier (ASPA 124) is 70 km to the NE. NW White Island (ASPA 137) is 35 km to the south across the Ross Ice Shelf.

7. Permit conditions

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

- it is issued for scientific study of the atmosphere, in particular for studies of electromagnetic radiation, trace gases, air particulates, auroras and geomagnetism or for other scientific purposes consistent with the management plan;
- it is issued for management and maintenance of science support facilities (including communications equipment), on the condition that movement within the Area be restricted to that necessary to access those facilities;
- it is issued for educational or public awareness activities associated with the scientific studies being conducted, on the condition that they are accompanied by permitted personnel responsible for the facilities being visited;
- it is issued for health and safety reasons, or for essential management purposes consistent with plan objectives such as inspection or review;
- the actions permitted are in accordance with the management plan and will not jeopardize the scientific values of the Area;
- the permit, or a copy, shall be carried within the Area;
- a report or reports shall be supplied to the authority or authorities named in the permit;
- permits should be valid for a stated period.

7(i) Access to and movement within the Area

Access to the Area is permitted by vehicle and on foot. Landing of aircraft and overflight within the Area is prohibited. When required for scientific or management purposes, transient overflight or landing may be allowed within the Area if specifically authorized by permit. Prior written notification must be given to the appropriate authority or authorities supporting scientists conducting research in the Area at the time of the proposed aircraft activity. The timing of the

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activity should be coordinated as appropriate so that possible disruption to scientific programs is minimized.

Entry by vehicle is restricted to those entering the Area to carry out science, servicing or equipment maintenance, installation of new facilities in accordance with a permit, and those permitted persons accompanying such people at the time of the visit. All other visitors should enter the Area on foot, leaving any vehicles at the 'Glacier Road' intersection. Vehicle and pedestrian traffic should be kept to the minimum necessary consistent with the objectives of any permitted activities and every reasonable effort should be made to minimize effects: e.g. personnel entering the Area by vehicle should coordinate travel so vehicle use is kept to a minimum. Vehicles shall keep to the established vehicle tracks as shown on Map A, unless specifically authorized by permit otherwise. Pedestrians should also keep to established tracks wherever possible.

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

Activities that may be conducted within the Area include:

- scientific research that will not jeopardize the scientific values of the Area;
- management activities, including the installation of new facilities to support scientific research monitoring;
- use of hand-held and vehicle radios by visitors entering the Area is allowed; however, their use should be minimized and shall be restricted to communications for scientific, management or safety purposes.

7(iii) Installation, modification or removal of structures

No structures are to be erected within the Area except as specified in a permit. All scientific equipment installed within the Area outside of research hut facilities must be approved by permit and clearly identified by country, name of the principal investigator and year of installation.

All such items should be made of materials that pose minimal risk of environmental contamination of the Area, and structures should be electromagnetically compatible with activities in the Area. The time period for removal of equipment shall be specified in the permit.

No Radio Frequency (RF) transmitting equipment other than low power transceivers for local essential communication may be installed within the Area. Electromagnetic radiation produced by equipment introduced to the Area shall not have significant adverse effects on any on-going investigations unless specifically authorized otherwise. Precautions shall be taken to ensure that electrical equipment used within the Area is adequately shielded to keep electromagnetic noise to a minimum.

Installation or modification of structures or equipment within the Area is subject to an assessment of the likely impacts of the proposed installations or modifications on the values of the Area, as required according to national procedures. Details of proposals and the accompanying assessment of impacts shall, in addition to any other procedures that may be required by appropriate authorities, be submitted by investigators to the activity coordinator for their national program, who will exchange documents received with other activity coordinators for the Area. Activity coordinators will assess the proposals in consultation with national program managers and relevant investigators for the potential impacts on the scientific or natural environmental values of the Area. Activity coordinators shall confer with each other and make recommendations (to proceed as proposed, to proceed with revisions, to trial for further assessment, or not to proceed) to their national program within 60 days of receiving a proposal. National programs shall be responsible for notifying investigators whether or not they may proceed with their proposals and under what conditions.

7(iv) Location of field camps

Camping within the Area is prohibited. Overnight visitation is permitted in buildings equipped for such purposes.

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

There are no specific restrictions on materials and organisms that can be brought into the Area.

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

Taking or harmful interference with native flora or fauna is prohibited, except in accordance with a permit issued in accordance with Annex II to the Protocol on Environmental Protection to the Antarctic Treaty. Where animal taking or harmful interference is involved, this should, as a minimum standard, be in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica.

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

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

7(viii) Disposal of waste

All wastes shall be removed from the Area.

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

- Permits may be granted to enter the Area to carry out scientific monitoring and site inspection activities, which may involve the collection of data for analysis or audit, or for protective measures.
- Any specific sites of long-term monitoring shall be appropriately marked.
- Spectral bands of specific science interests that warrant special protection should be identified by parties active within the Area and electromagnetic noise should be maintained as much as is practicably possible outside of those frequencies.
- Intentional electromagnetic radiation outside of the agreed frequency bands and power levels is prohibited except within agreed frequency bands and power levels or in accordance with a permit.

7(x) Requirements for reports

Parties should ensure that the principal holder for 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 descriptions of activities conducted by persons subject to their jurisdiction, which should be in sufficient detail to allow evaluation of the effectiveness of the management plan. Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage, to be used both for review of the management plan and in organizing the scientific use of the Area.

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