

The Selection Process of The Mars-Oz Base Site

Jonathan Clarke and Dave Willson

MSA's 2001 Jarntimarra-1 expedition identified a 200 km diameter region surrounding Arkaroola as its prime Mars analogue research region. The region would also contain the site for MARS-OZ. The region was selected because it combined high scientific value, history of previous Mars-related research, reasonable accessibility, range of environments for engineering tests, and generally supportive land managers. No specific site for MARS-OZ was identified, but the general opinion of the expeditioners was that a site on the fans east of the Flinders Ranges but within the Arkaroola property would be very attractive. Such a site would again combine high scientific value, history of previous Mars-related research, reasonable accessibility, diversity of surfaces and materials for engineering evaluations, and highly supportive land managers. In addition the site itself – generally flat landscape adjacent to numerous site of scientific and engineering interest would be similar to that which would be selected on Mars for an actual landing.

Today a team consisting of David Willson (MARS-OZ project manager), Guy Murphy (MSA president), Steve Jordan (videographer), and Jonathan Clarke (geologist) spent the morning evaluating an area in the south-eastern part of the Arkaroola property. These area have been identified the previous day by Dave, Jonathan and another geologist, Vic Gostin as having considerable potential for the actual site. Two sites were examined, site 1 and 2.

Site 1 was located in a narrow belt of low rolling hills dissected by small gullies between the fans of the Lake Frome Plain and the eastern margin of the Flinders ranges. The bedrock consisted of Proterozoic Wooltana basalts cut by numerous veins of quartz-haematite breccia. Some of the hills were mantled by residual caps of transported pebbles and cobbles. The soils were red brown and swelling, and were mantled with an armour of angular cobble to pebble-sized gibbers (rock fragments). Vegetation was sparse, with scattered small bushes and almost no grass.

Site 2 consisted of a dissected pediment incised into weathered Cretaceous Bulldog Shale, which contained sand lenses and ice-rafted cobbles. The pediment was between the Flinders Ranges to the west and the dissected fans to the east. The surface was mantled by a thick layer of cobbles interpreted as a mix of surface creep and residual cobbles from the Bulldog Shale. Soils consisted of minor components of swelling clays. Vegetation consisted of small bushes and only minor grass.

For an additional comparison a third site was included. This was the area just south of Paralana Hot Spring that had been seen during Jarntimarra-1 and revisited the previous day. This location consisted of a dissected Quaternary fan surface armoured with pebbles and cobbles with swelling clay soils. No bedrock cropped out in the immediate area. Vegetation was sparse, consisting of scattered small bushes and very minor grass.

The three sites were evaluated by the criteria in the following table, using a methodology based on that used during Jarntimarra-1 for site selection. The results show that site 1 has the highest score and is therefore the preferred site for MARS-OZ. Discussions with Doug Sprigg, the owner and operator of Arkaroola, showed

that there were no issues with site access or security and no conflicts with other users of the areas. So Site 1, illustrated in the accompanying images, will be where MARS-OZ will be deployed.

Overall field	Detailed criterion	Site 1	Site 2	Site 3
Field science	Site geology (/5) ¹	5	2	1
	Site biology (/5) ²	1	1	1
Human factors	Psychology (/10) ³	10	6	4
Field engineering	Suitability for suits (/5) ⁴	5	4	3
	Suitability for rovers (/5) ⁵	5	5	5
Logistics	Absence of negative environmental features (/5) ⁶	4	5	4
	Security (/10) ⁷	10	5	2
	Accessibility for construction (/5) ⁸	3	5	4
	Accessibility during operations (/5) ⁹	5	5	5
Aesthetics	Aesthetics ¹⁰ (5)	3	5	4
SCORE		51	43	33

¹ The site geology rank is a measure of the similarity of the site compared to a known site on Mars.

² Site biology is a measure of the amount of primitive biology (ie extremeophiles in hot springs) near to the Mars site.

³ The human factors ranking is a measure of the isolation of the site compared to other sites.

⁴ Suitability for suits ranking is the measure of the usability of the landscape forms for testing space suits.

⁵ Suitability for rovers ranking is the measure of the usability of the landscape forms for testing rovers.

⁶ Absence of negative environmental features ranking looks at site drainage, wind and archeological issues on the site that may impact on building the base.

⁷ The security ranking measures the ability to control the arrival of unexpected visitors to the site.

⁸ Accessibility for construction rank is a measure of the ease to transport construction equipment to the site.

⁹ Accessibility during operations ranking is the measure of accessing the base for users.

¹⁰ Aesthetics ranking is the visible appeal of the scenery of the site.



