WATER RESOURCES DIVISION
Assessment Branch
Groundwater Section

Report No 57/85 D

BORE COMPLETION REPORT
BORES 23449 AND 23450
EAST ALLIGATOR RANGER STATION

OCTOBER 1985

25:KARP

CONTENTS

DISTRIBUTION

	Copies
Australian National Parks and Wildlife Service Canberra	2
Department of Housing and Construction Adelaide	1
Department of Housing and Construction Darwin	1
Chief Ranger Kakadu National Park Jabiru	1
Water Resources Division Library	1
Water Resources Division Bore Data File	1

25:KARP

INTRODUCTION

This report provides details of construction and pumping recommendations for bores drilled on Kakadu National Park.

The Kakadu National Park is located about 120 km east of Darwin. The bores were drilled at AMG 276400 862500 (East Alligator 1:100 000 map sheet 5473).

Bore 23449 and 23450 were successfully drilled.

The work was carried out in July 1985 on behalf of the Australian National Parks and Wildlife Service and involved preliminary investigation, construction and testing of production bores.

Bores 20636 and 20637 were also pump tested at the request of the client.

HYDROGEOLOGY

The area is located in the north-east part of the Pine Creek Geosyncline. It is underlain by the Kambolgie Formation which is mainly composed of quartz sandstone. The bores were located on the weathered and fractured zone of the Bulman Fault running north-west to south-east.

Bores 23449 and 23450 encountered an aquifer between 14m and 24m located in fractured quartz sandstone.

RESULTS

Bores 23449 and 23450 were drilled and constructed with PVC casing and stainless steel screens.

A twenty four hour constant discharge test and a recovery test was conducted and water samples were taken.

Bores 20636 and 20637 were pump tested. Six hour constant discharge test and recovery test was conducted.

The water from bores 23449 and 23450 is of high chemical quality but has low pH. The water is suitable for domestic use after treatment to raise the pH to an acceptable level. If the water is not treated there is a possibility that metal water fittings will be corroded.

25:KARP

WATER RESOURCES DIVISION

TEST REPORT — BORE RN. 23449

Bore location: East Alligator Ranger Station
Client/owner: A.N.P. & W.S.
Client's reference: Kakadu National Park
Purpose of supply: Domestic

Map: East Alligator 1:100 000 Map Sheet 5473
Grid reference: 765-251

RECOMMENDATIONS

Pumping rate: 3.0 L/s. Pump setting: 22.0 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: Water Resources Sasco House, Darwin
(In all correspondence refer to the bore's RN number).

BORE DATA

Finished depth: 30.0m Completion date: 4/7/85
Standing water level 3.35 m on 6/8/85
Construction details:

Interval (m)	Description
0 m to 12 m	203 mm Blank Steel Casing
0 m to 23.5 m	150 mm Class 12 PVC Casing
23.5 m to 25 m	150 mm - 0.503 mm inline screens
25 m to 27 m	150 mm - 0.762 mm inline screens
27 m to 30 m	150 mm sump

AQUIFER TEST

Test date: 7/8/85
Test rates: 7.3 L/s
Test duration 24 hrs

Notes: 1. Top of casing as constructed was 0.70 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 150 mm

COMMENTS (LITHOLOGY)

0 m to 6 m	sandy clay
6 m to 21 m	sandstone: coarse, brown
21 m to 30 m	sandstone: fractured, white

WATER QUALITY

See water laboratory report (Analysis No. 85-86/0586)

WRD4020

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.

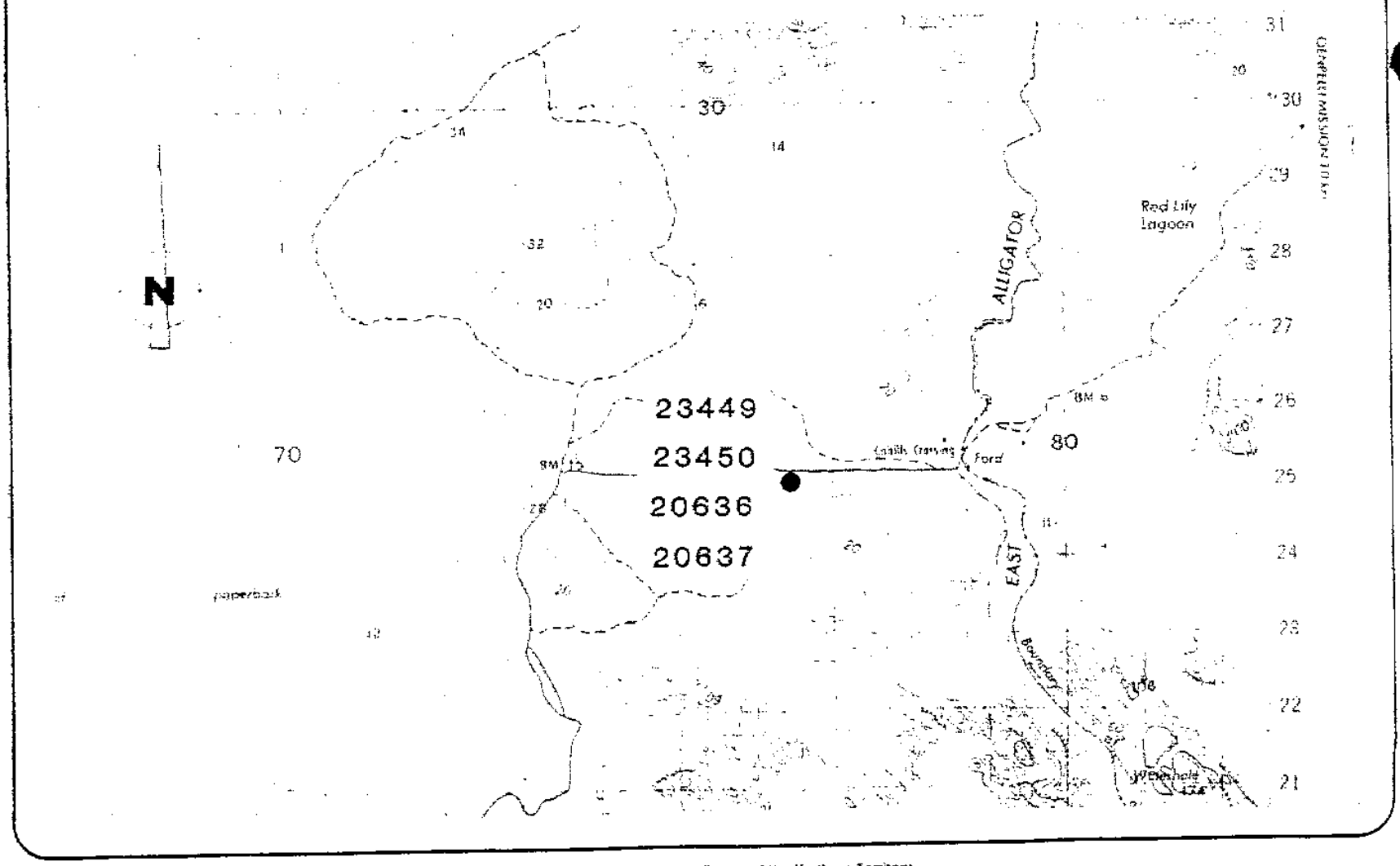
1. Construct a concrete apron around the bore head to prevent surface flow, seepage and waste from entering the bore.
2. Seal the space between the casing and pump equipment to prevent entry of vermin, dirt and pollutants.
3. Maintain pumping equipment in good order to prevent pollution. Prevent spillage 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.

The above recommendations are based on a 24 hour test at 7.3 L/s and assume that hydrologic conditions will not change with long term pumping.

This bore is capable of being pumping at higher rates by there is the possibility of sand intrusion at rates above the recommended 3 L/s.

BORE LOCATION MAP



G. L. DUFFIELD, Government Printer of the Northern Territory

WATER RESOURCES DIVISION

TEST REPORT — BORE RN. 23450

Bore location: East Alligator
Client/owner: A.N.P. & W.S.
Client's reference: Kakadu National Park
Purpose of supply: Domestic

Map: East Alligator 1:100 000 Map Sheet 5473
Grid reference: 764-250

RECOMMENDATIONS

Pumping rate: 2.0 L/s. Pump setting: 22.0 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: Water Resources Sasco House, Darwin
(In all correspondence refer to the bore's RN number).

BORE DATA

Finished depth: 30.40 m Completion date: 5/7/85
Standing water level 3.41 m on 9/8/85
Construction details:

Interval (m)	Description
0 m to 11 m	203 mm Blank Steel Casing
0 m to 22.48 m	152 mm Class 12 PVC Casing
22.48 m to 23.98 m	152 mm - 0.503 mm inline stainless steel screens
23.98 m to 25.98 m	152 mm - 0.762 mm inline stainless steel screens
25.98 m to 30 m	152 mm Class 12 PVC Casing

AQUIFER TEST

Test date: 14/8/85
Test rates: 2 L/s
Test duration 24 hrs

Notes: 1. Top of casing as constructed was 0.51 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 152 mm

COMMENTS (LITHOLOGY)

0 m to 6 m	sandy clay
6 m to 12 m	sandstone: yellow, pink
12 m to 12.4 m	clay: pink, purple
12.4 m to 21 m	sandstone

WATER QUALITY

See water laboratory report (Analysis No. 85-86/0588)

WRD4020

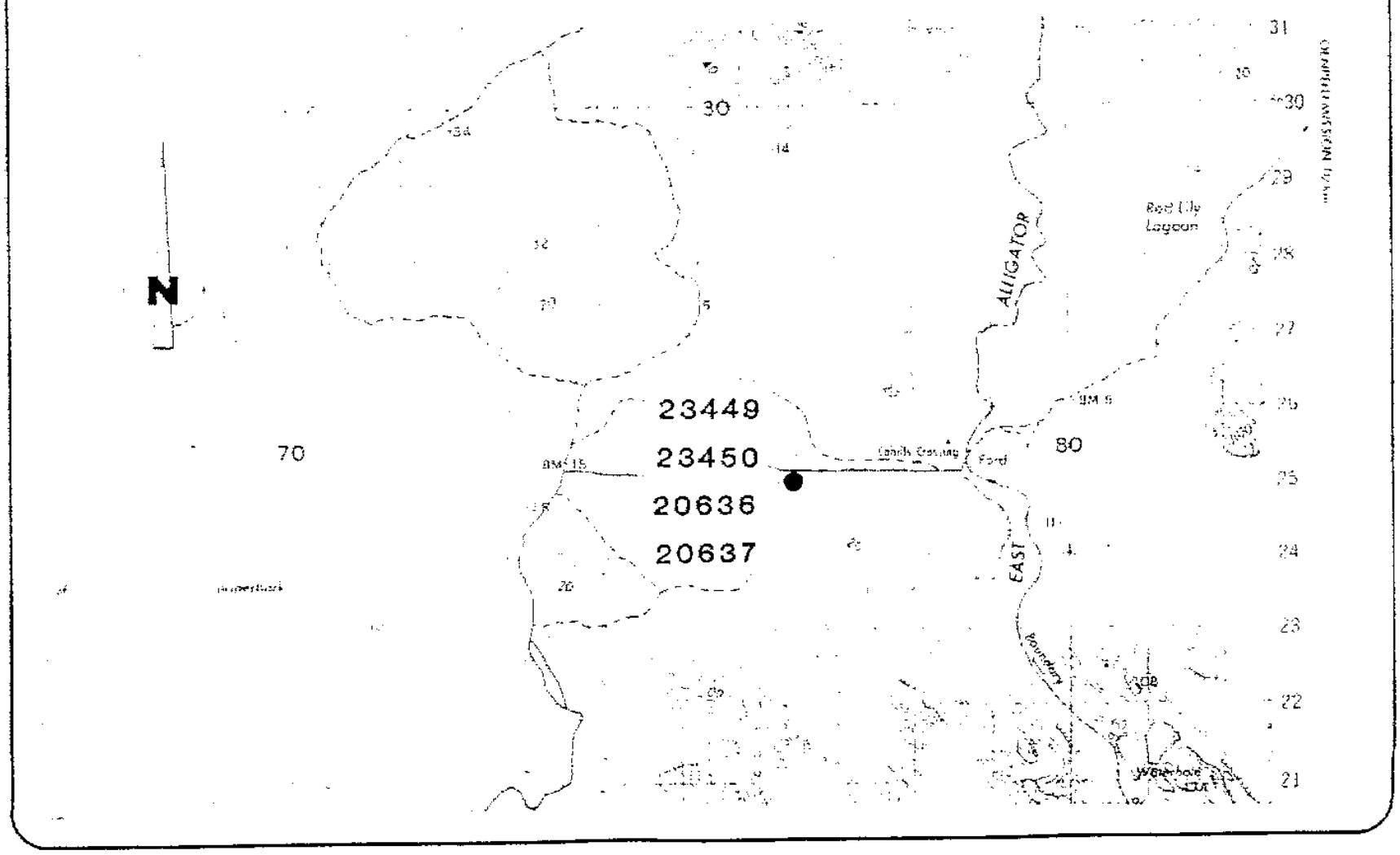
RECOMMENDATIONS FOR FINISHING, OPERATING AND PROTECTING GROUNDWATER BORES

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



G. L. DUFFIELD, Government Printer of the Northern Territory

WATER RESOURCES DIVISION

TEST REPORT — BORE RN. 20636

Bore location: East Alligator Ranger Station
Client/owner: A.N.P. & W.S.
Client's reference: Kakadu National Park
Purpose of supply: Domestic

Map: East Alligator 1:100 000 Map Sheet 5473
Grid reference: 765-251

RECOMMENDATIONS

Pumping rate: 2.50 L/s. Pump setting: 13.00 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: Water Resources Sasco House, Darwin
(In all correspondence refer to the bore's RN number).

BORE DATA

Finished depth: 26.00 m Completion date: 19/5/85
Standing water level 2.80 m on 1/8/85
Construction details:

Interval (m)	Description
0 m to 8.90 m	203 mm Blank Steel Casing
0 m to 13.4 m	152 mm Blank Steel Casing
13.4 m to 26 m	152 mm Perforated Steel Casing

AQUIFER TEST

Test date: 1/8/85
Test rates: 3.80 L/s
Test duration 6.0 hrs

Notes: 1. Top of casing as constructed was 0.20 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 152 mm

COMMENTS (LITHOLOGY)

0 m 8.29 m	sand: fine
8.29 m to 20.79 m	sandstone
20.79 m to 25 m	sandstone: fractured
25 m to 42.50 m	sandstone: hard
42 .50 m to 44 m	siltstone and clay
44 m to 45.19 m	sandstone: hard

WATER QUALITY

See water laboratory report (Analysis No.)

WRD4020

RECOMMENDATIONS FOR FINISHING, OPERATING AND PROTECTING GROUNDWATER BORES

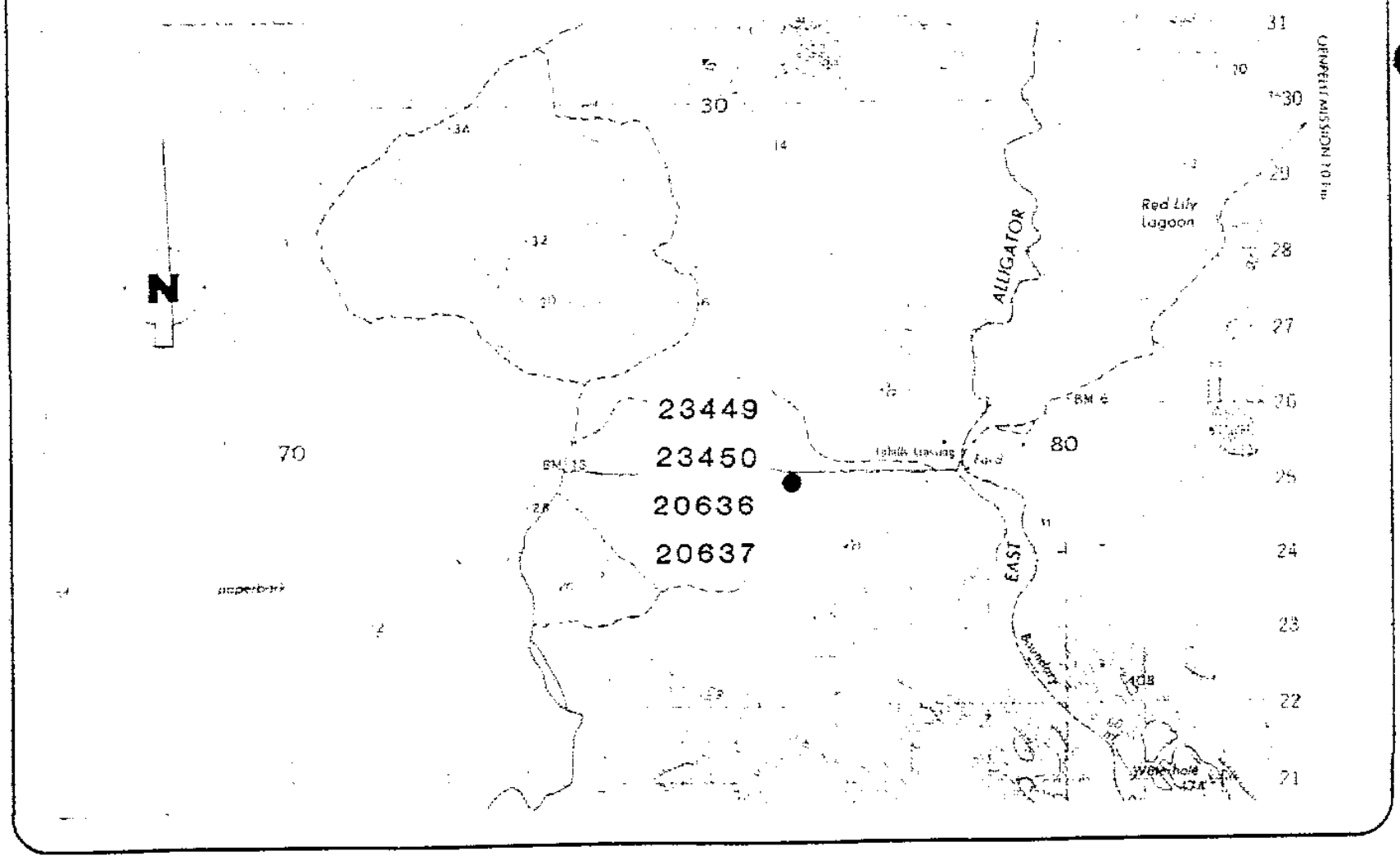
Attention to the following points will ensure a long and safe life for the bore supply and help prevent pollution of the groundwater resource.

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.

This bore if pumped at higher rate will induce fine sand into system resulting in pump damage.

BORE LOCATION MAP



G. L. DUFFIELD, Government Printer of the Northern Territory

WATER RESOURCES DIVISION

TEST REPORT — BORE RN. 20637

Bore location: East Alligator Ranger Station
Client/owner: A.N.P. & W.S.
Client's reference: Kakadu National Park
Purpose of supply: Domestic

Map East Alligator 1:100 000 Map Sheet 5473
Grid reference: 765-251

RECOMMENDATIONS

Pumping rate: 1.0 L/s. Pump setting: 18.00 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: Water Resources Sasco House, Darwin
(In all correspondence refer to the bore's RN number).

BORE DATA

Finished depth: 26.0 m Completion date: 22/5/81
Standing water level 2.68 m on 30/7/85
Construction details:

Interval (m)	Description
0 m to 6.8 m	203 mm Blank Steel Casing
0 m to 7.34 m	152 mm Blank Steel Casing
7.34 m to 14.80 m	152 mm Perforated Steel Casing (3mm slots)
14.80 m to 18.62 m	152 mm Blank Steel Casing
18.62 m to 26.0 m	152 mm Perforated Steel Casing (3mm slots)

AQUIFER TEST

Test date: 30/7/85
Test rates: 1.38 L/s
Test duration 6.0 hrs

Notes: 1. Top of casing as constructed was 0.20 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 152 mm

COMMENTS (LITHOLOGY)

0 m to 6.8 m	sandy clay: yellow
6.8 m to 7.8 m	sandstone weathered
7.8 m to 9.8 m	clay and siltstone
9.8 to 32.9 m	sandstone: weathered fractured

WATER QUALITY

See water laboratory report (Analysis No.)

WRD4020

RECOMMENDATIONS FOR FINISHING, OPERATING AND PROTECTING GROUNDWATER BORES

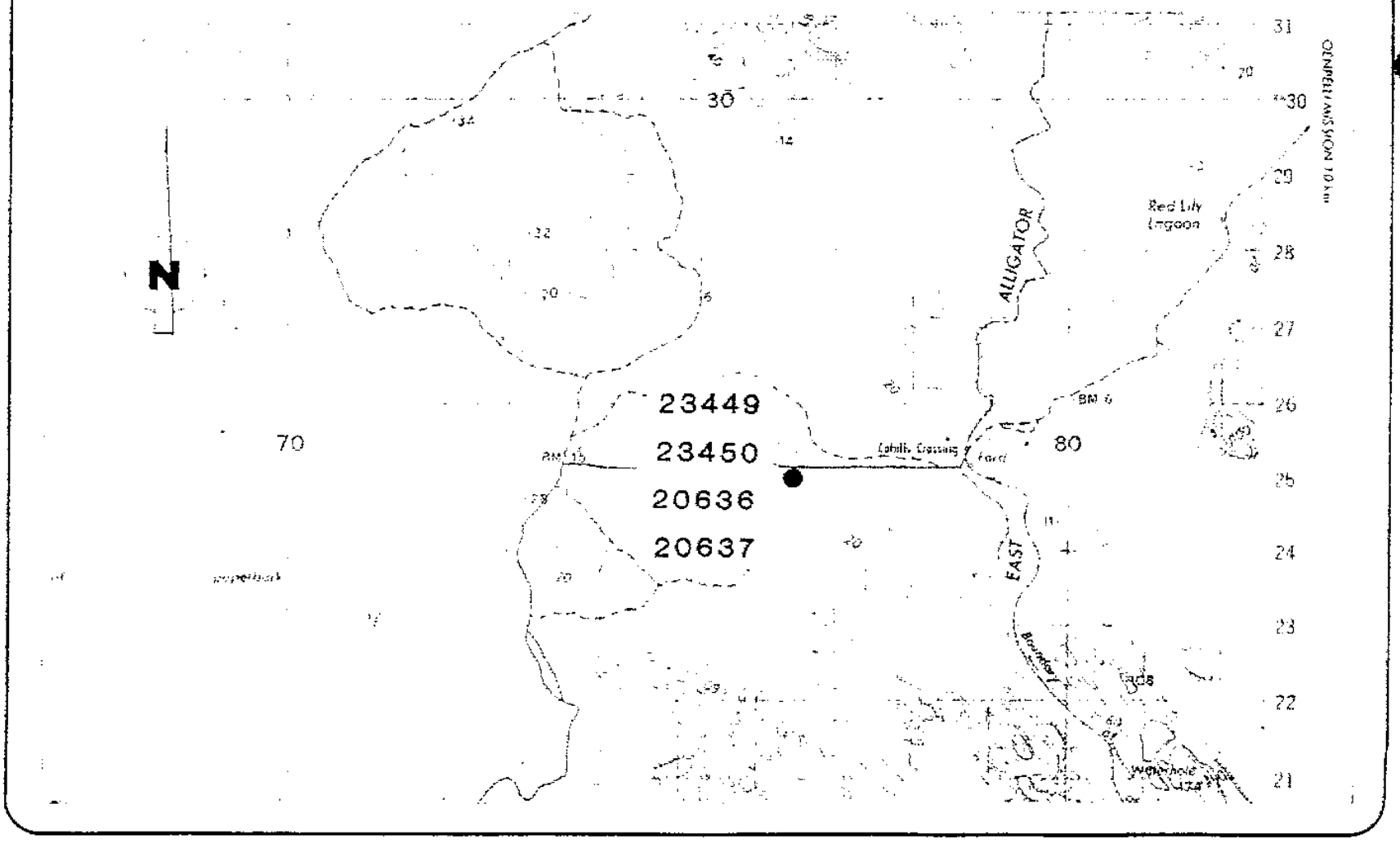
Attention to the following points will ensure a long and safe life for the bore supply and help prevent pollution of the groundwater resource.

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.

This bore if pumped any higher than recommended rate will induce fine sand resulting in pump damage.

BORE LOCATION MAP



G. L. DUFFIELD, Government Printer of the Northern Territory

WATER ANALYSIS

[redacted]

DEPARTMENT MINES & ENERGY
WATER RESOURCES DIVISION
DARWIN, N.T.

WR 4/1A

Laboratory Register No. 85-86/0586

Date received in Laboratory 23-8-85

Bottle No.	Time of sampling	Date of sampling
23449/2	0900	8-8-85

LOCATION AND DETAILS EAST ALLIGATOR RANGERS RN 23449 Temp 31°C RWT 341 RSP 1408

Proposed water use:- Domestic, Stock, Irrigation, other (specify)

ANALYSIS — PHYSICAL

☒ pH	5.0	☐ Colour (Hazen units)	
☐ Specific conductance (microsiemens/cm at 25° C)	25	☐ Turbidity (NTU's)	
☐ Total dissolved solids (mg/L - by evaporation at 180° C)	25	☐ Suspended solids (mg/L)	

ANALYSIS — CHEMICAL (mg/L)

☐ Sodium, Na	2	☐ Chloride, Cl	6
☐ Potassium, K	<1	☐ Sulphate, SO_4	1
☐ Calcium, Ca	1	☐ Nitrate, NO_3	<1
☐ Magnesium, Mg	<1	☐ Bicarbonate, HCO_3	<1
☐ Total Hardness (as $CaCO_3$)	3	☐ Carbonate, CO_3	
☐ Total Alkalinity (as $CaCO_3$)	<1	☐ Fluoride, F	<0.1
☐ Iron, (total) Fe	<0.1	☐ Orthophosphate, PO_4	
☐ Silica, SiO_2	19	☐ NaCl (calc. from chloride)	8

ANALYSIS — ADDITIONAL (mg/L)

☐ Copper, Cu	☐ Lead, Pb	☐ Arsenic, As
☐ Manganese, Mn	☐ Zinc, Zn	☐ Cadmium, Cd
☐ Nickel, N	☐ Cobalt, Co	☐

THE SAMPLE AS ANALYSED COMPLIES/DOES NOT COMPLY WITH NORTHERN TERRITORY DRINKING WATER STANDARDS AS RECOMMENDED BY THE NORTHERN TERRTORY DEPARTMENT OF HEALTH.

With suitable treatment the pH may be adjusted to an acceptable level.

This laboratory is registered by the National Association of Testing Authorities, Australia. The tests reported herein have been performed in accordance with its terms of registration. This document shall not be reproduced except in full.

Analysed by: Date 5.9.85

Boxes marked thus ☒ indicate levels considered undesirable for drinking water by the Northern Territory Department of Health.

5312/85 G. L. DUFFIELD, Government Printer of the Northern Territory

WATER ANALYSIS

[redacted]
DEPARTMENT MINES & ENERGY
WATER RESOURCES DIVISION
DARWIN N.T.

WR 4/1A

Laboratory Register No. 85-86/0588

Date received in Laboratory 23-8-85

Bottle No.	Time of sampling	Date of sampling
DP 87	0800	14-8-85

LOCATION AND DETAILS EAST ALLIGATOR RANGERS RN 23450 Temp 31°C RWT 341
7985 RSP 1408

Proposed water use:- Domestic, Stock, Irrigation, other (specify)

ANALYSIS — PHYSICAL

☒ pH	5.1	☐ Colour (Hazen units)	
☐ Specific conductance (microsiemens/cm at 25° C)	35	☐ Turbidity (NTU's)	
☐ Total dissolved solids (mg/L - by evaporation at 180° C)	30	☐ Suspended solids (mg/L)	

ANALYSIS — CHEMICAL (mg/L)

☐ Sodium, Na	3	☐ Chloride, Cl	10
☐ Potassium, K	<1	☐ Sulphate, SO_4	1
☐ Calcium, Ca	<1	☐ Nitrate, NO_3	<1
☐ Magnesium, Mg	1	☐ Bicarbonate, HCO_3	<1
☐ Total Hardness (as $CaCO_3$)	4	☐ Carbonate, CO_3	
☐ Total Alkalinity (as $CaCO_3$)	<1	☐ Fluoride, F	<0.1
☐ Iron, (total) Fe	0.2	☐ Orthophosphate, PO_4	
☐ Silica, SiO_2	19	☐ NaCl (calc. from chloride)	16

ANALYSIS — ADDITIONAL (mg/L)

☐ Copper, Cu	☐ Lead, Pb	☐ Arsenic, As
☐ Manganese, Mn	☐ Zinc, Zn	☐ Cadmium, Cd
☐ Nickel, N	☐ Cobalt, Co	☐

THE SAMPLE AS ANALYSED COMPLIES/DOES NOT COMPLY WITH NORTHERN TERRITORY DRINKING WATER STANDARDS AS RECOMMENDED BY THE NORTHERN TERRTORY DEPARTMENT OF HEALTH.

This Laboratory is registered by the National Association of Testing Authorities, Australia. The tests reported herein have been performed in accordance with its terms of registration. This document shall not be reproduced except in full.

Analysed By: [signature] Date 5/9/85

Boxes marked thus ☒ indicate levels considered undesirable for drinking water by the Northern Territory Department of Health.