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MINOR INVESTIGATIONS BY NORTHERN TERRITORY RESIDENT GEOLOGICAL SECTION:

PRELIMINARY INSPECTION OF PROPOSED DAM SITES 1963-1964

by

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PREFACE

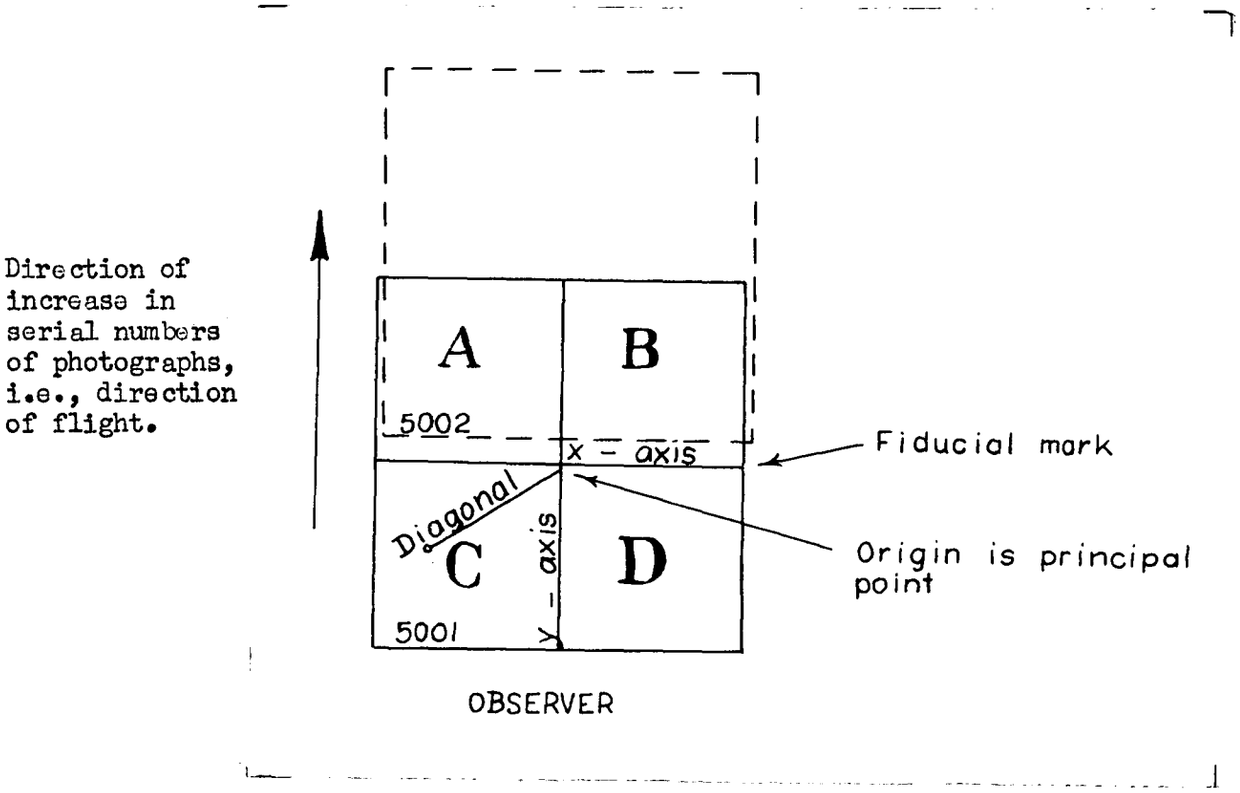
This Record is one of a series in which reports of minor investigations by the Northern Territory Resident staff are brought together to make the information contained in them more readily available to interested persons. Records are issued as circumstances justify.

In some reports locations of points of interest, such as sites selected for bores, are given by reference to aerial photographs. To locate any point on the photograph from the reference given the following steps should be taken.

1. The photograph is oriented in such a manner that, when the photograph with the next succeeding serial number is superimposed on the photograph of interest, it lies above (i.e., away from) the observer - see sketch.

2. The photograph is divided into quadrants by joining opposing fiducial marks. The quadrants are labelled A, B, C, D, from left to right, starting in the top left-hand quadrant and following with the lower quadrants.

3. The origin for all measurements is the principal point - the point of intersection of the lines joining the fiducial marks. Measurements given are the ordinates - x horizontal and y vertical - and the diagonal, and are in inches; they are made to 1/100th of an inch.



MINOR INVESTIGATIONS BY NORTHERN TERRITORY RESIDENT GEOLOGICAL SECTION: PRELIMINARY INSPECTION OF PROPOSED DAM SITES 1963-1964

1. MARY AND McKINLAY RIVERS

SUMMARY

A helicopter flight was made along the Mary and McKinlay Rivers on 16th May, 1963, accompanied by Mr B. Brooks, Water Resources Branch, Darwin. The flight was undertaken at the request of Water Resources Branch to acquire preliminary geological and other information on possible dam sites.

INTRODUCTION

Several localities were examined from the confluence of the rivers upstream to the Mount Masson area. The inspections were of a cursory nature because the flight schedule permitted only a short period of time at each site. Consequently the three possible sites, shown on Plate 1, can only be described briefly at this stage. If feasibility studies for the construction of a dam are to be undertaken at any of these sites, detailed investigations would have to be carried out to prove that storage characteristics are favourable and the sites are sound, and

GEOLOGY

Information on the regional geology has been obtained from the geological maps issued by the Bureau of Mineral Resources, Canberra.

Site 1 : McKinlay River

1:250,000 sheet : Pine Creek, SD 52/8
1-mile sheet : Ban Ban, D 52/8-62
R.A.A.F. aerial survey no.924
Date : June 1950
Photo 5210; Run 1; Quadrant D; x = 3.5", y = 0.5", diagonal
South-west of Mount Douglas.

At this site, the McKinlay River flows along the western side of a gap through a low range of north-east trending hills. Mount Douglas lies in the north-east part of the range, and a small isolated hill occurs in the centre of the gap.

A major north-east trending fault passes through the area about half a mile upstream from the site. Faulting in a northerly direction may be indicated by the occurrence of massive quartz reefs aligned in that direction on the western side of the gap.

The north-eastern part of the range, including Mount Douglas, consists of gently folded Upper Proterozoic sandstone of the Katherine River Group; folded Lower Proterozoic siltstone of the Burrell Creek Formation crops out in the south-west part of the range and on the isolated hill in the gap. The gap at the site is about 4,000 feet wide.

Site 2 : Mary River

1:250,000 sheet : Pine Creek, SD 52/8
1-mile sheet : Wool Wonga, D 52/8-55
R.A.A.F. aerial survey no.1058
Date 1950
Photo 5070; Run 3; Quadrant A; x = 2.4", y = 0.6", diagonal

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The Mary River flows westwards at this locality through a gap in a north-trending range of low hills. The river is in a channel which is about 100 feet wide and 30 feet deep.

A low-grade iron deposit crops out intermittently in a narrow, north-trending line through the site. It is believed to be a replacement deposit of siltstone which crops out extensively in the range of hills. The siltstone is part of the Golden Dyke Formation inter-folded with siltstone of the Craig Creek Member. These rocks are of Lower Proterozoic age.

Site 3 : Tributary of the Mary River

1:250,000 sheet : Pine Creek, SD 52/8
1-mile sheet : Ban Ban, D 52/8-62
R.A.A.F. aerial survey no. 924
Date 1950
Photo 5203; Run 1; Quadrant B; x = 1.2", y = 0.1", diagonal

The site is half a mile north-north-east of the Nelson Mine and two miles west of the Mary River.

At this locality, a tributary of the Mary River flows eastwards through a gap in hills of folded sandstone and siltstone of the Lower Proterozoic Masson Formation. The fold axes trend in a general north-south direction. A major north-east trending fault passes through the hills on the southern side of the gap.

The gap is about 400 feet wide.

2. DALY RIVER AND MULDIVA CREEK

SUMMARY

In connection with preliminary investigations of possible dam sites, a helicopter flight was made along the Daly River from near the old Oolloo homestead in a downstream direction to the Daly River police station. A second flight along a deep gorge on Muldiva Creek was included. The investigations were made in the company of Mr B. Brooks of Water Resources Branch, Darwin, and at the request of that Branch.

INTRODUCTION

Several rock bars were noted along the Daly River and brief ground examinations were made of two which were accessible to helicopter landings (Sites 4 and 5 below Plate 1). The rock bars are in localities where low pondage dams could be constructed. The channel of the river at these places is from 100-200 feet wide and from 30-40 feet deep. The river is flanked on each side by flat-lying country.

Possible sites from larger dams were examined four miles upstream from the Daly River police station and at a gap in the Rock Candy Range, a further nine miles upstream.

GEOLOGY

Site 4 : Daly River - Rock Bar

1:250,000 sheet : Pine Creek, SD 52/8
1-mile sheet : Douglas, D 52/8-77
Photo 75; Run 3 (air photo not available to obtain precise co-ordinates)

The rock bar is at river level and is composed of very fine-grained micaceous sandstone which has a flaggy appearance and contains many small pot-holes. The sandstone is flat-lying and probably belongs to the Jinduckin Formation of Middle Cambrian age. In the bank of the river the rock bar is overlain by about 20 feet of alluvium.

...../3

Site 5 : Daly River - Rock Candy Range

1:250,000 sheet : Pine Creek, SD52/8
1-mile sheet : Daly River, D52/8-76
Photo 53; Run 4 (air photo not available at present)

This locality is a possible site for a large dam. The Daly River flows through a gap in the Rock Candy Range, which is composed of Stray Creek Sandstone of Upper Proterozoic age.

A detailed geological study could not be made in the time available. However, it was noted that the strata are sub-horizontal; the sandstone is white and somewhat friable; the gap is about 2,000 feet wide and 70 feet deep.

Site 6 : Daly River - Rock Bar

1:250,000 sheet : Pine Creek, SD52/8
1-mile sheet : Daly River, D52/8-76
Photo 15; Run 3 (air photo not available at present)

Rock debris, composed mainly of quartzite slabs, occurs extensively at this site. It is believed that the slabs have not been transported. The quartzite is probably of Upper Proterozoic age and part of the Stray Creek Sandstone Member. In the banks of the river the rock bar is overlain by about 20 feet of alluvium.

Site 7 : Daly River - 4 Miles from Police Station

A possible dam site on the river at this locality has been recognised for some time by Water Resources Branch.

The river flows through a gap in a north-east trending range of hills. Pink quartz sandstone of the Depot Creek Formation crops out with a strike of 055° magnetic; it dips from 45° - 60° to the south-east.

In the brief time available during the visit it was noted that the sandstone is hard and somewhat friable; the beds dip upstream; joints are well spaced and fairly well closed; and the gap is about 600 feet wide and 70 feet deep.

Site 8 : Muldiva Creek

1:250,000 sheet : Ferguson River, D52/12
1-mile sheet : Muldiva Creek, D52/12-85
Aerial survey no.339; Photo 118; Run 3.

In this area, Muldiva Creek flows in a north-westerly direction through a gorge which is from 400-500 feet deep and several miles long. The sedimentary rocks through which the gorge is cut were observed to strike at 340° approximately and to have steep dips. Strong folding was observed in a few places. The geological one-mile map sheet records the sediments as Lower Proterozoic quartz sandstone and siltstone of the Noltenius Formation. Ground observations were not possible as no suitable landing points for the helicopter could be found.

GENERAL

Unsuccessful attempts were made to land the helicopter on and near other rock bars along the Daly River. It was noted that the sediments at these localities were flat-lying. From this and the evidence mentioned above, it is thought probable that the attitude of the strata upstream from Site 4 to the old Oolloo Homestead is sub-horizontal.

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PROPOSED DAM SITES ON THE DOUGLAS, CULLEN AND FERGUSON RIVERS, N.T.

INTRODUCTION

Geological inspections were made from 18th to 20th May, 1964, at proposed dam sites on the Douglas, Cullen and Fergusson Rivers. The work was requested by Water Resources Branch, Darwin, as part of a planning project involving the location of suitable dam sites for future water supply schemes. The sites were examined in the company of Mr D. Kneebone, Senior Technical Officer, Water Resources Branch, Darwin.

GEOLOGY

Douglas River Dam Site (See Plates 2 and 3)

1:250,000 sheet : Pine Creek, D52/8
One mile sheet : Burrundie, D52/8-70
Aerial survey 327; 15,000 feet
Photo 175; Run 6; Quadrant B;
x = 2.9", y = 0.9", diagonal = 3.1".

The proposed dam site is located where the Douglas River flows westwards through a gorge in Upper Proterozoic Depot Creek Sandstone.

The gorge at this point trends westwards; it is about 100 feet deep and varies in width from 10 feet at river level to about 200 feet at the top.

At the prospective dam site the Depot Creek Sandstone strikes 350° magnetic and dips 15° to the west. It is pink, fine-grained, generally hard, and occurs in beds up to one foot thick. The texture ranges from friable to quartzitic; the latter apparently results from silicification of the sandstone during weathering.

Weathering along the bedding in the gorge has resulted in tabular openings up to 2 feet high, 100 feet long and 20 feet deep into the sides of the gorge.

Jointing is a prominent feature and master joints strike 270° and 160° magnetic; both sets generally dip vertically. A minor set of vertical joints strikes 220° magnetic. In general, the joints are tight and spaced about 2 feet apart. There are rare zones of shattering, where the joints are about 3 inches apart. The course of the river in the gorge appears to have been controlled by the master joints and an east-west zone of close-jointing.

The site appears to be satisfactory for construction of a dam, but a more detailed investigation, including testing of the rock foundations for water loss through joints and along weathered zones, would be required before design studies could be undertaken.

Cullen River Dam Site (See Plates 2 and 4)

1:250,000 sheet : Fergusson River, D52/12
One mile sheet : Lewin Springs, D52/12-87
Aerial Survey 330; 15,000 feet
Photo 150; Run 2; Quadrant D;
x = 2.4", y = 2.8", diagonal = 3.7".

The Cullen River flows in a southerly direction through the site where a dam aligned in an east-west direction could be constructed.

The width of the site is about 400 feet at river level, and the height of the flanking hills is about 300 feet.

A series of long water holes, parallel to the river, extends south from

the dam site and constitutes what may have been a former course of the river. This feature accounts for the unusual width of the valley at the site and downstream from it.

The rocks that crop out at the dam site are part of the Burrell Creek Formation, of Lower Proterozoic age. They consist of metamorphosed sedimentary rocks, mainly quartzite and (?) cordierite-biotite hornfels, intruded by greenstone, and they form part of a roof pendant within the Cullen Granite.

The greenstone intrusives appear to be generally concordant with the metasedimentary rocks, which strike 090° magnetic and dip 45° to the south.

A study of air photographs of the area revealed a lineament that was interpreted as a north-striking fault passing through the site. The ground inspection revealed an apparently minor fault, striking 015° and dipping 45° east, and a strong, widespread, fracture cleavage which strikes 350° and dips vertically.

Although the rocks at the site are very hard and dense, it would be necessary to test the foundation conditions, and especially the extent of water loss, particularly through possible fault zones and along the fracture cleavage, before a decision is taken on the construction of a dam at this site.

Fergusson River Dam Sites (See Plates 2 and 4)

1:250,000 sheet : Fergusson River, D52/12
One mile sheet : Lewin Springs, D52/12/87
Aerial Survey 330; 15,000 feet
Photo 150; Run 2; Quadrant B, at
x = 2.5", y = 0.6", diagonal 2.5"; and at
x = 2.9", y = 0.4", diagonal 2.9".

The two sites examined in this locality are about 1,000 feet apart, on a stretch where the Fergusson River flows to the south-south-west. At each site the western bank of the river is flanked by cliffs. The cliffs are 30 feet and 70 feet high at the upper and lower sites respectively. The eastern side of the river rises gently to a height of about 200 feet at both sites; the width of the valley at river level is about 500 feet at the upper site and 300 feet at the lower site.

On the western side of the river, at both sites, interbedded sandstone and mudstone of the Burrell Creek Formation crop out; bedding strike ranges from 320°, dipping 45° west, at the upper site, to 350°, dipping 60° west, at the lower site. A vertical cleavage strikes 330° at both sites.

The Fergusson River 1:250,000 geological map, published by the Bureau of Mineral Resources, indicates that strata are folded and are part of a roof pendant within the Cullen Granite.

On the eastern side of the river at the lower site, a concordant quartz reef crops out in interbedded sandstone and mudstone which strike 310° and dip 60° to the south-west. Small scale open-cut mining has been carried out, and it appears that this reef is the south-west extension of the Woolngi Goldfield. The reef is emplaced in an overturned anticline of the Burrell Creek Formation (Randal, 1962).

The lower site appears to be more favourable than the upper as it is in a narrower part of the river valley. However, a decision to build a dam at either site would have to be preceded by detailed foundation investigations and possibly by an evaluation of the mineralization in the quartz reef at the lower site.

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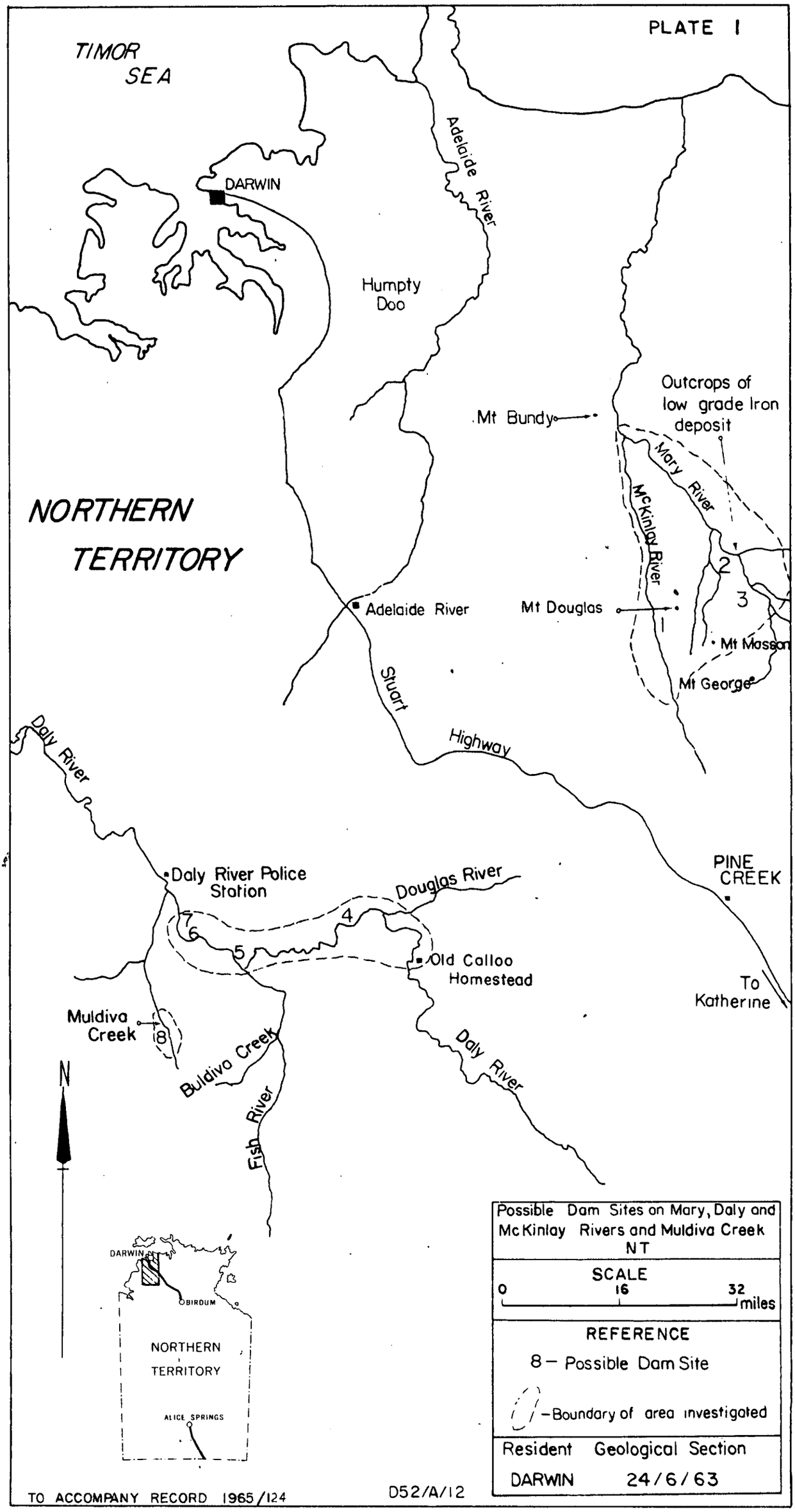
REFERENCES

RANDAL, M.A. 1962 - Fergusson River 1:250,000 Geological Series. Bur. Miner.Res.Aust.Explan.Notes, D52/12.

MALONE, E.J. 1962 - Pine Creek 1:250,000 Geological Series. Bur. Miner. Res. Aust. Explan. Notes, D52/8.

PLATE 1



Possible Dam Sites on Mary, Daly and McKinlay Rivers and Muldiva Creek NT

SCALE

0 16 32 miles

REFERENCE

8 – Possible Dam Site

/ – Boundary of area investigated

Resident Geological Section

DARWIN 24/6/63

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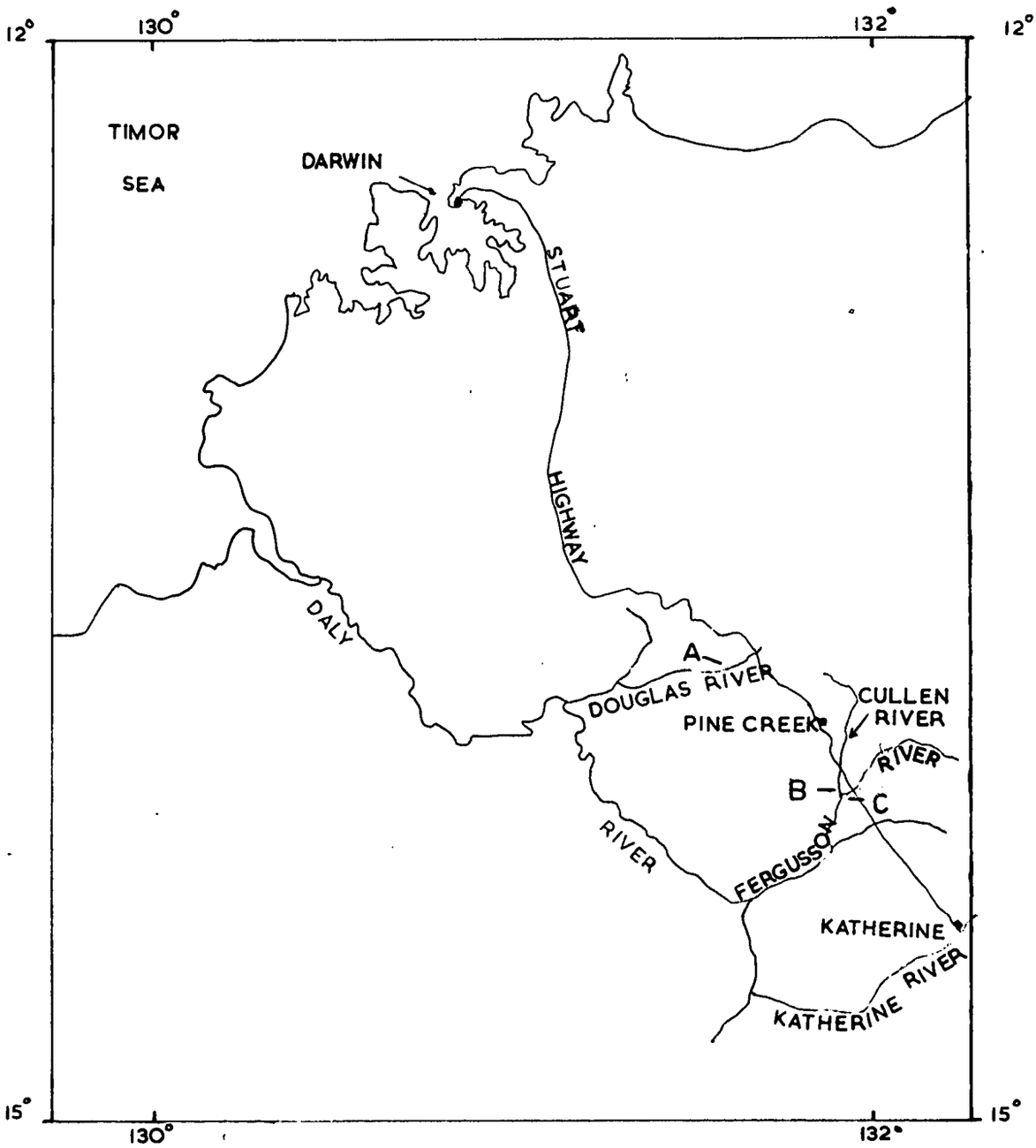
D52/A/12

PLATE 2



POSSIBLE DAM SITES

ON DOUGLAS, CULLEN, FERGUSSON RIVERS

SCALE

0 100 MILES

REFERENCE

A	DOUGLAS RIVER DAM SITE
B	CULLEN . . .
C	FERGUSSON . . .

D52/A/13

RESIDENT GEOLOGICAL SECTION, DARWIN JUNE 1964

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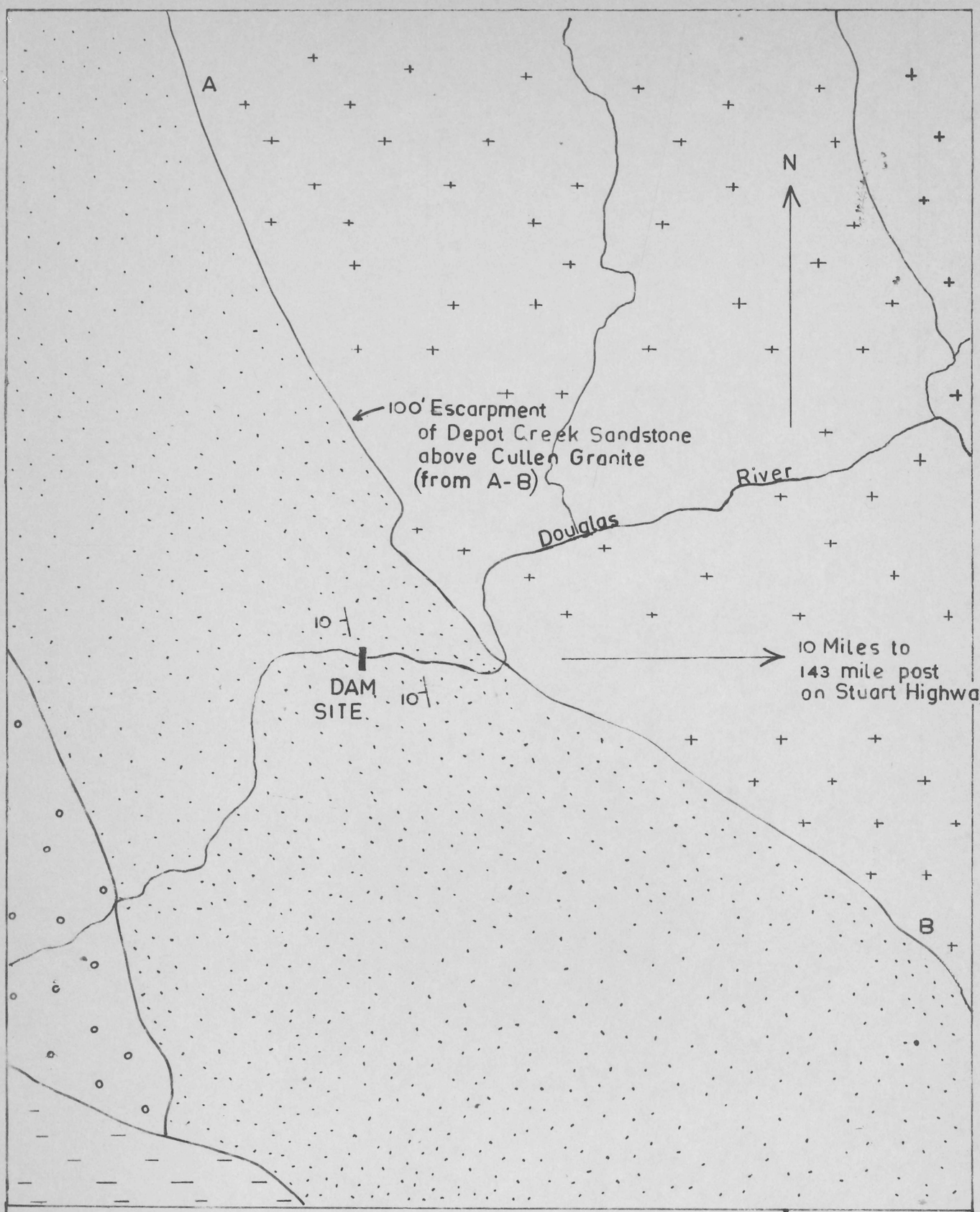

DOUGLAS RIVER DAM SITE

SCALE
0 2500 5000 ft

REFERENCE

ALLUVIUM – CAINOZOIC

10 STRIKE AND DIP OF STRATA

STRAY CREEK SANDSTONE – UPPER PROTEROZOIC

DEPOT CREEK SANDSTONE – " "

CULLEN GRANITE – LOWER "

RESIDENT GEOLOGICAL SECTION, DARWIN. JUNE 1964 D52/A/14

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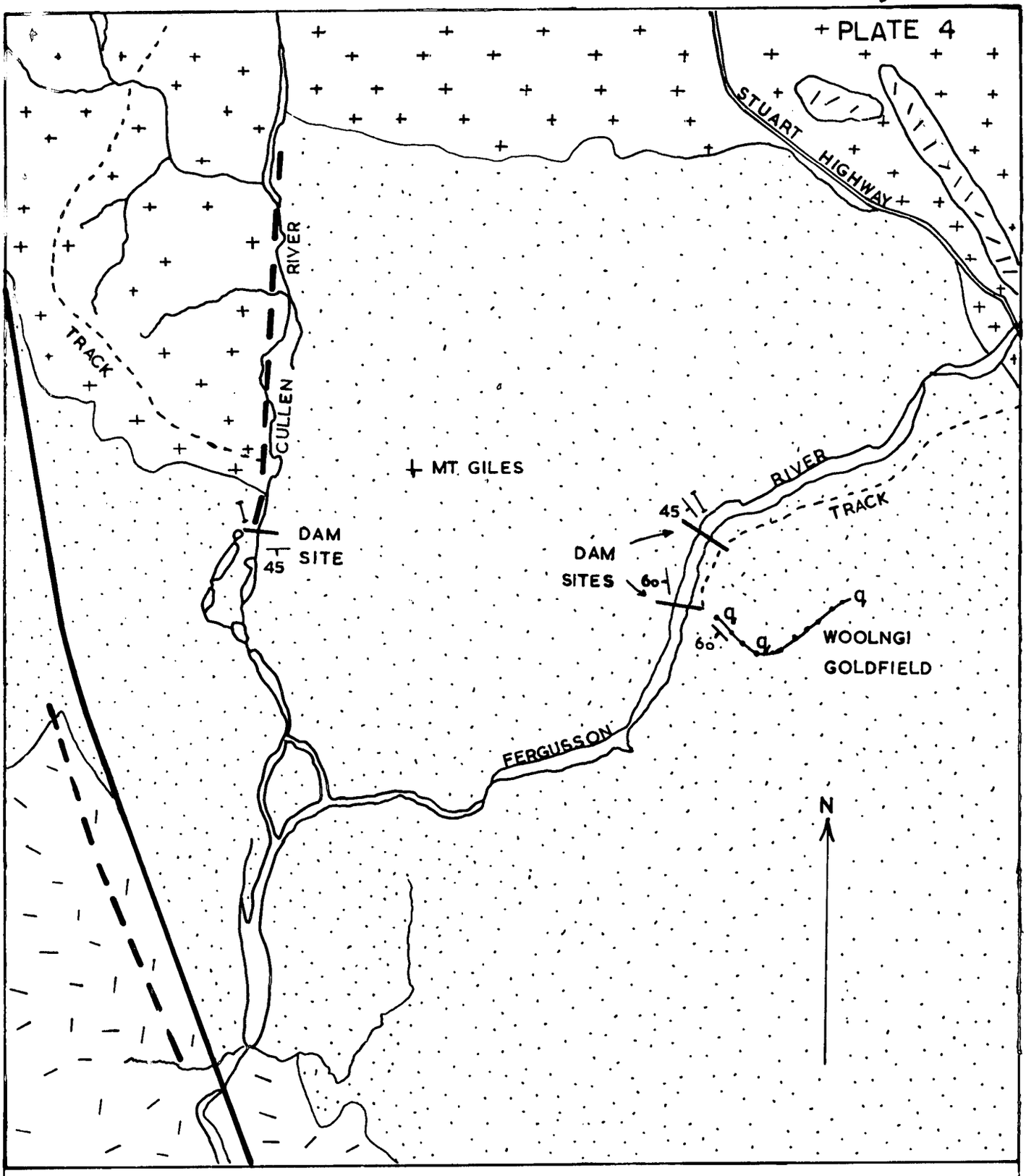

DAM SITES

ON CULLEN AND FERGUSSON RIVERS

SCALE

0 2500 5000 ft.

REFERENCE

45 STRIKE AND DIP OF BEDDING

VERTICAL CLEAVAGE

q QUARTZ REEF

FAULT

POSTULATED FAULT

EDITH RIVER VOLCANICS-UPPER PROTEROZOIC

CULLEN GRANITE -LOWER "

BURRELL CREEK FORMATION- " "

D52/A/15

RESIDENT GEOLOGICAL SECTION, DARWIN. JUNE 1964.

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