WATER RESOURCES DIVISION
DEPARTMENT OF MINES AND ENERGY

BORE COMPLETION REPORT

ELCHO ISLAND OUTSTATIONS

Prepared by:
Danuta Karp
Hydrogeologist
Assessment Branch

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LIST OF ABBRIEVIATIONS

AMG	-	Australian Map Grid
km	-	Kilometre
L/s	-	Litre per second
L/day	-	Litres per day
m	-	Metre
mm	-	Millimetre
m^3/day	-	Cubic metre per day
pH	-	Index of Acidity or Alkalinity

1. INTRODUCTION

The objective of this work was to investigate the groundwater potential and subsequently construct production bores providing an adequate water supply for Gawa, Gitan and Nhangiynpurra outstations on Elcho Island, situated 520 km east of Darwin and north of Cadell Strait.

The work was carried out in June, July and September 1986 on behalf of the Department of Community Development and involved preliminary investigation, construction and testing of the production bores.

The Gawa outstation is located approximately 48 km north-east of Galiwinku, at the AMG co-ordinates 980-997 (Elcho 1:100 000 sheet 6074). The outstation is accessible by road only during the dry season.

The Gitan outstation is located approximately 27 km north-east of Galiwinku, at the AMG co-ordinates 848-828 (Elcho 1:100 000 sheet 6074). The outstation is accessible by road throughout the year.

The Nhangiynpurra outstation is located at Naningbura Point approximately 47 km north-east of Galiwinku, at the AMG co-ordinates 959-001 (Elcho 1:100 000 sheet 6074). The outstation is accessible by road during the dry season only.

The Elcho Island has a monsoonal climate with a wet season from December to April. The mean annual rainfall is 1270mm. Most of the rain falls in the wet season and only scattered light showers fall during the dry season.

2. HYDROGEOLOGY

Elcho Island is situated on the eastern part of the Arafura Basin.

The area is covered by the Cainozoic sediments underlain by the Elcho Island Formation of the Upper Proterozoic age. The Elcho Island Formation can be divided into three members. The basal member consists of flaggy and blocky, dark brown, fine grained ferruginous sandstone. It is overlain by interbedded flaggy, fine grained glauconitic sandstone and fissile green micaceous sandstone and shale of the middle member of Elcho Island Formation. The upper most member of the Formation is a leached dolomitic siltstone and chert.

The Cainozoic sediments consists mainly coastal alluvial deposits, sand dunes, alluvium and laterite.

In the past, 101 bores were drilled in this area and water was obtained from various depths. 61 bores were drilled to penetrate Cainozoic sediments, 40 bores were drilled to encounter aquifers in Elcho Island Formation of Upper Proterozoic age. The best aquifer was identified in the basal member of the Elcho Island Formation. The aquifer with small supply could be expected at the interface between the Cainozoic and the Upper Proterozoic; and in the Cainozoic sediments.

3. RESULTS

GAWA OUTSTATION

During the investigation in 1985 three bores (24157, 24158, 24159) were drilled through the Cainozoic sediment into the underlying Upper Proterozoic rocks to establish the groundwater potential of the area. Only one bore (24159) was successfully constructed with a supply of 0.8 L/s. Two bores (24157 and 24158) were unsuccessful because of saline water intrusion. On the request of Gawa Community, one more bore (24656) was drilled in September 1986. Drilling was unsuccessful due to saline water intrusion at the depth of 7.0m.

GITAN OUTSTATION

Two bores (24285 and 24286) were drilled in the vicinity of Gitan outstation during June and July 1986. Bore 24286 intersected Cainozoic sediments to the depth of 28.3m. The aquifer was encountered at 27.0m and the water supply was 0.3L/s. The bore was constructed with PVC casing and stainless steel screens.

A four hundred minutes constant-rate test and a recovery test were conducted on the bore to establish the maximum pumping rate and relevant pump setting depth. The Test Report indicated that the maximum pumping rate is 0.3 L/s and pump setting should be 21.5m below the ground level.

Water samples were collected during the test pump and sent for analysis to the East Point Laboratory in Darwin.

The water quality data obtained from the chemical analysis are summarised in the Table 1. Water quality is within the recommended limit for drinking water as adopted by the Australian Water Resources Council/National Health and Medical Research Council (ref 1) except for pH and iron concentration, which can be adjusted to an acceptable level with a suitable treatment.

According to information supplied by the Department of Community Development the outstation had a population fluctuating between 10 and 20 people. The water supply from the bore 24286 would meet the demand estimated to be 25.920 m^3/day.

NHANGIYNPURRA OUTSTATION

During the investigation in July 1986 nine bores (24287, 24288, 24289, 24650, 24651, 24652, 24653, 24654 and 24655) were drilled. These bores intersected the Cainozoic sediments up to the maximum depth of 18.0m. Unsuccessful bores were 24650, 24651, 24287 and 24288 in which salt water at shallow depths were struck. Bores 24289 and 24653 encountered hard Proterozoic sandstone at a very shallow depth (approximately 4.0m). Bores 24652 and 24655 intersected multicoloured clay to the depth of 18.0m and drilling stopped on the top of Proterozoic sandstone.

Further groundwater investigation is recommended to be carried out only in some distance inland from the proposed location.

TABLE 1 GROUNDWATER QUALITY

BORE REGISTERED NUMBER	SODIUM, Na	POTASSIUM, K	CALCIUM, Ca	MAGNESIUM, Mg	TOTAL HARDNESS AS $CaCo_3$	TOTAL ALKALINITY AS $CaCo_3$	IRON (TOTAL) Fe	SILICA, SiO_2	CHLORIDE, Cl	SULPHATE SO_4	NITRATE, NO_3	BICARBONATE, HCO_3	FLUORIDE, F	NaCL (CALC FROM CHLORIDE)	pH	SPECIFIC CONDUCTANCE us/cm AT 25°C	TOTAL DISSOLVED SOLIDS (mg/L-BY EVAP. AT 180°C)	DATE OF SAMPLING	COMMENTS
GITAN 24286	28	9	1	4	19	12	5.5	22	50	5	1	15	0.1	84	6.4	210	125	12/7/86	

Analysis in milligrams per litre - mg/L (unless otherwise stated)

REFERENCE

1. AUSTRALIAN WATER RESOURCES COUNCIL/NATIONAL HEALTH AND MEDICAL RESEARCH COUNCIL - Desirable Quality for Drinking Water in Australia. Australian Government Publishing Service, Canberra, 1980.

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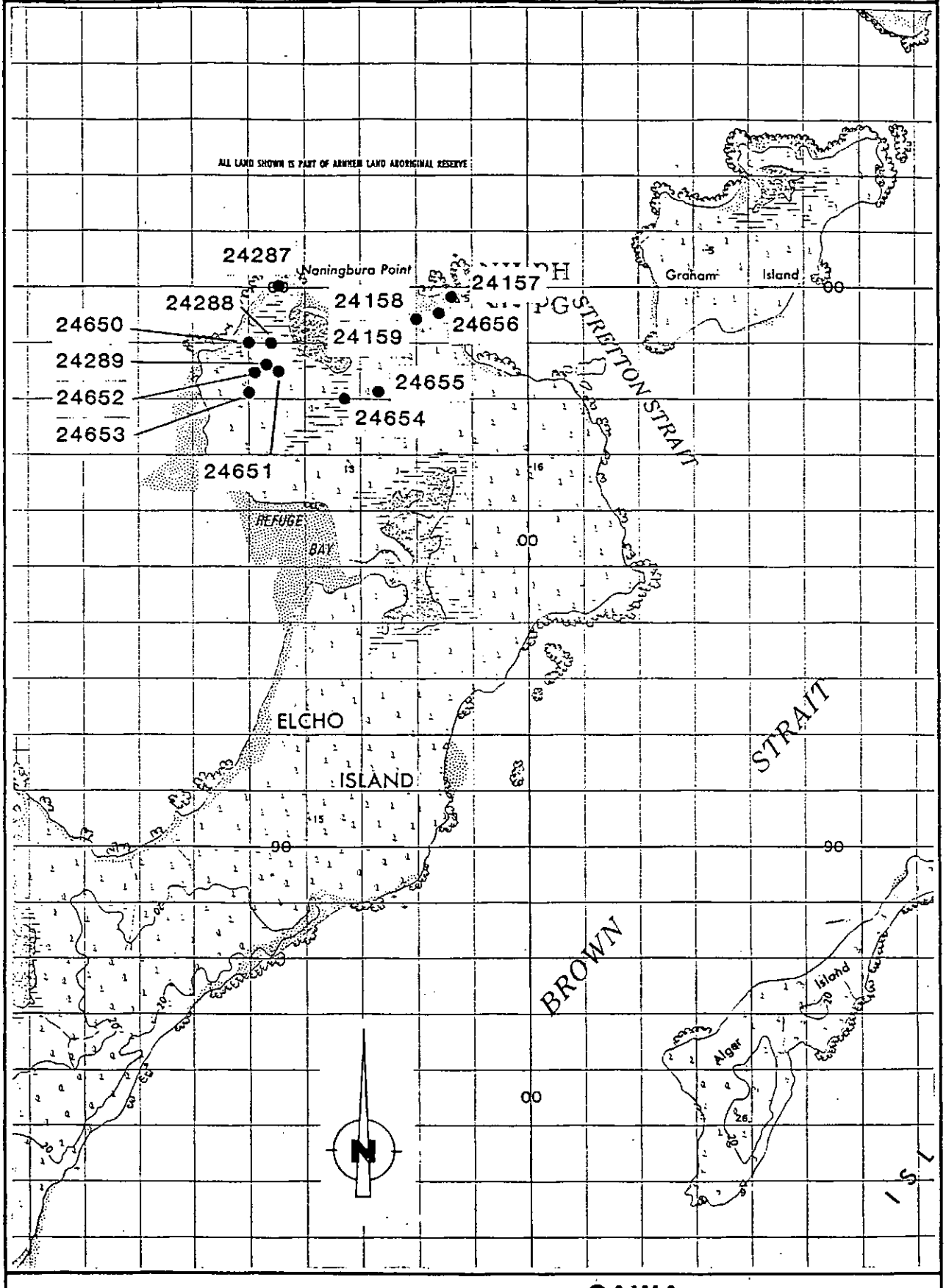

BORE LOCATION MAP

GAWA
NHANGIYNPURRA

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TEST REPORT — BORE RN. 24286

Bore location: Gitan Outstation
Elcho Island

Client/owner: Department of Community Development
Client's reference:
Purpose of supply: Domestic

Map: Elcho 1:100 000 Sheet 6074
Grid reference: 853-828

RECOMMENDATIONS

Pumping rate: 0.3 L/s. Pump setting: 21.5 m below ground level
General recommendations are given on the reverse side.
The aquifer and bore can/cannot sustain higher pumping rates with deeper pump settings or for short periods in favourable seasons. Further advice can be obtained from:
(In all correspondence refer to the bore's RN number).

BORE DATA

Finished depth: 28.39 m Completion date: 11/7/86
Standing water level 10.24m on 12/7/86
Construction details:

AQUIFER TEST

Test date: 12/7/86
Test rates: 0.3 L/s
Test duration 400 minutes ~~hrs~~

Interval (m)	Description
0 - 1.60	152 mm ID Steel Casing
0 - 26.90	105 mm ID Class 9 PVC casing
25.50 - 28.39	97 mm ID Stainless steel screens with 0.75 mm slots with packer and sump

Notes: 1. Top of casing as constructed was 0.36 m above ground
2. All depths are measured from natural ground level
3. Test rates are not indicative of safe long term pumping rates.

WARNING: MINIMUM INTERNAL BORE DIAMETER IS 97 mm

COMMENTS

1. Recommended pumping rate is based on a test at 0.3 L/s for period of 400 minutes and assume that hydrological conditions remain constant.

2. Provisions to obtain water samples at the bore head should be incorporated in any reticulation.

WATER QUALITY

See water laboratory report (Analysis No. 86/87/0214)

WRD4020 By: B Thatcher

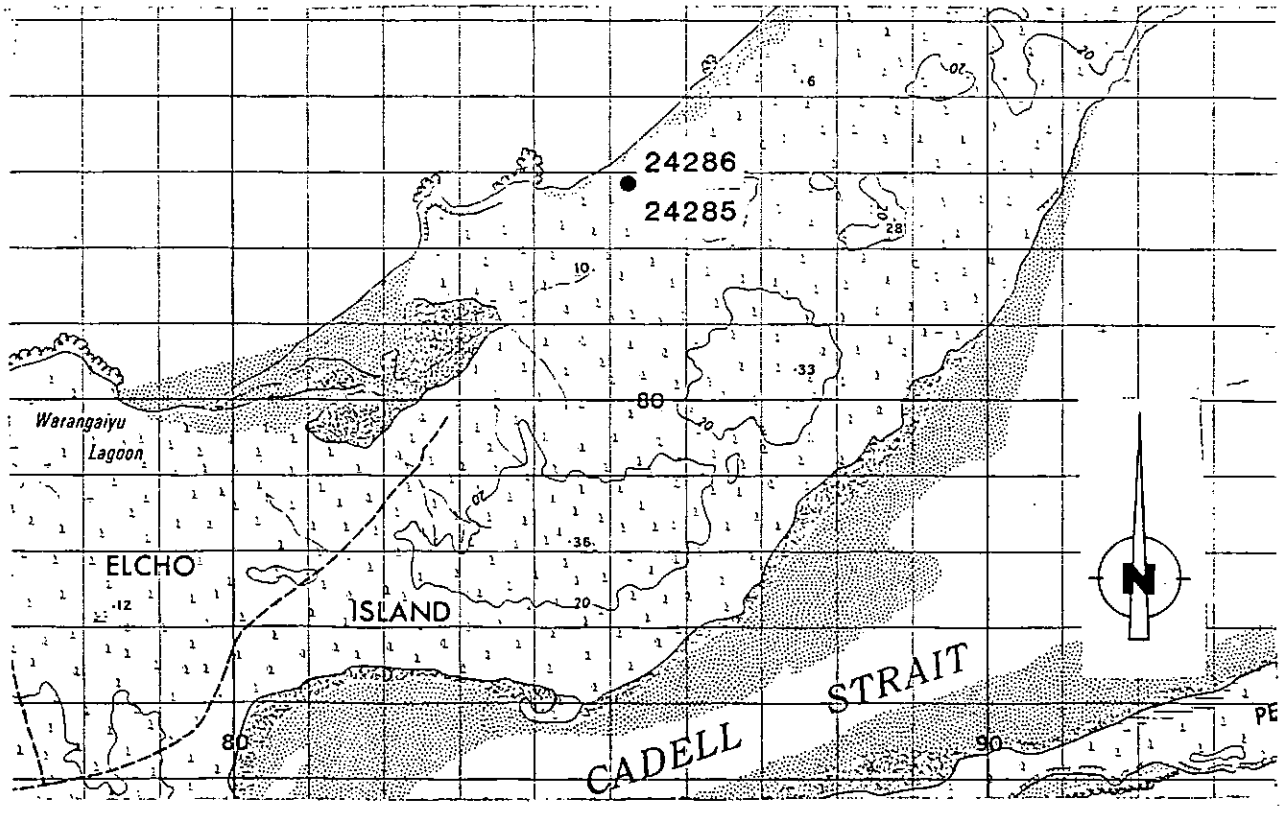
RECOMMENDATIONS FOR FINISHING, OPERATING AND PROTECTING GROUNDWATER BORES

Attention to the following points will ensure a long and safe life for the bore supply and help prevent pollution of the groundwater resource.

1. Construct a concrete apron around the bore head to prevent surface flow, seepage and waste from entering the bore.
2. Seal the space between the casing and pump equipment to prevent entry of vermin, dirt and pollutants.
3. Maintain pumping equipment in good order to prevent pollution. Prevent spillage of fuel and oil on the ground around the bore. Store fertilizer and other chemicals at least 50 m away.
4. Keep stock away from the bore head. Discourage domestic activity at the bore. The first tap on the pipeline should not be less than 5 m from the bore head.
5. Pumping the bore at higher than recommended rates may fork the bore leading to instability or pump maintenance problems. Seek the professional advice of an hydrogeologist or groundwater engineer.
6. If the bore is no longer required, the casing is to be removed or securely capped and the bore backfilled with clayey material. A cement plug may be required in some instances.

In addition, please ensure that the BORE IDENTIFICATION TAG is retained securely at all times. The registered bore number is Water Resources Division's only reference to the scientific and engineering data on this bore, and hence important to WRD's further advice to bore owners.

BORE LOCATION MAP



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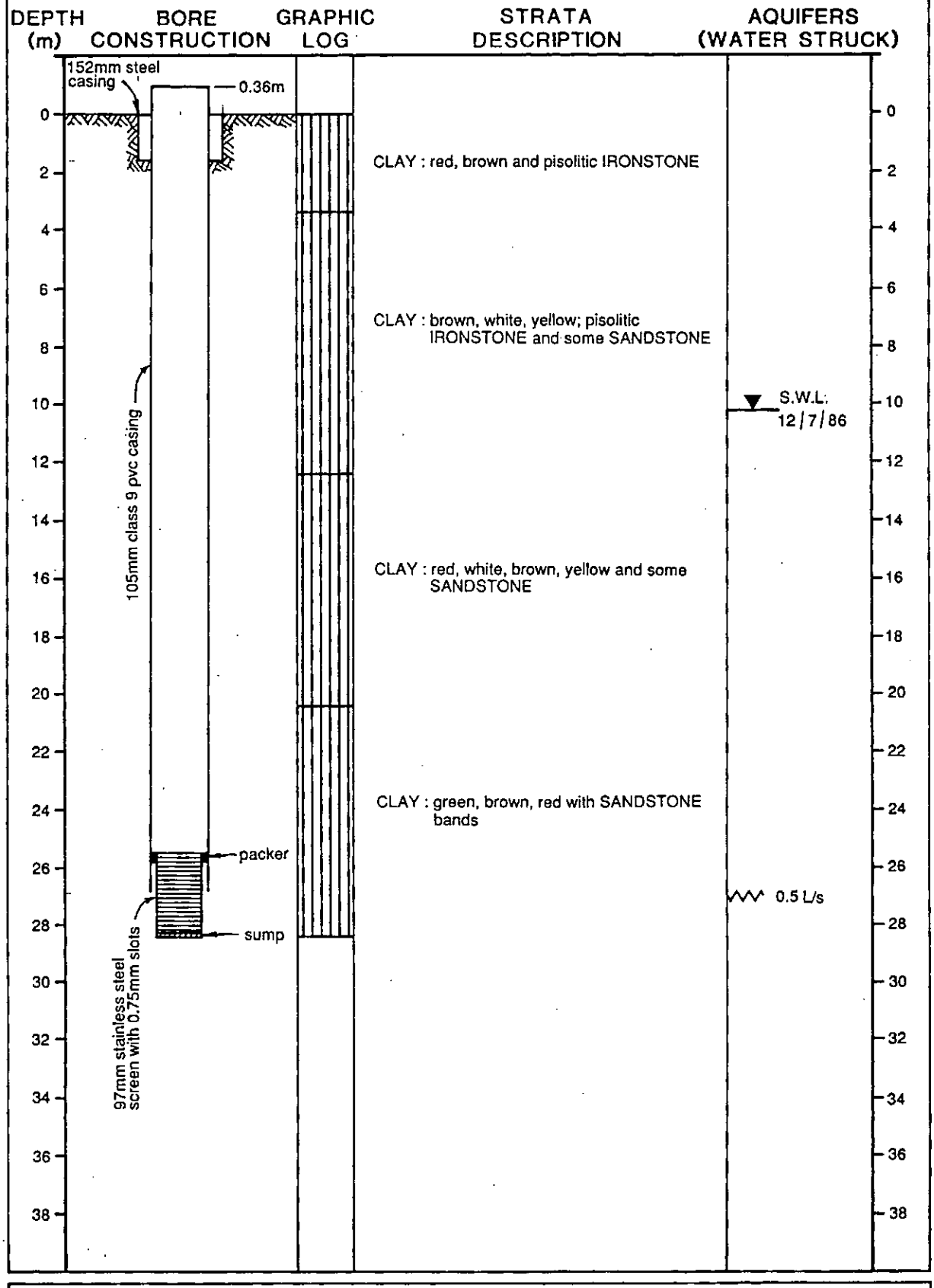

COMPOSITE LOG OF BORE 24286