



SITE OF SPECIAL SCIENTIFIC INTEREST No. 25

MARINE PLAIN, MULE PENINSULA, VESTFOLD HILLS, PRINCESS ELIZABETH LAND

Management Plan

(1) Description of Site

Physical Features

Marine Plain (23.4 km<sup>2</sup>, lat. 68° 38'S, long 78° 08'E) opens into an arm of Crooked Fjord on the southern side of Mule Peninsula, the southernmost of the three major peninsulas which comprise the Vestfold Hills. The Vestfold Hills comprise an essentially ice-free oasis (approx. 400 km<sup>2</sup>) of bedrock, glacial debris, lakes and ponds at the eastern side of Prydz Bay, Princess Elizabeth Land.

The boundary of the site is as follows: commencing at lat. 68° 36' 30"S, long. 78° 09' 00"E it runs south-easterly to lat. 68° 36' 45"S, long. 78° 10' 30"E; thence south-easterly to lat. 68° 37' 30"S, long. 78° 10' 30"E<sup>1</sup>, then south along the parallel<sup>2</sup> of long. 78° 12' 30"E to its intersection by the low water mark on the northern shore of Crooked Fjord; from here it follows the low water mark of the northern shore of Crooked Fjord to its intersection with the meridian of long. 78° 03' 00"E; thence north along the meridian of long. 78° 03' 00"E to its intersection with the parallel of lat. 68° 37' 30"S, then north-easterly to lat. 68° 37' 00"S, long. 78° 05' 00"E, and finally north-eastwards to the point of commencement.

**Topography.** The site includes Burton Lake (surface at sea level) as a major component of the western part of the region. An extensive low level (less than 20 m above sea level) area occupies the centre of the site with a north-south orientation. In the north-east is another area below 20 m. Areas above 20 m are mostly low, rugged hills of Precambrian rock acting as divides between the lower part and characterized at their base by a marked change in their slope, probably representing an old (Holocene?) shoreline. The surface of the lower areas below 20 m is marked by a series of concave-to-the-south recessional moraine ridges.

**Geology.** The Precambrian rock consists for the most part of 3000 Ma gneisses from both igneous and metamorphic protoliths intruded in the course of at least three intervals between 1800 and 1375 Ma by numerous metabasalt dykes with a rough north-south orientation. These dykes are a major feature of the Vestfold Hills. Low lying areas consist of at least 8 metres of early Pliocene (40-46 million years) diatomites and, less commonly, lenticular sandstone overlying the Precambrian rock and occupying the sites of what were embayments in the early Pliocene. In the western part of the central area below 20 m a.s.l., the Pliocene deposits are overlain by a thin veneer of Holocene (6490 ± 130 y BP) glacial debris covering an area of 8-10 sq km, in places containing a few molluscs (*Laternula elliptica* King and Broderip) *in situ*. Low scarps in the Pliocene adjacent to small lakes have yielded remains of a new genus, species and probably family - all extinct - of dolphin, and there is evidence of another larger, fossil form.

**Meteorology.** No data are available from the area, but conditions are similar to those at Davis station, 6 km to the north-west.

Biological features

**Terrestrial.** Reconnaissance studies have reported few species and no significant stands of vegetation within the site.

**Inland Waters.** There are many small lakes and ponds.

**Marine.** Burton Lake opens to Crooked Fjord at its south-western corner and is affected by tides in summer. It has been the site of biological research for several years.

**Birds and Seals.** No bird or seal surveys have been conducted but it is relatively devoid of birds and sea mammals. Wilson's storm petrels (*Oceanites oceanicus*) and snow petrels (*Pagodroma nivea*) occur sporadically and nest in the Precambrian hills.

(ii) Reason for designation

The site is of exceptional scientific interest because of its vertebrate fossil fauna. In addition to the dominant important fossils such as molluscs and diatoms, which define the age of the Pliocene marine sediments, the site has yielded well preserved vertebrate remains of a new species, genus and probably family of fossil dolphin and evidence of at least one other vertebrate species.

Burton Lake, as a hypersaline lake which is still in seasonal connection with sea, presents the opportunity for important limnological research. It represents a unique stage in the biological and physico-chemical evolution of a terrestrial water body from the marine environment. Burton Lake together with several of the smaller lakes, provide important examples of the spectrum of lake types in the Vestfold Hills.

Davis (68° 35'S, 77° 58'E), a permanently occupied Australian scientific station, is located on Broad Peninsula, the central peninsula of the Vestfold Hills, 6 km to the north-west of the site. It is the focus of continuing biological, including limnological, studies within the Vestfold Hills. As a result of its proximity to Davis station, the scientific value of the site could be diminished by accidental interference. The site lies on the frequently used pedestrian route to the Mule Peninsula lakes (Clear, *Laternula*, Cemetery and McCallum) from Ellis Rapids and it is critical that fossil fauna should be protected from unrecorded sampling or collection.

(iii) Outline of research

A paleontological research programme has commenced following the initial discovery of vertebrate fossils at the site in 1985. The programme consists of the collection of well-preserved fossil molluscs and diatoms and, in particular, fossil vertebrates, with the aim of documenting the fauna of the epoch. Oxygen isotope studies on the well-preserved bivalve fauna will be employed to help quantify water temperature at that time.

Burton Lake is the subject of detailed year-round research as part of a programme aimed at understanding the evolution of the hydrological system in the Vestfold Hills, by looking at various stages of isolation from the marine environment.

(iv) Date of expiry of designation

31 December 1997.

(v) Access points

Access should, where possible, be from the sea ice in Ellis Fjord or Crooked Fjord, or by helicopter at places where no disturbance can be caused by the aircraft to water bodies, vegetation or sediment deposits. If these means of access are not possible, access by land, either by vehicle or on foot, should be via Ellis Rapids at the eastern end of Ellis Fjord.

(vi) Pedestrian and vehicular routes

Vehicles should not be used within the site except for over-snow travel by motorized toboggan. Pedestrians or vehicles must not damage areas of vegetation, or disturb steep inclines marking sediment outcrops or the lake margins near these outcrops.

(vii) Other kinds of scientific investigations which would not cause harmful interference

Research on the ecology of Wilson's storm petrels, snow petrels, mosses and lichens, and other biota, and investigation of water bodies other than Burton Lake. Other scientific investigations which do not disturb the palaeontological, ecological and limnological programmes being conducted.

(viii) Scientific sampling

Scientific sampling should be restricted to that required for the programmes described in (iii) and (vii) above.

(ix) Other restraints

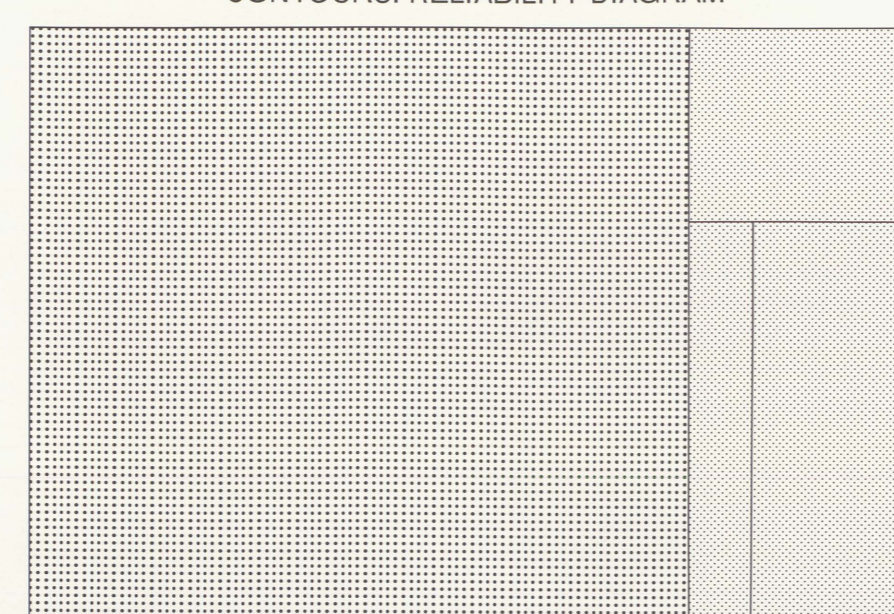
All waste materials taken into, or generated within the Site should be removed as soon as practicable. No fuel depots should be made within the Site, nor should refuelling operations be undertaken. No permanent buildings should be erected within the Site. Power boats should not be used on Burton Lake and use of other boats should be restricted to the minimum necessary to support programmes consistent with this plan.

Notes

- 1 It is believed that the authors of this document intended the longitude of this point to be 78°12'30"E.
- 2 It is believed that the authors of this document intended to use the word "meridian" here rather than the word "parallel".



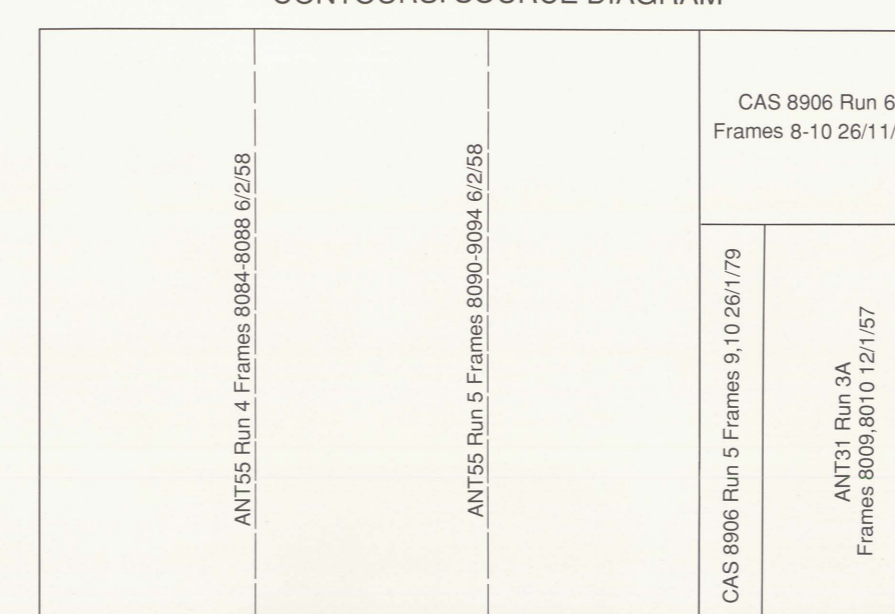
CONTOURS: RELIABILITY DIAGRAM



The average accuracy of this map in these areas is ± 20 metres in the horizontal position of well defined detail. Some features are known to be up to 40 metres out of position. The average accuracy of contour and spot height elevations is ± 3 metres.

The average accuracy of this map in these areas is ± 40 metres in the horizontal position of well defined detail. Some features are known to be up to 70 metres out of position. The average accuracy of contour and spot height elevations is ± 5 metres. Though errors of up to 10 metres may exist.

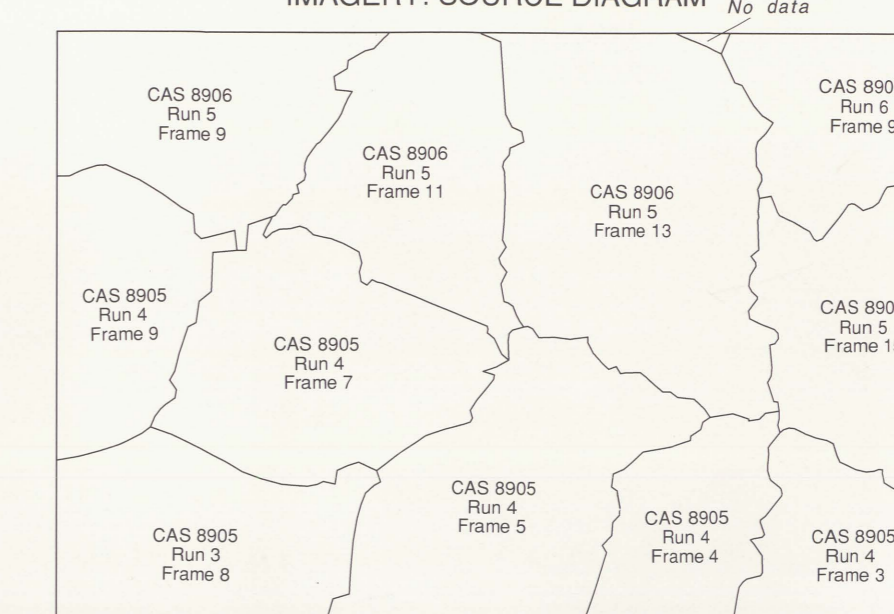
CONTOURS: SOURCE DIAGRAM



This diagram shows the film identifiers, run numbers and frame numbers of the ANARE aerial photography from which the coastline, lake edges and spot height elevations shown on this map have been compiled.

The contours and some spot height elevations have been interpolated from a digital elevation model which was also derived from this ANARE aerial photography.

IMAGERY: SOURCE DIAGRAM No data



This diagram shows the film identifiers, run numbers and frame numbers of the ANARE aerial photography which constitutes the imagery shown on this map. The image is a mosaic of eleven aerial photographs each of which has been scanned and digitally processed to form an orthophoto.

The aerial photography was acquired by a Hasselblad EL500 70mm camera. Since this was a non-metric camera the imaged position of some of the terrain is in error. The average error in position is ± 20 metres. Some features are known to be out of position by up to 70 metres.

LEGEND

- Survey control station: ..... Δ
- Bench mark: ..... +