WATER RESOURCES BRANCH

ADELAIDE RIVER DAM SITE PROPOSAL

FIELD INVESTIGATION REPORT

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Attached - Geological Report. (including 4 appendices and 5 plates)
by G. Hays, Mines Branch.
INTRODUCTION

The water potential of the Adelaide River falls into two parts, namely Dam storage upstream of Adelaide River Township and river storage in the lower tidal reaches. This report details investigations undertaken to assess the suitability of the dam site upstream of Adelaide River Township and includes the preliminary investigations, the field survey of the dam site, part of the watershed boundary, and the two influencing saddles, and also makes reference to the compilation of plans from field information, the decision to contour the dam site basin area by photogrammetry, and the geological investigations carried out by Mines Department Geologist Mr. J. Hays whose report is attached herewith.

LOCATION

The Adelaide River is a stream approximately 150 miles in length.

The river rises in the ranges west of Adelaide River Township and flows to the east and north to cut the Stuart Highway at 72 miles from Darwin, thence travels northward to discharge into the Clarence Strait into the Arafura Sea approximately 32 miles east of Darwin.

SITE

The dam site is located in the Adelaide River Gorge approximately 1½ miles upstream from the Adelaide River Township on Army co-ordinates converted to feet N.9937800 E.129200 (refer plates 6 & 9)

INVESTIGATION STAFF

The field work was carried out by Lands & Survey, and Mines Branch at the request of Water Resources Branch.

The officers concerned with this investigation were:

Investigation Supervised by G. Mason, Senior Engineer W.R.B.
Geological Investigations J. Hays, Geologist Mines Branch
Field Survey F. Brandsetter Technical Officer Lands & Survey Branch.
Survey Plans Drawing Office Lands & Survey.
Investigation Co-ordinated by D. Kneebone, Senior Technical Office, W.R.B.
CATCHMENT AREA AND BASIN

The catchment covers an area of approximately 240 sq. miles. The lower end of the basin area is in a steep valley and diverges to flat areas upstream. The soil consists of sandy loam and black soil on the river banks and flats with the slopes and hills being covered with shales and rock. The area generally is almost devoid of undergrowth apart from thick grass in the wet season. The timber density using 10 as a maximum over-head cover is in the vicinity of 3 comprising mainly of stringy barks, woolly butts and ironwood, average diameter about 10".

ACCESS

Access to the area was by Helicopter and four wheel drive Land Rover. The helicopter was used, in conjunction with ground reconnaissance, in the preliminary investigations for the selection of the dam site and by the Geologist at various times throughout the investigations to obtain a better appreciation of the rock formation, details of the various saddles, dam sites and catchment area in general.

The versatility of the helicopter proved to be a valuable asset in this investigation, the operating range being from zero to 5000' for vertical observations with a forward speed slow enough that detail could be observed. Its ability to land at almost any required point saved considerable time with far better results than could have been obtained by ground reconnaissance. The Land Rover was used to gain access to the main dam site and the Eastern saddle via a bush track which diverts from the Stuart Highway south side of Adelaide River approximately 50 yards past the railway crossing; it was also used during reconnaissance of a part of the West water shed boundary via the Stapleton Track.

The difficult access to areas, other than those mentioned, in conjunction with adverse climatic conditions and the heavy grass growth were factors influencing the rate of progress of field work.

PRELIMINARY INVESTIGATIONS


A result of this reconnaissance 3 sites were observed.

1. The first site, approx. 1 mile downstream from site 2, was rejected due to a very low saddle to the west with
would allow only a very low dam of little value.

2. The second site was selected and details of the investigation are covered in the report.

3. The third site, approx. 1 mile upstream of site 2, was passed in favour of No.2 site for Geological reasons and the considerable reduction of capacity.

A land reconnaissance carried out by the field surveyor and the writer of both East and Western boundaries of the catchment area, in excess of the sections traversed, failed to show any other limiting physical factor than those shown by field survey.

Aerial photos of the dam site area were not available until investigations were more than half complete.

INVESTIGATIONS

Following preliminary investigations the field survey was commenced on 27th April, 1960 and completed 27th September 1960. A total of 70 working days in the field being required to complete this part of the investigations.

The field surveyor was required to carry out other urgent work for his own Branch during this period.

Field work commenced with the establishment of a traverse line and levels to the dam site area from the Dams.

DATUMS

Level - Darwin Town Datum
BM 17M 1700' on Stuart Highway RL184.29 and BM abutment Railway Bridge RL 183.91. A bench mark RL171.10 was established near the Dam site at co-ordinates N.9938125 E.1229214.

Azimuth: True North
Origin of co-ordinates is Mt. Carr Trig Station N.9944118 E.1231965.

All traverse stations are co-ordinated. Grid corresponds with Army Zone 4 co-ordinates converted to feet.

Stations 73,73W and 44W are tied into Mt. Carr.

EASTERN BOUNDARY

The Eastern boundary of the catchment area was traversed and levelled for a distance of a little less than 5 miles south from the dam site to establish level relationships between the dam site and various saddles including the Eastern Saddle referred to in this report.

The lowest saddle on this boundary apart from the Eastern Saddle (see plate 7) RL275.1 is 39' higher at an RL316.0 between station 53 and 54.
WESTERN BOUNDARY

Traversing and levelling of this boundary for a distance of approximately 5 miles revealed that the lowest saddle was within 3/4 miles of the dam site with an RL of 283.9 (see plate 8) the next lowest saddle RL 303.0 is at station 37W.

Plate 9 shows traverse lines and reduced levels of both Eastern and Western catchment boundaries.

DAM SITE

The dam site located by Geologist Hays is in a steep valley between two major spurs which rise 306' on the west side and 320' on east side to the top of the hills above the invert level of the River.

Traverses were established in the area followed by a detailed Tacheometric survey from the top of the hill on the east side to the top of the hill on the west side of the river and from 960' upstream to 1200' downstream of a traverse line at approximate site of possible dam. Plate 6 shows detail of this area.

SADDLES

There are 2 saddles which would influence the top water level of any dam proposal.

Eastern Saddle

Located approximately 2½ miles south of the dam site at co-ordinates N.9924500 E.1228200 and RL of 277.1.

The saddle is approximately 380' long at 280' contour and 200' wide with very flat falling gradients into the valley to the north east and south west.

The saddle joins the ridge on the north side with a long low narrow spur on the south.

The surface of the saddle is very sandy with shales on the slopes either side.

Geologist Hays suggests this saddle as a potential spillway site. (See Plate 7)

Western Saddle

Located approximately ¼ mile to the west of the dam site, co-ordinates N.9937100 E.1226400 and RL 283.9 the saddle is approximately 80' long at the 290' contour and 150' wide falling at gradient of approximately 1:4 to either side.

Geologist Hays suggests this saddle as a possible alternative to the Eastern Saddle as a spillway. (See Plate 8)
The compilation of plans from data obtained by the field survey party was carried out by the Lands and Survey Branch.

PHOTOGRAFMETRICAL CONTOURING of the basin area which is being undertaken by Lands & Survey Drawing Office is in obedience at present due to the existing aerial photos of the area being un-suitable to obtain the information required.

To overcome this problem funds have been requested for the re-flying of the area. No specific date of completion can be expected at this time.

SUMMARY

The results of the field survey and Geological investigations may be summarised as follows:

**Dam Site.**

A possible dam site does exist in the Adelaide River Gorge, the height of which, under present physical conditions, would be approximately 127' to top water level from invert level of the River. The physical factors which would determine this height are two saddles one on either side of the dam site referred to in this report as the Eastern and Western Saddles.

These levels show a difference of 127.6' between invert level of the river at the dam site and ground level at possible spillway site on the Eastern Saddle with the Western Saddle being 134.4' above the invert level of the river.

The length of the dam would be in the vicinity of 520' at ground level R.L. 172.1 on river flats and 1200' at the contour.

**Spillway Sites.**

Geologist Hays (in his attached report page 4 of 4) suggests that the Eastern Saddle is a potential spillway and the Western Saddle an alternative possible spillway site.

A comparison of levels related to Darwin Town Datum are given below:

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<th>R.L.</th>
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<th>R.L.</th>
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<tr>
<td>Invert Level of River at Dam Site</td>
<td>149.5</td>
<td>Ground Level on Bank of River</td>
<td>172.1</td>
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<tr>
<td>Ground Level on invert of Eastern Saddle</td>
<td>277.1</td>
<td>&quot; &quot; &quot; &quot; of Western Saddle</td>
<td>283.9</td>
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</tbody>
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(D. KNEEBONE)
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