



Director

RECORDS OF THE
GEOLOGICAL SURVEY
OF WESTERN AUSTRALIA

No. 1962/3

TITLE: REPORT ON EXPLORATORY DRILLING
FOR WATER AT THE MENTAL
HOSPITAL, WHITBY FALLS

AUTHOR: K. Berliat, D. Sc.,
Senior Geologist

DATE: 3rd June, 1962



NO PART OF THIS REPORT MAY BE PUBLISHED OR ISSUED IN ANY FORM
WITHOUT THE PERMISSION OF THE GOVERNMENT GEOLOGIST

REPORT ON EXPLORATORY DRILLING
FOR WATER AT THE MENTAL HOSPITAL,
WHITBY FALLS.

by

K. Berliat, D.Sc., Senior Geologist.

Record No. 1962/3.

<u>CONTENTS</u>	Page
ABSTRACT	1
INTRODUCTION	1
GENERAL GEOLOGY	1
LOCATION OF DRILL SITES	2
BORE HISTORY	2
General Data	2
Drilling Data	2
STRATIGRAPHY	4
HYDROLOGY	5
Aquifers	5
Results of Final Pump Test	6
CONCLUSIONS	7
PLATES	
Plate 1. Generalised Geological Map showing Locations of Drill Sites at Whitby Falls.	

ABSTRACT.

An exploratory water bore drilled to a depth of 690 feet near Whitby Falls Mental Hospital failed to locate water for human consumption, but yields adequate supplies of good stock water. The bore, 40 chains to the west of the Darling Fault, intersected a thick, monotonous sequence of Lower Jurassic claystone and shales, which are correlated with the upper part of the Cockleshell Gully Sandstone. Only thin aquifers of low permeability were encountered.

INTRODUCTION.

Exploratory drilling operations on an area of some 250 acres comprising the grounds of the Mental Hospital at Whitby Falls were undertaken at the instigation of the Medical Department, for the purpose of determining whether underground water of domestic quality could be obtained. The drilling was done by a private contractor, and the contract was let by the Metropolitan Water Supply Department. The Geological Survey was responsible for the selection of drill sites and general supervision.

The Hospital is on Crown Reserve 7125, which is cut by the South-Western Highway (Perth to Bunbury), 28 miles by road south of Perth.

GENERAL GEOLOGY

The area open for drilling is located to the east and west of the Darling Fault, which coincides roughly with the South-Western Highway. Sporadic outcrops of Cardup Shale (light grey, greenish and reddish slates and shales of late Proterozoic age) occur eastward of the Fault. The sequence dips

steeply to the west and rests unconformably on crystalline Archaean rocks which crop out outside the drilling area, some 40 chains east of the South-Western Highway.

The country to the west of the Darling Fault is underlain by Mesozoic sediments of the Perth Basin, but these rocks do not crop out anywhere near the drilling area.

LOCATION OF DRILL SITES

Whitby Falls no. 1 bore was located close to Manjedal Brook, approximately 5 chains east of the South-Western Highway (Plate 1). The site was chosen to test the potentially alluviated drainage channel. The bore was abandoned at a depth of 78 feet in Cardup Shale. Only an insignificant supply was obtained at 36 feet.

Whitby Falls no. 2 bore was subsequently located in the north-western corner of the Crown Reserve (Plate 1), a position as far to the west as possible from the Cardup Shale outcrops. The object of this hole was to ascertain the potential of the Mesozoic rocks on the eastern edge of the Perth Basin.

BORE HISTORY

General Data

Bore Name and Number:	Whitby Falls No. 2.
Location:	Latitude 32° 18' S. (approx.)
	Longitude 116° 0' E. (approx.)
	North-western corner of Crown Reserve 7125, approximately 1 mile east of Mundijong.

3.

Ground Elevation: 190 feet (approx.)
Date Commenced: 13th October, 1961.
Date Completed: 3rd February, 1962.
Total Depth: 690 feet.
Status: Bore cased, casing slotted opposite
aquifers, developed, and left ready
for use.

Drilling Data:

Name and Address
of Drilling Con-
tractor: Westphal Bros. & Co., 415 William Street,
Perth.

Type of Rig: Ruston-Bucyrus 22 R.W., Percussion.

Hole Size: 10 $\frac{1}{2}$ inch from surface to 10 feet
8 $\frac{1}{2}$ inch from 10 feet to 130 feet
6 $\frac{1}{2}$ inch from 130 feet to 690 feet.

Casing: 10 inch to 10 feet
8 inch to 130 feet
6 inch to 690 feet.

Casing left in
completed hole: 5 inch from surface to 690 feet.
Slotted sections from 220 feet to
260 feet, 560 feet to 600 feet, and
640 feet to 680 feet. All 10 inch,
8 inch, and 6 inch casing withdrawn.

STRATIGRAPHY.

The lithology of the sequence penetrated
in the Whitby Falls No. 2 bore is given below:

From (feet)	To (feet)	Thickness (feet)	Description
0	4	4	SAND, coarse-grained, gritty, brown.
4	19	15	CLAY, sandy, ferruginous, brown.
19	21	2	GRIT, quartz, ferruginous, clayey, brown.
21	35	14	CLAYSTONE, silty, light brown.
35	54	19	SANDSTONE, quartz, medium-grained, gritty, clayey, poorly sorted, pink.
54	66	12	SILTSTONE, gritty, clayey, brick-red.
66	91	25	CLAYSTONE, micaceous, silty, grey.
91	183	92	CLAYSTONE, carbonaceous, black, contains fragments of lignite around 170 feet.
183	233	50	CLAYSTONE, silty, brown, probably with thin beds of siltstone.
233	235	2	SANDSTONE, quartz, fine-grained, moderately sorted, light grey. WATER.
235	322	87	CLAYSTONE, silty, brown.
322	376	54	CLAYSTONE, dark grey.
376	423	47	SILTSTONE, clayey, dark grey.
423	447	24	CLAYSTONE, carbonaceous, black.
447	459	12	SHALE, silty, greenish-grey.
459	492	33	CLAYSTONE, brown.
492	501	9	CLAYSTONE, carbonaceous, black.
501	511	10	CLAYSTONE, brown.
511	546	35	CLAYSTONE, carbonaceous, black.
546	566	20	CLAYSTONE, sandy, carbonaceous, dark grey.
566	568	2	SANDSTONE, quartz, medium-grained, clayey, light brown. WATER.

From (feet)	To (feet)	Thickness (feet)	Description
568	583	15	CLAYSTONE, silty, brown.
583	584	1	SANDSTONE, quartz, clayey, fine to medium grained, poorly sorted, light brown. WATER.
584	648	64	CLAYSTONE, sandy, light brown or grey.
648	660	12	SANDSTONE, quartz, clayey, carbonaceous, medium-grained, dark grey. WATER.
660	675	15	CLAYSTONE, silty, carbonaceous, dark grey to black.
675	690	15	CLAYSTONE, silty, brown.

Five sludge samples were submitted to Mr. B.E. Balme, Senior Lecturer at the University of Western Australia, for palynological examination. The samples came from the following depths: 130 feet, 322 feet, 492 feet, 546 feet, and 660 feet.

The sequence penetrated in the bore hole is of Lower Jurassic age, and is correlated by Mr. Balme with the upper part of the Cockleshell Gully Sandstone of the Perth Basin, and the Woodleigh Beds of the Carnarvon Basin.

HYDROLOGY

Aquifers.

The aquifer intervals intersected in the bore hole were at the following depths:

- 1) 233 feet to 235 feet. Bailing indicated a supply in the order of 2,000 gallons per day. The water contains 2,570 p.p.m. of sodium chloride (180 grains of sodium chloride per gallon).

- 2) 566 feet to 568 feet. The supply from this aquifer is 1,000 to 1,500 gallons per day, the salinity amounting to 2,500 p.p.m. of sodium chloride (175 grains of sodium chloride per gallon).
- 3) 583 to 584 feet. The yield from this horizon is not in excess of 1,000 gallons per day. The salinity is 2,500 p.p.m. of sodium chloride (175 grains of sodium chloride per gallon).
- 4) 648 feet to 660 feet. This aquifer was not tested separately, but the supply appeared to be larger. The salinity is 1,828 p.p.m. of sodium chloride (128 grains of sodium chloride per gallon).

Results of Final Pump Test.

On completion of the bore a final pump test was carried out to determine the combined supply from all aquifers encountered. Prior to the test 5 inch casing was inserted to full depth, and slotted in position opposite all aquifer intervals. All 6 inch, 8 inch, and 10 inch casing was withdrawn, and the annulus gravel packed with 3 tons of $\frac{1}{4}$ inch diameter blue metal. The bore was then developed by bailing until all fines were removed.

The rest level before pumping was 93 feet below surface, and the pump was set at 212 feet below surface. A short initial pumping rate of 1,200 gallons per hour was dropped to 1,000 gallons per hour, then maintained for 6 hours, when the pump began to suck air. The bore was then pumped at 800 gallons per hour for a period of 3 hours. After that time the pumping rate had to be gradually reduced to 400 gallons per hour. This rate was maintained for 28 hours with a stable drawdown of 117 feet.

The salinity of the bore water, as determined on completion of the pump test is 2,057 p.p.m. of sodium chloride (144 grains of sodium chloride per gallon.)

Total dissolved solids amount to 2,542 p.p.m. (178 grains per gallon).

CONCLUSIONS.

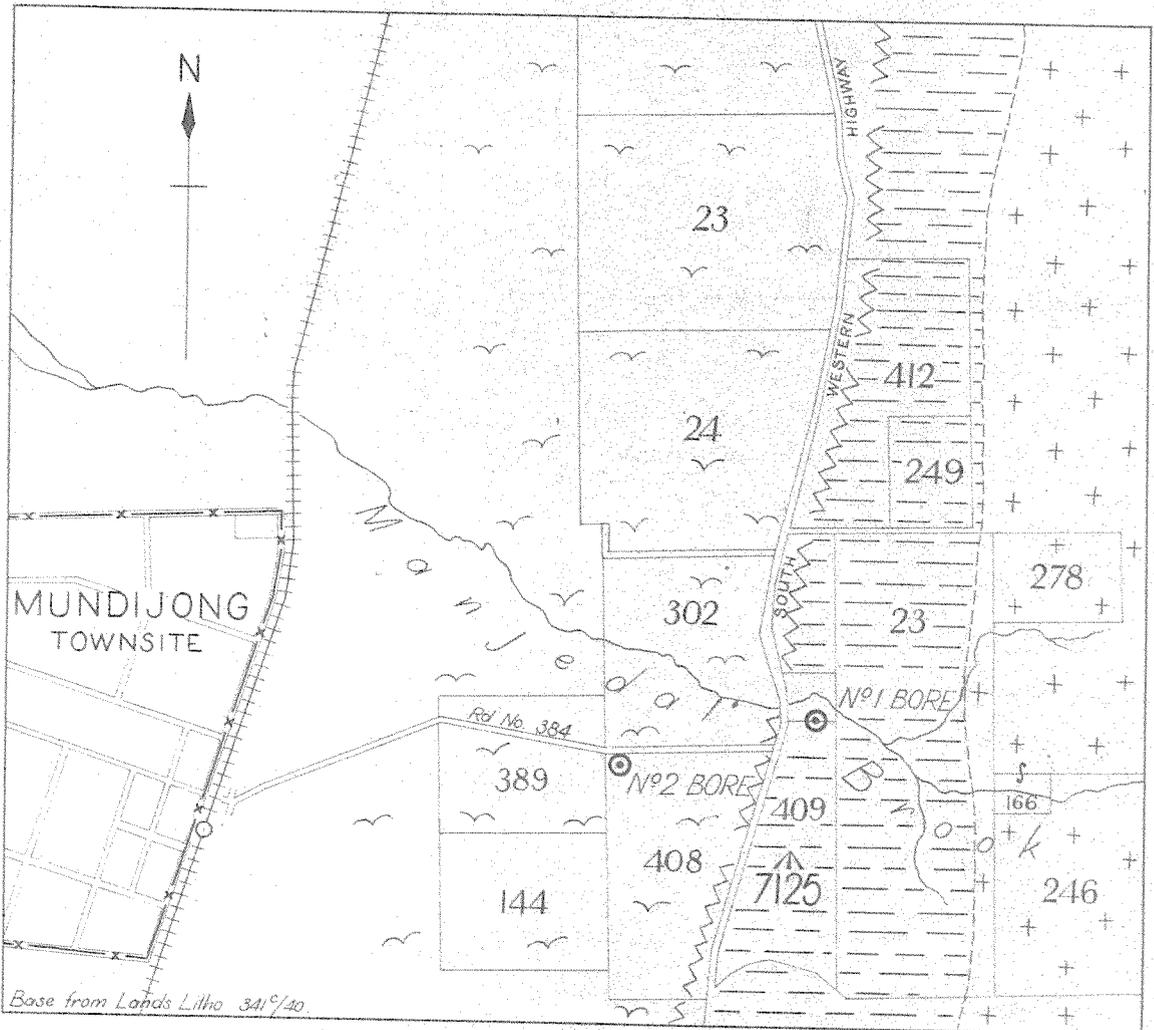
Supplies of domestic quality water are not obtainable on Crown Reserve 7125 by drilling in the Jurassic sediments westward of the Darling Fault. Exploratory work carried out elsewhere along that Fault (e.g. at Byford) has demonstrated that the massive development of impermeable claystone and shale is not a local geological feature. The conditions encountered in Whitby Falls no. 2 bore can certainly not be expected to change within the limited boundaries of the Reserve.

The country to the east of the Darling Fault is underlain by Cardup Shale, a rock type unsuitable as an aquifer. Limited supplies of water could be obtained, however, from local alluviated patches overlying the Cardup Shale.

3rd June, 1962.

GENERALISED GEOLOGICAL MAP
SHOWING
LOCATION OF DRILL SITES
WHITBY FALLS

Scale: 40 chains to an inch



LEGEND

- Geological boundaries (approx).
- ~~~~~ Darling fault (position approx)
- ~ ~ ~ Sand and alluvium, overlying mesozoic sediments
- — — Cardup shale (outcrops sporadic)
- + + Granite and granite gneiss