PRELIMINARY SITE INVESTIGATION

Little Mindil

Prepared for:

KTT Investment Pty Ltd
459 Harris Street,
Ultimo NSW 2007

SLR Ref: 680.30010-R01
Version No: v3.0
September 2019

PREPARED BY

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with KTT Investment Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
680.30010-R01	29 June 2021	Sarah Doherty	Paul Turyn	Paul Turyn
680.30010-R01	28 May 2020	Sarah Doherty	Paul Turyn	Paul Turyn

CONTENTS

1 Introduction

KTT Investment Pty Ltd (the Client) have commissioned SLR Consulting Australia Pty Ltd (SLR) to undertake a Preliminary Site Investigation (PSI) at 25 Gilruth Avenue, The Gardens, Northern Territory, also known as Little Mindil (the Site). This report outlines the findings of this PSI and subsequent recommendations.

The findings of this PSI are based on review on publicly available historical data, masterplan documentation provided by the Client and observations made by SLR representatives during an initial site inspection.

1.1 Objectives

SLR understands the purpose of this PSI was to provide a preliminary assessment on the potential contamination status of the Site. The objectives of this PSI are as follows:

- Identify site and surrounding landholding characteristics and current conditions.
- Identify past or current uses and activities at the site and in the surrounding area that have potential to contaminate land and groundwater.
- Identify Contaminants of Potential Concern (CoPC) based on past or current activities.
- Provide preliminary advice on whether there were contaminating activities at the Site that would preclude the Site from being suitable for its intended use.
- Recommend further assessment necessary (if required) to inform the suitability of the site for its intended use.

1.2 Scope of Works

This PSI was undertaken in general accordance with the following guidelines.

- National Environment Protection Council (1999, 2013 revision), National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM).
- NT EPA 2017, Northern Territory Contaminated Land Guideline, Northern Territory Environmental Protection.

The scope of works undertaken as part of this PSI included the following.

- Review available historical aerial photographs of the property and immediate surrounds.
- Review relevant and available Northern Territory Government records (which may include zoning, building and services plan approvals, water and air quality data, waste management, proximity to environmentally sensitive areas, proximity to local surface waters and proximity to groundwater resources).
- Review all available geological, hydro-geological, and heritage information.
- Review existing assessments/documents/reports (where available).
- Undertake an initial site inspection and walkover to aid in the development of this PSI
- Preparation of this PSI report.

2 Site Information

2.1 Site Identification

The Site existed as part Lot 7651 of Town of Darwin Plan S2009/255A-B. A copy of the City of Darwin *Survey Plan* for the Site is provided in **Appendix A**. Refer to **Figure 1** for a current aerial image at the time of this investigation and **Figure 2** for a copy of the Site location map. A summary of the property identification information is detailed below in **Table 1**, with the historic Land Title documentation provided in **Appendix B.**

The Site is commonly known as Little Mindil and is directly adjacent to Little Mindil Beach foreshore to the north-west. At the time of this assessment, the Site consisted of a large, unoccupied grassed area and an open air bitumen carpark adjoining the neighbouring casino carpark.

Table 1 Summary of Property Information

Site Information	Details
Site Owner	SKYCITY Australia Pty Ltd (ACN 090 0828 612)
Site Address	25 Gilruth Avenue, The Gardens, Northern Territory
Parcel Reference	Lot 7651 of Town of Darwin Plan S2009/255A-B
Site Area	51,300m^2
Current Occupier/Land use	230 space open air bitumen carpark and associated landscaping and open air grassed area known as “Gala Lawns” which has been used for gala events and helicopter landings.
Proposed Future Land Use	Multi-storey hotel and Multiple private dwellings with pools
Current Zoning	Tourist Commercial (TC)
Local Government	Town of Darwin
Central GPS Coordinates	Latitude: 12°26'58.9"S Longitude: 130°49'45.7"E

C:\Users\sleperkins\Documents\aa_GIS\LittleMindil\LittleMindil.mxd

SLR
5/21 Parap Road
PARAP, NT 0801
AUSTRALIA
www.slrconsulting.com

Project No.:	A00.0094
Date:	27-May-2020
Drawn by:	S.Doherty
Scale:	1:2,863
Sheet Size:	A4
Projection:	GDA 1994 MGA Zone 52

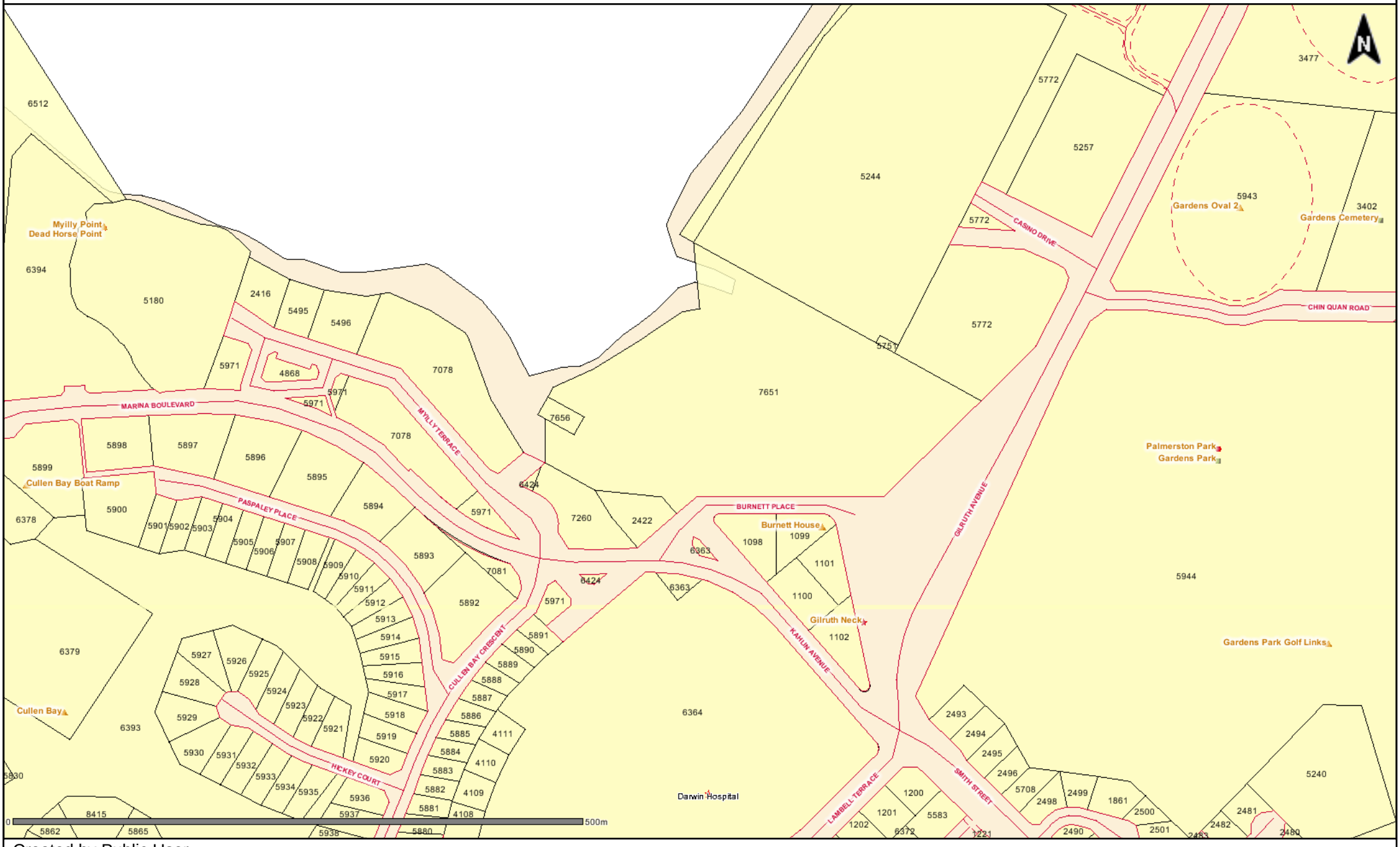
N
W E
S

0 100 200 300 400 m

Current Site Aerial

Figure 1

Site Locality: Lot 7651



Created by Public User

Bottom Left: -12° 27' 11", 130° 49' 23" Top Right: -12° 26' 47", 130° 50' 04" Approximate Scale: 1:4,300 Datum: GDA 1994

Data for information purposes only - accuracy not guaranteed

Map Center: 130° 49' 44.1" E, 12° 26' 59.5" S

2.2 Surrounding Environment

2.2.1 Surrounding Land Uses and Activities

A summary of the properties adjacent to the Site at the time of this assessment is detailed in **Table 2**.

Table 2 Summary of surrounding land uses

Direction	Description
North	Mindil Beach Casino and Resort complex (formerly known as SkyCity Casino).
North East	Sewer pump station and open air carpark and road reserve for Mindil Beach Casino A registered sacred site exists within the lot boundary to the north north-east, see **Section 3.2** for further detail. Mindil Creek flows along the length of the site, within a Restricted Works Area (see **Section 3.2).**
North West	Little Mindil Beach. Electrical substation.
South	Heritage zone "Myilly Point Heritage Precinct" including Burnett House, Mines House, Audit House and Magistrates House. Beyond this is a historic site known to have contained the old Darwin hospital which is currently undergoing remediation works for development as a public open space.
South West	Multi level residential buildings
West	Vacant Lot, Myilly Point Park (public open space) and the Cullen Bay Marina
East and South East	Gardens Park Golf Course

2.2.2 Regional Geology

A review of the *Darwin Northern Territory Australian 1:250,000 Geological Series* map (NTDME, 1988) indicated the strata which underlay the Site consisted of kaolinitic claystone, commonly radiolaria-rich, silty in places, montmorillonitic, glauconitic and calcareous when fresh; basal conglomerate; minor bioturbated siltstone, carbonate, sandy claystone and clayey sandstone. Refer to **Appendix C** for an extract of the geological series map.

2.2.3 Regional Topography

Topography from the *Northern Territory Government's Department of Infrastructure, Planning and Logistics* depict the Site as relatively flat with no significant change in ground level elevation. An escarpment to the south and south west of the Site rises sharply along the boundary and a creek exists to the north and north east of the Site. There is a registered sacred site (discussed in further detail in **Section 3.2** and shown in **Figure 3**) close to the creek which appears to be slightly lower in elevation than the grassed area and carpark on the site. Refer to **Appendix D** for the topographic maps of the area.

2.2.4 Registered Groundwater Bore Information

A search of the Department of Environment and Natural Resources (DENR) *Natural Resource Maps* online database (DENR, 2020) indicated that no registered groundwater bores existed on the Site. The search further indicated that four registered groundwater bores existed within a 500 metre radius of the Site. **Table 3** provides a summary of the location and details of the identified registered bores. Refer to **Appendix E** for copies of the registered bore reports.

Table 3 Summary of registered bore search

Registered Number	SWL (mbgs)	Total Depth (mbgs)	Yield (L/s)	Distance from site boundary
RN000953	NR	33.5	0.13	360m north-west
RN002756	24	18.3	Monitoring well	300m south
RN000954	NR	65.2	0.25	360m north-west
RN000955	NR	66.8	0.25	310m west

SWL = static water level mbgs = metres below ground surface L/s = Litres per second NR = Not Recorded

2.2.5 Acid Sulphate Soils

Acid Sulphate Soils (ASS) are a characteristic natural feature of lowland coastal environments in Darwin, particularly where landform elevations are below 5m Australian Height Datum (AHD). ASS contain highly reactive iron sulphides generally in the form of framboidal pyrite. ASSs are benign when in a waterlogged state. However, when these soils are drained or excavated, oxygen from the atmosphere reacts with the iron sulphides in the soil resulting in the production of sulphuric acid and the potential release of metal compounds from disturbed soils.

A review of the *Land Systems of the Northern Part of the NT (1:250,000)* indicated the following ASS properties were applicable to the Site.

- The Site exists within the Darwin Coastal geomorphic zone and is classified as level tidal flats with channels and estuaries and minor dunes.
- Common occurrence of ASS can be expected on tidal flats, coastal floodplains and some coastal sand plains.

3 Site History

3.1 Historical Aerial Imagery

A review of the NT Archives Aerial Photography Index was undertaken to provide supporting evidence of the past and present land uses and activities undertaken on or surrounding the Site. Refer to **Appendix F** for a copy of the historical aerial photographs. **Table 4** provides a summary of historical information identified through these searches.

Table 4 Summary of historical aerial and satellite imagery review

Date	Description
1941	Undeveloped land with apparent woody vegetation. The Casino Lot is also undeveloped in this image. The heritage houses at Myilly Point are observable in this image.
1975	Post Cyclone Tracy, debris from buildings to the west atop the escarpment has been spread across the Site. The electrical substation on to the west of the Site is now in place. Woody vegetation has been cleared and dirt roads transect the Site. Some development including land clearing has occurred across the neighbouring casino Lot.

Date	Description
1999	Earthworks have been undertaken along the north-western foreshore potion of the Site and with new access tracks installed. Apparent imported fill material of unknown origin is observable in this picture. The flow of Mindil creek appears to have been altered through these works. The casino and carpark are observable in this image.
2008	The Site appears largely unchanged from previous image. Multi-storey residential buildings have been constructed to the south-west.
2009	The Site appears largely unchanged from previous image.
2010	Installation of footbridges across Mindil creek, the bitumen carpark area and access road from the casino carpark are underway in this image. Significant clearing of vegetation along the southern site boundary has occurred and grass installed on the northern area.
2012 - 2016	The Site appears largely as it does today, with temporary infrastructure relating to events on the Gala lawns observable in some images.

3.2 Cultural Heritage

A search of the Northern Territory Heritage Register (NT Heritage Council, 2020) indicated that no public record of heritage listings exists within the Site however, there are a number of heritage listed buildings to the south west of the site within the Myilly Point area.

Registered Sacred Site 5073-89, a burial site, exists within the boundary of the Site, shown in the exert from the Aboriginal Areas Protection Authority (AAPA) certificate in **Figure 3**. A restricted works area is also defined along Mindil Creek and surrounding the Sacred Site.

Tumarkin (2004) reports that during construction works for the Casino between 1977 and 1980, human remains were uncovered in the Mindil Beach sand dunes. Human remains were reportedly again encountered in the area during excavation works in 1991.

Lot 7651 Town of Darwin. (25 Gilruth Avenue, The Gardens, NT) - 201901805

NOT FOR WORKS

MAP SHOWING SACRED SITES RECORDED AS AT 13/03/2019

ISSUED TO:
Colliers International NT Pty ltd

J2019-0077

0 80
metres
Scale 1:2,000

KEY

- Subject Land
- Registered Sacred Site
- Restricted Works Area
- Extent of Registered Site

** The Sacred Site point is not indicative of the specific site location and does not represent the location of any features of the site.*

Prepared and produced by Aboriginal Areas Protection Authority (AAPA), Darwin, Northern Territory of Australia
© Northern Territory of Australia

3.3 Previous Investigations

Multiple potential sources of contamination at the Site have been identified through this PSI, with further detail provided in the preliminary conceptual site model in **Section 5**.

In more recent years, development has been undertaken including a 230 space bitumen carpark, installation of underground services, landscaping of the Gala Lawns area and installation surrounding pedestrian walkways and footbridges.

It is possible that land quality assessment works, and potentially remediation, would have been carried out prior to development works, although SLR have not been able to source such reports.

As such, potential areas and contaminants of concern identified in this report are provided without consideration or review of any remediation works that may have been undertaken.

4 Initial Site Inspection

An initial inspection of the Site was undertaken on 28 May 2020 by an experienced SLR representative. The following details a summary of the observations and findings of the initial site inspection. A photography log supporting these observations is provided in **Appendix G.**

- Members of the public were observed across the Site throughout the inspection exercising, camping and fishing.
- Information signs (shown photo log) describe the Site as a dumping ground after the 1942 bombing of Darwin and 1974 Cyclone Tracy impact.
- The footpath adjacent to the foreshore to the north of the Site has collapsed and is barricaded by temporary fencing.
- Evidence of fly tipping in Mindil Creek was observed.
- Environmental weeds are established along the cliffs to the south west of the Site.

5 Preliminary Conceptual Site Model

This preliminary conceptual site model (CSM) has been developed in accordance with the ASC NEPM, which draws upon the ASTM E1689-95 (2014) Standard Guide for Developing Conceptual Site Models for Contaminated Sites (ASTM E1689). This CSM has been developed to determine the presence of plausible complete exposure pathways from potential contamination sources to susceptible receptors such as humans and/or environmental values. As per ASTM E1689, definitions of the key elements of the complete exposure pathways are as follows.

- Contaminants – any substance, including any radiological material, that is potentially hazardous to human health and/or the environment and is present in the environment at concentrations above background levels.
- Source – the location from which a contaminant(s) has entered or may enter a physical system. A source may be of primary or secondary origin.
- Environmental Receptor – humans and other living organisms potentially exposed to and adversely affected by contaminants because they are present at the source(s) or along contamination migration pathways.

- Migration Pathway – the course through which contaminants in the environment may move away from the source(s) to potential environmental receptors.
- Exposure Route – the process by which a contaminant or physical agent in the environment comes into direct contact with the body, tissues, or exchange boundaries of an environmental receptor or organism. Examples include (but are not limited to) ingestion, inhalation, dermal absorption, root uptake, and gill uptake.

It should be noted that as no intrusive investigation was conducted as part of this PSI as such, no definitive assessment of the presence/absence of contamination associated with these sources of contamination can be made.

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Table 5 Potential contamination and sources

Contaminants of Potential Concern	Potential Sources	Potential transport mechanisms	Potential exposure pathways	Potential Receptors
Asbestos Containing Material	• Dispersal of debris from Cyclone Tracy impact • Remnant impact of historic dumping following 1942 bombing of Darwin and 1974 Cyclone Tracy impact. • Fill of unknow origin imported during historic earthworks projects.	• Aerial dispersion and distribution contaminants.	• Inhalation of contaminated material, such as vapour or dust.	• On-site recreational land users • Off-site residential and recreational land users • Potential future on-site commercial/industrial workers
ASS/PASS	• Proximity to coastal/tidal areas.	• Disturbance and mismanagement of ASS/PASS material during earthworks	• Ingestion of contaminated material. • Dermal contact • Plant uptake	• Ecological flora & fauna

Contaminants of Potential Concern	Potential Sources	Potential transport mechanisms	Potential exposure pathways	Potential Receptors
Heavy metals	• Fill of unknow origin imported during historic earthworks projects. • Remnant impact of historic dumping following 1942 bombing of Darwin and 1974 Cyclone Tracy impact. • Mobilisation following disturbance ad mismanagement of ASS/PASS material	• Migration of surface contaminants, impacted soil, or leachable contaminants via hydraulic surface flow during periods of inclement weather. • Bioaccumulation of contaminants in aquatic fauna.	• Inhalation of contaminated material, such as vapour or dust. • Bioaccumulation of contaminants in aquatic fauna. • Ingestion of contaminated material.	• On-site recreational land users • Off-site residential and recreational land users • Potential future on-site commercial/industrial workers • Ecological flora & fauna
Hydrocarbons	• Fill of unknow origin imported during historic earthworks projects. • Spills relating to historic development projects. • Remnant impact of anecdotal historic dumping following 1942 bombing of Darwin and 1974 Cyclone Tracy impact.	• Migration of surface contaminants, impacted soil, or leachable contaminants via hydraulic surface flow during periods of inclement weather. • Bioaccumulation of contaminants in aquatic fauna.	• Inhalation of contaminated material, such as vapour or dust. • Ingestion of contaminated material.	• On-site recreational land users • Off-site residential and recreational land users • Potential future on-site commercial/industrial workers • Ecological flora & fauna

Contaminants of Potential Concern	Potential Sources	Potential transport mechanisms	Potential exposure pathways	Potential Receptors
Polychlorinated Biphenyls	• Remnant impact of historic dumping following 1942 bombing of Darwin and 1974 Cyclone Tracy impact. • Electrical substation to the west of the site.	• Migration of surface contaminants, impacted soil, or leachable contaminants via hydraulic surface flow during periods of inclement weather. • Bioaccumulation of contaminants in aquatic fauna.	• Inhalation of contaminated material, such as vapour or dust. • Ingestion of contaminated material.	• On-site recreational land users • Off-site residential and recreational land users • Potential future on-site commercial/industrial workers • Ecological flora & fauna

6 Summary, Conclusions, and Recommendations

KTT Investment Pty Ltd (the Client) have commissioned SLR Consulting Australia Pty Ltd (SLR) to undertake a Preliminary Site Investigation (PSI) at 25 Gilruth Avenue, The Gardens, Northern Territory, also known as Little Mindil (the Site).

SLR understands the purpose of this PSI was to provide a preliminary assessment on the potential contamination status of the Site. The objectives of this PSI are as follows:

- Identify site and surrounding landholding characteristics and current conditions.
- Identify past or current uses and activities at the site and in the surrounding area that have potential to contaminate land and groundwater.
- Identify Contaminants of Potential Concern (CoPC) based on past or current activities.
- Provide preliminary advice on whether there were contaminating activities at the Site that would preclude the Site from being suitable for its intended use.
- Recommend further assessment necessary (if required) to inform the suitability of the site for its intended use.

The Site as it currently exists was observed to contain a 230-space open air bitumen car park including landscaped garden beds, Power and Water infrastructure including underground services, a large grassed area known as the “Gala Lawns” used for events and helicopter landings and a series of concrete pedestrian pathways including footbridges across Mindil Creek.

Mindil Creek flows through the Site and, in accordance with the AAPA certificate, is a Restricted Works Area. Adjacent to the creek is a Registered Sacred Site and known burial ground, also listed on the Site’s AAPA certificate. Human remains are reported to have been encountered in previous excavation works in the area in the late 1970’s and early 1990’s, including during development of the neighbouring Casino (Tumarkin, 2004).

The Site is surrounded by a mix of tourist commercial, public open space and residential areas, including the Casino to the north, Little Mindil beach to the west, heritage listed buildings atop the escarpment to the south and the Gardens Park golf course to the east.

Based on this PSI, SLR has identified the following potential sources of contamination relating to the site and past land use:

- Fill of unknow origin imported during historic earthworks projects.
- Remnant impact of anecdotal historic dumping following 1942 bombing of Darwin and 1974 Cyclone Tracy impact.
- Mobilisation of heavy metals following disturbance and mismanagement of ASS/PASS material
- Proximity of the Site to coastal areas and tidal muds.
- Potential spills during historic development projects.
- Adjacent substation within the Site which may have used PCB containing transformer oils

Related to these sources, SLR has identified the following Contaminants of Potential Concern:

- Asbestos Containing Material

- Heavy metals
- Acid Sulfate Soils
- Polychlorinated Biphenyls
- Hydrocarbons

It should be noted that as no intrusive investigation or laboratory analytical assessments were conducted as part of this PSI as such, no definitive assessment of the presence/absence of contamination can be made.

SLR recommends further investigation including intrusive investigation and laboratory analytical assessment of surface and subsurface samples be undertaken to further investigate the above outlined potential for contamination to exist on the Site. If required. SLR can develop and provide a Sampling Analysis and Quality Plan to inform such an investigation.

This Preliminary Site Investigation report must not be reproduced except in full and must be read in conjunction with the Limitations outlined in Section 8 of this report.

7 References

ASC NEPM 2013, *"National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended in 2013"*. National Environment Protection Council.

ASTM 2014 *"Standard Guide for Developing Conceptual Site Models for Contaminated Sites*." ASTM E1689-95. American Society for Testing and Materials ASTM International.

Department of Environment and Natural Resources 2008 "*Land Systems of the Northern Part of the NT (1:250,000)"* Northern Territory Government.

Department of Environment and Natural Resources 2018 "*Natural Resource Maps*" Northern Territory Government.

NTDME 1988 *"Darwin Northern Territory Australian 1:250,000 Geological Series Sheet SD 52-4."* Northern Territory Geological Survey. Second Edition. 1988.

NT EPA 2017, "*Northern Territory Contaminated Land Guideline"*

NT EPA 2013, "*Guidelines for Consultants Reporting on Environmental Issues"*

Tumarkin, M 2004, *"First as a tragedy, second as a farce: traumascapes, memory and the curse of indifference"* Overland, Vol. 175 pp. 22-26

WA Department of Health 2009, *"Guidelines for the assessment, Remediation and management of Asbestos-contaminated sites in Western Australia"*

WA Department of Health 2019 *"Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia, Consultation Draft"*

Wuana, R. and Okieimen, F. 2011, "*Heavy Metals in Contaminated Soils: A Review of Sources, Chemistry, Risks and Best Available Strategies for Remediation*", Analytical Environmental Chemistry Research Group, Benue State University Makurdi, Nigeria

8 Limitations

The following information will assist in understand the uncertainties relating to the interpretation of the data obtained during this investigation and the recommendations presented in the report and help with assessment and interpretation of the report.

SLR assumes no responsibility for the quality or accuracy of data obtained from external sources, or for occurrences outside the scope of works defined in this report.

All work conducted, and reports produced by SLR are prepared for a particular Client's objective and are based on a specific scope, conditions and limitations, as agreed upon between SLR and the Client. Information and/or report(s) prepared by SLR may therefore not be suitable for any use other than the intended objective.

Before passing on to a third party any information and/or report(s) prepared by SLR, the Client is to inform fully the third party of the objective and scope, and all limitations and conditions, including any other relevant information which applies to the information and/or report(s) prepared by SLR.

It is the responsibility of third parties to investigate fully to their satisfaction if any information and/or report(s) prepared by SLR, is suitable for a specific objective.

Services were conducted in a conscientious and professional manner. The nature of the task, however, and the likely disproportion between any damage or loss which might arise from the work and any report prepared as a result and the cost of our services is such that SLR cannot guarantee that all issues of concern/contamination have been identified.

The report(s) and/or information produced by SLR should not be reproduced and/or presented/reviewed except in full.

APPENDIX A

Survey Plan

SUPERSEDES A.691 AND PART OF S.79/105

7651
5.13 ha

7656
668m²

7078
S.99/229A

7260
S.2000/161

2422
Dia. 397

5772
S.90/247B

5244
S.79/12

5751
S.90/247B

FANNIE BAY

H.W.M.

Little Windil Beach

ROAD (VAR WIDTH)

MYILLY TERRACE (VAR WIDTH)

(20-115 WIDE) ROAD (VAR WIDTH)

KAHLIN AVENUE (VAR WIDTH)

TEMIRA CRESCENT (VAR WIDTH)

BURNETT (VARIABLE WIDTH) PLACE

GILRUTH AVENUE (VAR WIDTH)

CREEK

ELECTRICITY SUPPLY EASEMENT

ELECTRONIC COMMUNICATIONS EASEMENT

SEWERAGE EASEMENT

RIGHT OF WAY EASEMENT

CLIFF

SEE ENLGT 'A'

SEE ENLGT 'B'

SEE ENLGT 'C'

ENLARGEMENT 'A'
Not to scale

ENLARGEMENT 'B'
Not to scale

ENLARGEMENT 'C'
Not to scale

CRM S.09255001

CRM S93307020

CRM S95220043

I, RICHARD DAVID PURNELL hereby certify that the survey represented on this plan was carried out by me or under my supervision and was completed on 03 MARCH 2010 and that this survey has been executed in accordance with the Licensed Surveyors Act and the Directions thereunder.

R. Purnell — Licensed Surveyor — 9/6/2010 — Date

Northern Territory Government, Department of Planning and Infrastructure

SURVEY APPROVED

Surveyor-General — 29/07/10 — Date

AMENDMENTS			
Reference	Details	Approved	Date
S2009/255/56	Audit amendments made to plan	Delegate of Surveyor General	29-11-10

Notes:
- Easement's Dimension – See Sheet S2009/255B
- Reference Marks are at one metre unless otherwise shown.
- Sewerage and Electricity Supply Easements are in favour of the Power and Water Corporation.
- Electronic Communications Easements are in favour of Telstra Corporation Ltd.
- Right of Way Easement is in favour of the Power and Water Corporation.

Field Book: S.2009/255
Drawn: Ausurv Pty Ltd 02.2010
Examined: Ausurv Pty Ltd
Map Reference

GRID Bearings

AZIMUTH
Assumed from S.2000/161
Observed at

LEGEND
Concrete Post
Concrete Block
Peg or Wooden Post
Reference Mark
Lockspit
Fence Post

LOTS 7651 AND 7656
SUBDIVISION OF LOTS 4818 & 5994
TOWN OF DARWIN

SCALE 1:1000
20 0 20 40 60 metres

S.2009/255A
SHEET 1 OF 2

APPENDIX B

Historic Land Titles

APPENDIX C

Darwin Northern Territory Australian 1:250,000 Geological Series (Extract)


Charles Point Lighthouse
East Point
Fannie Bay
West Point
Dak Point
Woods Inlet
Frances Bay
PORT DARWIN
Swires Bluff
Middle Point
Lee Point
Tree Point
Hope Inlet
Noogoo Swamp
Kings Creek
Howard Springs
Fisher Lagoon
Lyons Lagoon
Girraween Lagoon
McMinns Lagoon
Marlows Lagoon
Corrowara Creek
West Arm
East Arm
Channel Island
DARWIN
COX
PENINSULA
SHOAL BAY
DELISSAVILLE
KINGS TABLE
ELIZABETH RIVER
A
B
C
D
Kld
Qca
Qcr
Qaf
Czs, Czl
Kld
Qcl
Qa
Pwt
Pfb
Ps
Pp
Pf
Ppa
Ppw
Ppy
Epk
Rc
Czl
JKl
Sn
375
350
325
300
275
250
225
200
175
150
125
100
75
50
25
450
475

APPENDIX D

Regional Topography

GARDENS
1:2 500
5073-23241

GARDENS

NORTHERN TERRITORY

1:2 500

0 40 80 120 160 200

metres

CONTOUR INTERVAL :	1 metre	**CURRENCY OF TOPOGRAPHY :**	1 Jul 2016
HORIZONTAL DATUM :	GDA94	**CURRENCY OF CADASTRE :**	12/09/2017
VERTICAL DATUM :	AHD	**SOURCE MAP SCALE :**	1: 2500
PROJECTION :	Transverse Mercator	**ZONE UTM :**	52

This map was produced on the Geocentric Datum of Australia (GDA 94).

For most practical purposes GDA94 coordinates and satellite derived (GPS) coordinates based on the World Geocentric System 1984 (WGS84) are the same.

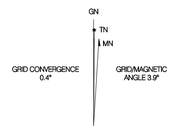
This map has been compiled without field verification. The representation of a road or track on this map is not necessarily evidence of a Public Right of Way.

Horizontal Accuracy: Expected accuracy of well defined detail is within 0.5mm at source map scale.

Vertical Accuracy: 90% of elevations are correct to within one half the contour interval at source map scale.

Compilation : By digital photogrammetric methods without field verification

This map has been automatically generated and may contain errors.



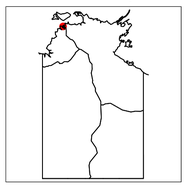
True north, grid north and magnetic north are shown diagrammatically for the centre of this map. Magnetic north is correct for 2009 and moves easterly about 0.1° every ten years.

LOCALITY DIAGRAM

Adjoining Mapsheets

5073-23133	5073-23132	5073-23123
5073-23244	5073-23241	5073-23214
5073-23243	5073-23242	5073-23213

Northern Territory



ORTHOGRAPHIC MAP

GARDENS
1:2 500
5073-23241

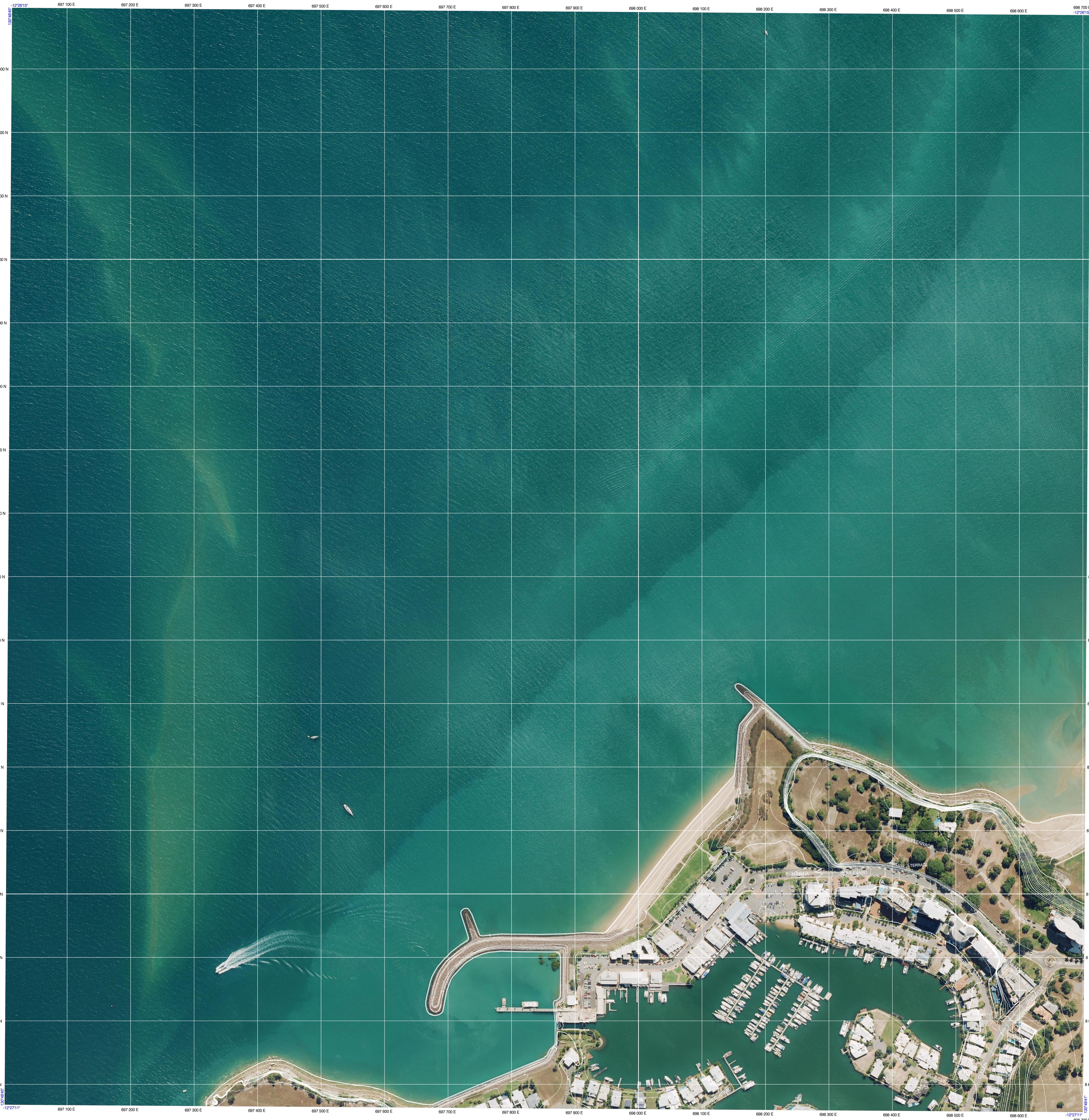
Dept of Infrastructure, Planning and Logistics
Land Services Division
Ground Floor, Arnhemica Building, Parap
GPO Box 1680 Darwin NT 0801
http://www.nt.gov.au/dlpe

1:2 500

5073-23244

5073-23244

NORTHERN TERRITORY



1:2 500

0 40 80 120 160 200

metres

CONTOUR INTERVAL :	1 metre	**CURRENCY OF TOPOGRAPHY :**	1 Jul 2016, 23 Jul 2015
HORIZONTAL DATUM :	GDA94	**CURRENCY OF CADASTRE :**	12/09/2017
VERTICAL DATUM :	AHD	**SOURCE MAP SCALE :**	1: 2500
PROJECTION :	Transverse Mercator	**ZONE UTM :**	52

This map was produced on the Geocentric Datum of Australia (GDA 94).

For most practical purposes GDA94 coordinates and satellite derived (GPS) coordinates based on the World Geocentric System 1984 (WGS84) are the same.

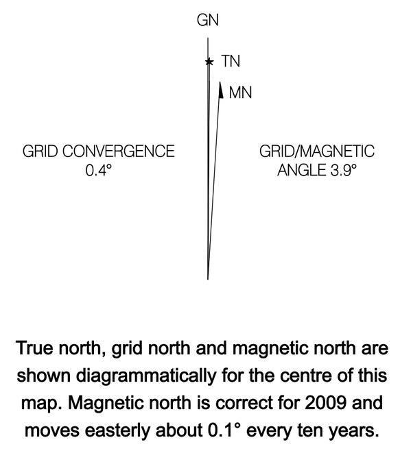
This map has been compiled without field verification. The representation of a road or track on this map is not necessarily evidence of a Public Right of Way.

Horizontal Accuracy: Expected accuracy of well defined detail is within 0.5mm at source map scale.

Vertical Accuracy: 90% of elevations are correct to within one half the contour interval at source map scale.

Compilation : By digital photogrammetric methods without field verification

This map has been automatically generated and may contain errors.



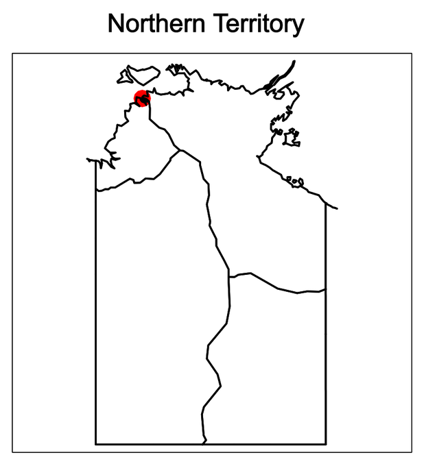
True north, grid north and magnetic north are shown diagrammatically for the centre of this map. Magnetic north is correct for 2009 and moves easterly about 0.1° every ten years.

LOCALITY DIAGRAM

Adjoining Mapsheets

	5073-23133	5073-23132
5073-23311	5073-23244	5073-23241
5073-23312	5073-23243	5073-23242

Northern Territory



ORTHOGRAPHIC MAP

1:2 500

5073-23244

NORTHERN TERRITORY GOVERNMENT

GDA

Dept of Infrastructure, Planning and Logistics

Land Services Division

Ground Floor, Arnhemica Building, Parap

GPO Box 1680 Darwin NT 0801

http://www.nt.gov.au/dlpe

APPENDIX E

Bore Reports

RN000953

N.T.A. WATER RESOURCES BRANCH

BORE DATA SHEET

NAME	No. 1 Myilly Point	INDEX No.	80/207
LOCALITY	Darwin N.T.A.	REG. No.	953
DEPTH	110' 3½"	FILE No.	
CASINGS		PERFORATIONS / SCREENS	
LOCATION / / E N	SURFACE LEVEL R.L.	B M LEVEL R.L.	DATUM
CONTRACTOR.	DRILLER.	DATE STARTED. 30/11/12	DATE FINISHED. 11/12/12

WATER				
AQUIFERS				
DEPTH STRUCK				
AQUIFER THICKNESS				
STANDING WATER LEVEL				
PUMP TEST G.P.H.	100	0·125		
DRAWDOWN LEVEL				
PUMP LEVEL				
DURATION OF TEST HOURS				
R.L. S.W.L.				
WATER TEMPERATURE °C				
TRANSMISSIBILITY				
STORAGE COEFF.				
ANALYSES				
BINOMIAL CLASSIFICATION				
T. D. S.				
CONDUCTIVITY				
TOTAL HARDNESS				
CHLORIDE				
BICARBONATE				
CARBONATE				
SULPHATE				
NITRATE				
FLUORIDE				
SODIUM				
POTASSIUM				
CALCIUM				
MAGNESIUM				
REG. ANAL. No.				

STRATA SECTION

DEPTH FEET	CASING	AQU.	SEC.	STRATA

EQUIPMENT.

Windmill

Plotted DARWIN 1:50,000

GR 791099

REMARKS.

RN000954

N.T.A. WATER RESOURCES BRANCH

BORE DATA SHEET

NAME	No. 2 Myilly Point	INDEX No.	80/208
LOCALITY	Darwin N.T.A. Mylly Point.	REG. No.	954
DEPTH	214 ft.	FILE No.	
CASINGS		PERFORATIONS / SCREENS	
LOCATION / / E N	SURFACE LEVEL R.L.	B M LEVEL R.L.	DATUM
CONTRACTOR.	DRILLER.	DATE STARTED. 20/12/12	DATE FINISHED. 20/1/13

WATER				
AQUIFERS				
DEPTH STRUCK				
AQUIFER THICKNESS				
STANDING WATER LEVEL				
PUMP TEST G.P.H.	200			
DRAWDOWN LEVEL	0·25			
PUMP LEVEL				
DURATION OF TEST HOURS				
R.L. S.W.L.				
WATER TEMPERATURE °C				
TRANSMISSIBILITY				
STORAGE COEFF				
ANALYSES				
BINOMIAL CLASSIFICATION				
T. D. S.				
CONDUCTIVITY				
TOTAL HARDNESS				
CHLORIDE				
BICARBONATE				
CARBONATE				
SULPHATE				
NITRATE				
FLUORIDE				
SODIUM				
POTASSIUM				
CALCIUM				
MAGNESIUM				
REG. ANAL. No.				

EQUIPMENT.

Plotted DARWIN 1:50,000
G.R. 791 099

REMARKS. See also 953, 955

STRATA SECTION				
DEPTH FEET	CASING	AQU.	SEC.	STRATA

RN000955

N.T.A. WATER RESOURCES BRANCH

BORE DATA SHEET

NAME	No. 3 Myilly Point	INDEX No.	80/127
LOCALITY	Darwin	REG. No.	955
DEPTH	21.3 - 66.75 m	FILE No.	
CASINGS		PERFORATIONS SCREENS	
LOCATION	80 / 07 / 22.20 E 3.30 N	SURFACE LEVEL R.L.	B M LEVEL R.L. / DATUM
CONTRACTOR.	DRILLER.	DATE STARTED 19.2.13	DATE FINISHED 25.3.13

WATER				
AQUIFERS				
DEPTH STRUCK				
AQUIFER THICKNESS				
STANDING WATER LEVEL				
PUMP TEST G.P.H.	200	[illegible]		
DRAWDOWN LEVEL				
PUMP LEVEL				
DURATION OF TEST HOURS				
R.L. S.W.L.				
WATER TEMPERATURE °C				
TRANSMISSIBILITY				
STORAGE COEFF.				
ANALYSES				
BINOMIAL CLASSIFICATION				
T. D. S.				
CONDUCTIVITY				
TOTAL HARDNESS				
CHLORIDE				
BICARBONATE				
CARBONATE				
SULPHATE				
NITRATE				
FLUORIDE				
SODIUM				
POTASSIUM				
CALCIUM				
MAGNESIUM				
REG. ANAL. No.				

EQUIPMENT.

Plotted DARWIN 1:50,000
GR. 791 099

REMARKS.

STRATA SECTION

DEPTH FEET	CASING	AQU.	SEC.	STRATA

RN002765

BORE DATA SHEET

REAR OF MEDICAL SUPT. HOUSE.

NAME	Well	INDEX No.	80/172
LOCALITY	Near Nurses Quarters, Darwin	REG. No.	2765
DEPTH	60' = 18.3 Silted	FILE No.	
CASINGS	— well	PERFORATIONS / SCREENS	
LOCATION	80 / 07 / 22.3 E 3.1 N	SURFACE LEVEL R.L. approx 96'	B M LEVEL R.L. / DATUM Town
CONTRACTOR.	DRILLER.	DATE STARTED.	DATE FINISHED.

WATER — AQUIFERS				
DEPTH STRUCK				
AQUIFER THICKNESS				
STANDING WATER LEVEL	24	30·2	=9.2	
PUMP TEST G.P.H.		1200 -740		
DRAWDOWN LEVEL		22		
PUMP LEVEL		—		
DURATION OF TEST HOURS		4		
R.L. S.W.L.				
WATER TEMPERATURE °C				
TRANSMISSIBILITY		≈90		
STORAGE COEFF.				
ANALYSES				
BINOMIAL CLASSIFICATION P.H.	7·5	7·5		
T. D. S.				
CONDUCTIVITY				
TOTAL HARDNESS	78	78		
CHLORIDE HnCl.	30	30		
BICARBONATE				
CARBONATE				
SULPHATE				
NITRATE				
FLUORIDE				
SODIUM				
POTASSIUM				
CALCIUM				
MAGNESIUM				
ALK.	155	133		
REG. ANAL. No.	12774	12775		
EQUIPMENT: 4" hr Pump Test				
16-10-65				

STRATA SECTION

DEPTH FEET	CASING	AQU.	SEC.	STRATA

N.T.A. 152

NORTHERN TERRITORY ADMINISTRATION—WATER RESOURCES BRANCH

WATER ANALYSIS

Sample No. 70/1151 Date received in Laboratory 10/8/70

Time and date of sampling 1150 Hrs. 6/8/70

Location and details Darwin Hospital (Near Nurses Quarters) Well RN 2765.

80/172

Analysis in parts per million— p.p.m. (unless otherwise stated)—

Appearance		Taste and odour	
Conductivity (Micromhos/cm²) at 25°C	250	pH	6.7
Total dissolved solids	170	Hardness, total	115
Suspended solids		Hardness, temporary	112
Total solids		Hardness, permanent	3

Anions—		Cations—	
Chloride	10	Sodium	9
Sulphate	14	Potassium	1
Nitrate	1	Calcium	40
Nitrite		Magnesium	4
Carbonate		Ammoniacal nitrogen	
Bicarbonate	137	Iron	~~Z~~ 0.1
Fluoride	0.1	Aluminium	
Silica	12	Selenium	
Boron		Arsenic	
Alkalinity	112	Copper	
Turbidity		Lead	
Phosphate	/ 1	Manganese	

Analysed by M. Dobbe.

Date 30.10.70.

REMARKS: The sample as tested is chemically suitable for human consumption according to World Health Organisation drinking water standards.

N.T.A. 152

NORTHERN TERRITORY ADMINISTRATION—WATER RESOURCES BRANCH

WATER ANALYSIS

Sample No. 70/2150 Date received in Laboratory 10-8-70

Time and date of sampling 0925 Hrs. 6-8-70

Location and details Darwin Hospital - Well RN. 2765

Near Nurses Quarters. 80/172.

Analysis in parts per million— p.p.m. (unless otherwise stated)—

Appearance		Taste and odour	
Conductivity (Micromhos/cm²)			
at 25°C	236	pH	7.7
Total dissolved solids		Hardness, total	117
Suspended solids		Hardness, temporary	108
Total solids		Hardness, permanent	9

Anions—		Cations—	
Chloride	5	Sodium	
Sulphate		Potassium	
Nitrate		Calcium	
Nitrite		Magnesium	
Carbonate		Ammoniacal nitrogen	
Bicarbonate	132	Iron	
Fluoride		Aluminium	
Silica		Selenium	
Boron		Arsenic	
Alkalinity	108	Copper	
Turbidity		Lead	
		Manganese	

Analysed by John B. Jones

Date 8-9-70

REMARKS:

MINES AND WATER RESOURCES BRANCH

PUMPING TEST REPORT

Name of Bore: WELL Bore Location: DARWIN HOSPITAL (NEAR NURSES QUARTERS)

Reg. No: 2965 Index No: 80 / 172 Date of Test 6/8/70

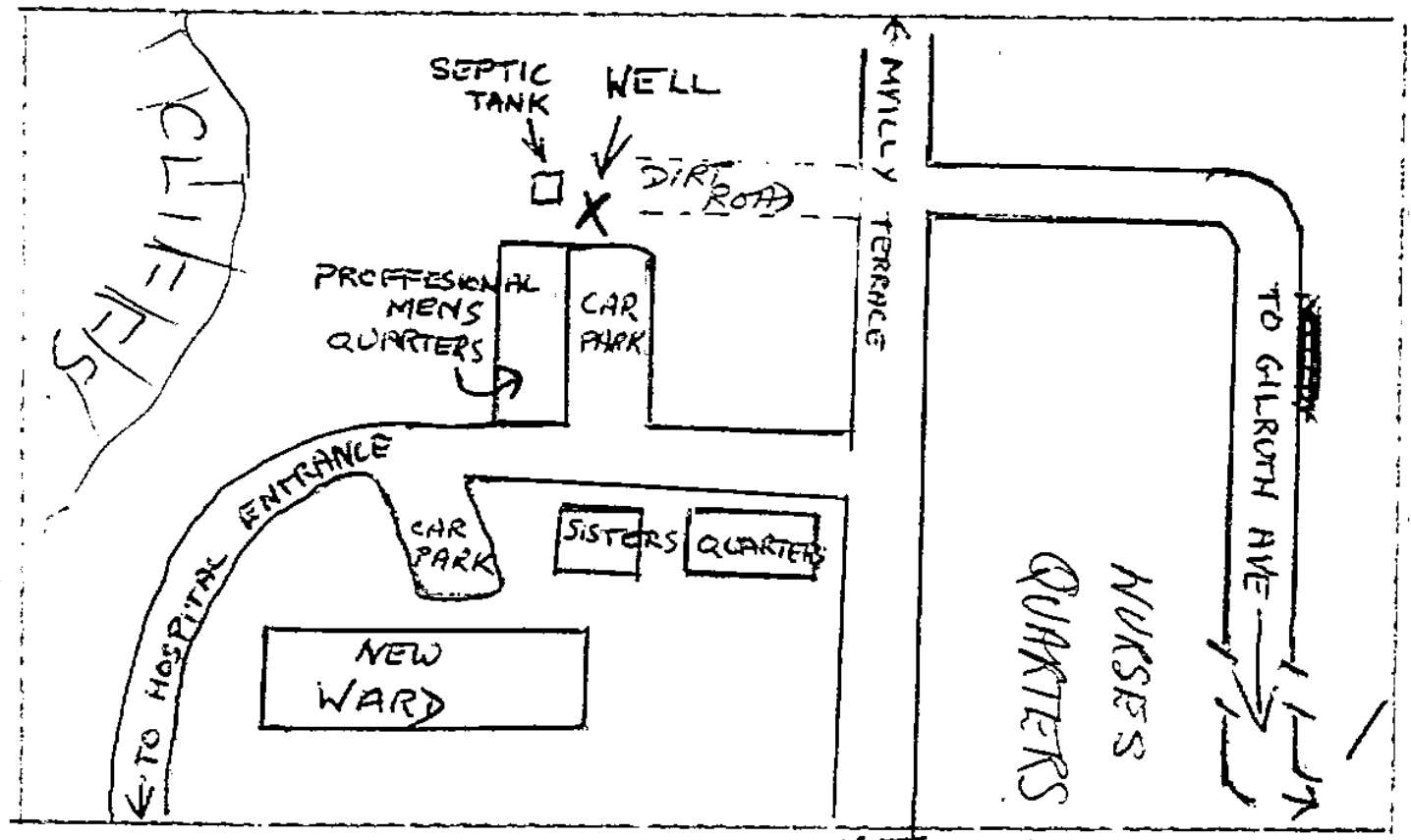
1. Type of Bore: Production/~~Observation~~
2. Standing water level at start of test: 32.35 feet.
3. Total depth of bore: 61.3 feet.
4. Diameter of casing: 7"ø WELL inches.
5. Pump suction set at: 13 feet.
6. Pumping Rate: 550 G.P.H.
7. Pumping water level maximum: 25.39 feet.
8. Water temperature: 88 °F.
9. Point from where measurements are taken. TOP OF HOLE see sketch over.
10. Draw-down measurements taken: Yes/~~No~~, method used. MEGGER.
11. Recovery measurements taken: Yes/~~No~~, method used: "
12. All measurements recorded in technical notebook no.....
13. Type of pumping equipment used for test 2" JET PUMP
14. Size of column and pump: 2" PUMP 2" PLASTIC COLUMN
15. Power unit used: VILLIERS 4 STROKE H.P.
16. Starting time of test: 0900
17. Stopping time of test: 1200
18. Duration of test: 180 minutes.
19. Water samples taken: at start of test, Bottle No. BJ 11
    Time 0925
    at finish of test, Bottle No. BS 37
    Time 1150
20. Is bore capped: ~~No~~ SEE OVER PAGE
21. Is concrete block cast: Size:
22. Height of casing above ground level: 6"

Comments:

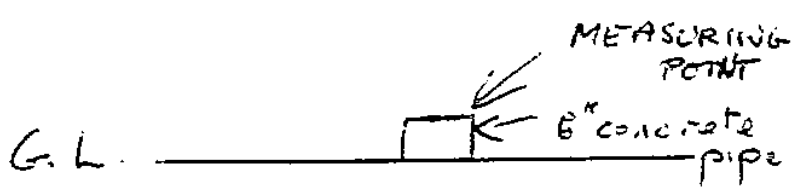
Note: 1. Give sketch of bore characteristics
2. Use one report for each bore used in test, e.g. Observation Bores.

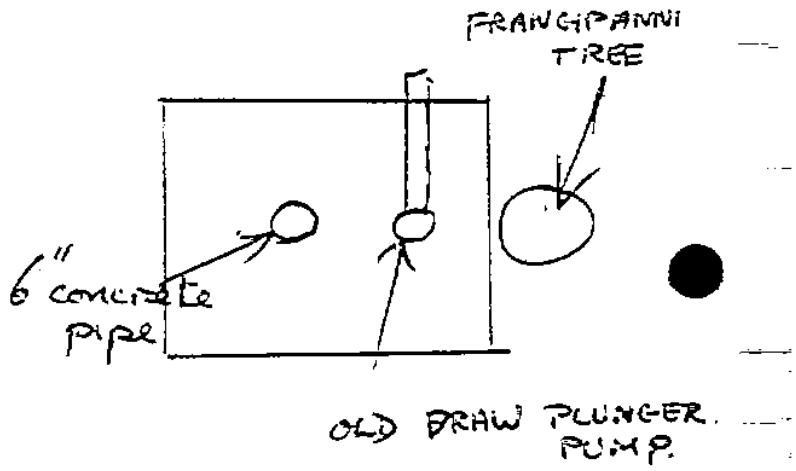
Officer in Charge of Test.

Location sketch plan



Bore Characteristic sketch NOT TO SCALE





OLD DRAW PLUNGER PUMP.

This well has a plate ~~on it~~ or block on it and is grassed over. A 6" concrete pipe is the only opening at the surface.

W/G/4/5

26 August 1970

Director of Health,
P. O. Box 147,
DARWIN N.T. 5794

RN. 2765.

WATER SUPPLY : DARWIN HOSPITAL
(Your 68/1233(16) of 6.7.70 refers)

Various bores and wells in the hospital area were inspected during early August. Only one well was considered to be worth testing.

The test showed that the well was only capable of yielding approximately 2,000 gallons per day. With this small supply it is not considered to be worth equipping. The well in question is located as shown on the attached sketch plan.

— (M. R. FINGER)
Assistant Administrator (E. & S.A.)

Enc:

Mines and Water Resources Branch
DARWIN.

SENIOR ENGINEER (GROUNDWATER) :

WATER SUPPLY - DARWIN HOSPITAL

The Darwin Hospital area was visited on 13/7/70 and a well and a bore were inspected. The bore was back-filled to within 2ft from the surface. The well has a cement cover with two openings. One opening is a 2ft length of earthenware pipe and the other is part of an old pump.

2. The well has been tested once before. There was slow recovery once the water in the well was pumped out.

3. The bore is now useless and cannot be tested. No other source of water was found.

B. HEWETT
TCI

Mines and Water Resources Branch,
N.T. Administration,
DARWIN.

7 August 1970

Senior Engineer Groundwater :

Pump Test of Well in Darwin Hospital Grounds RN 2765

A test was run on this bore to establish the supply on 6/8/70.

2 The standing water level was 32.35' and total depth 61.3'. The well is covered with a concrete slab and grassed over but records show it to be 6 feet square.

3 The test was carried out with a jet pump coupled to a 1½" centrifugal pump discharge being 550 g.p.h. After 180 minutes the test was stopped due to trouble with the pump engine. Draw-down after 180 minutes was 6.96'.

4 The pump would not operate efficiently near the bottom of the well (due possibly to silting up) and was set at 13' below S.W.L. The water was clear throughout the test.

5 Recovery readings were taken and have been submitted for analysis.

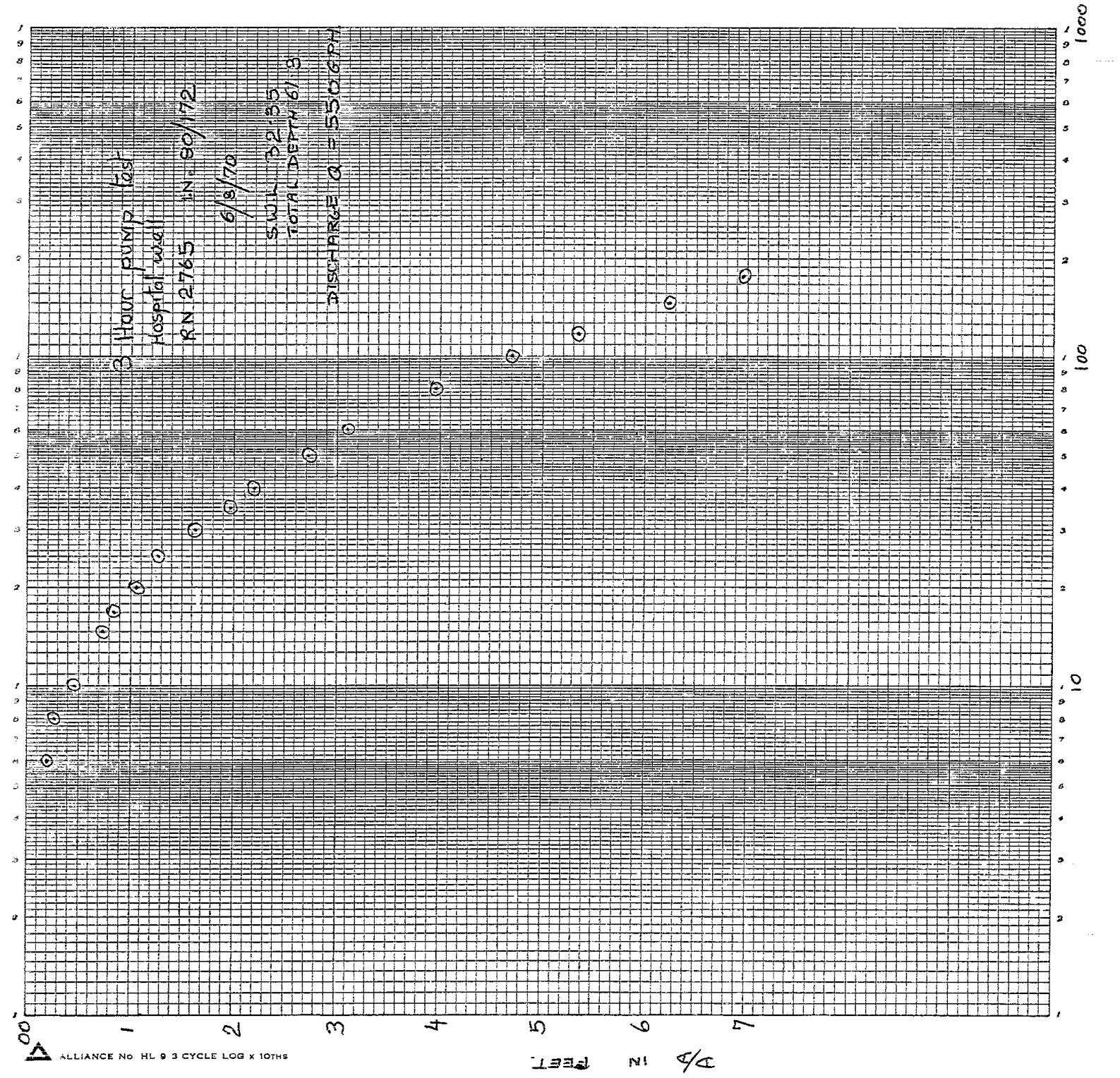
6 All information is shown in Technical note book No. 531 and on the attached graphs.

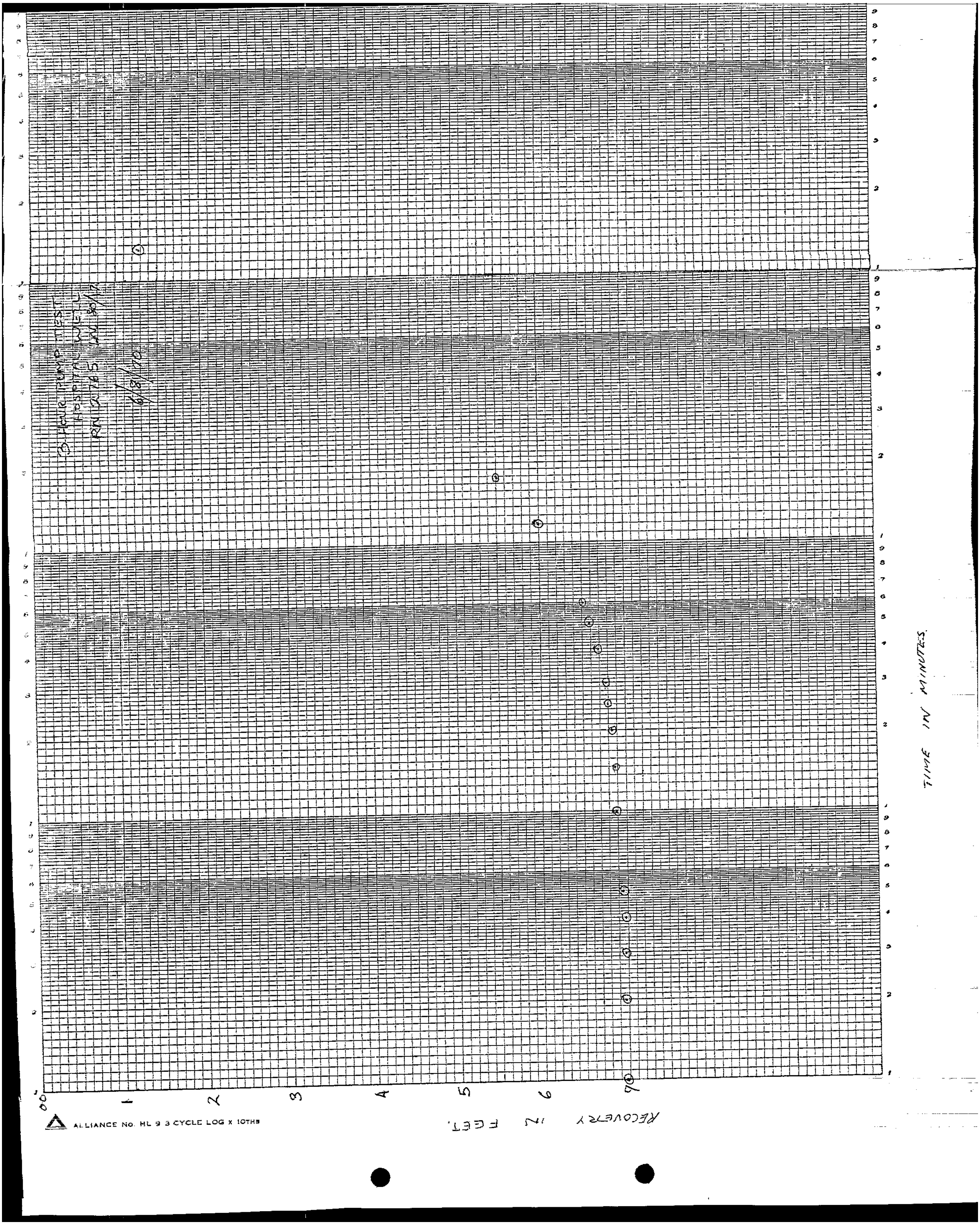
7 It should be noted that a septic tank is approximately 8 - 10 yds NW of the well.

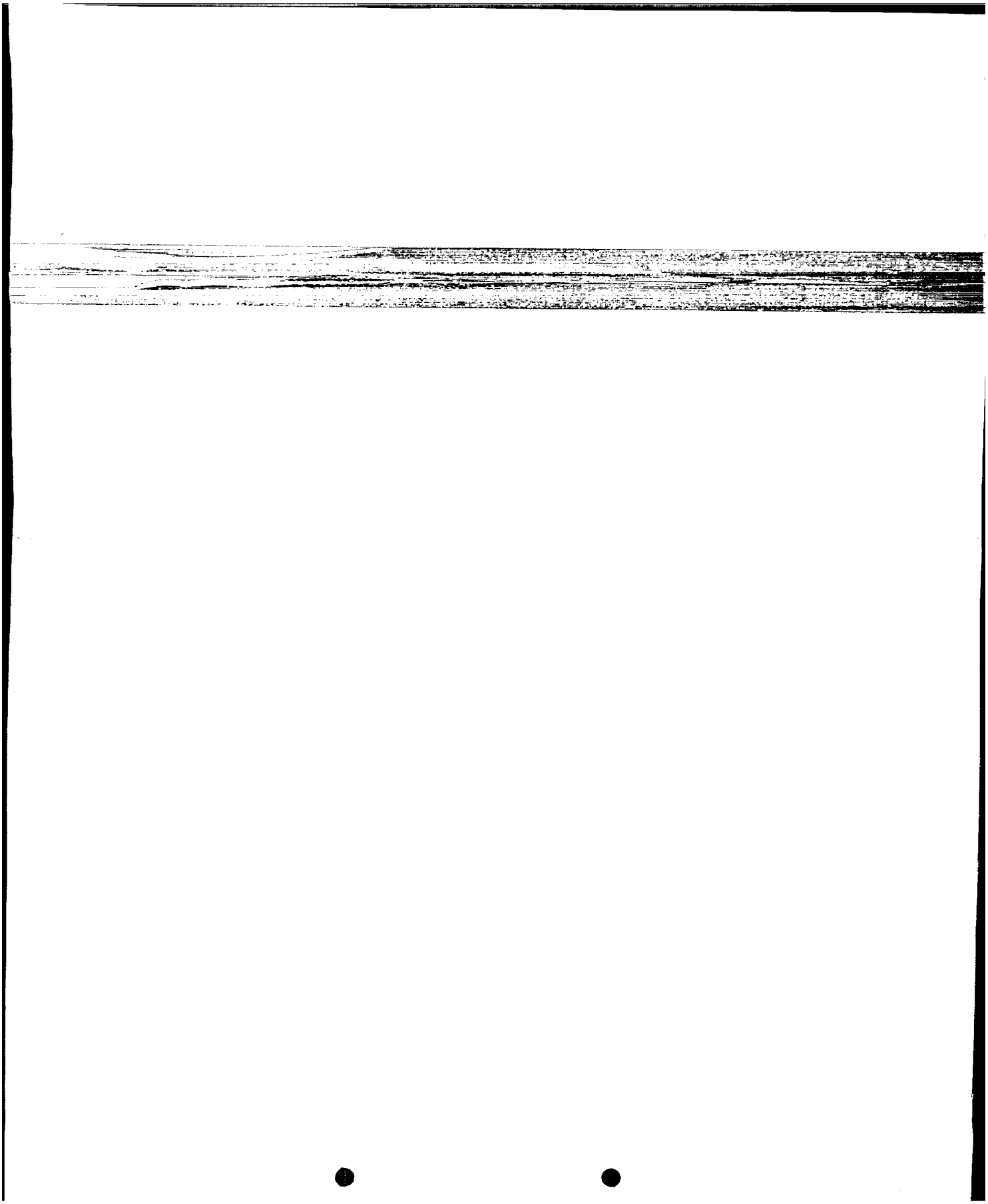
This is the only well existing at the Hospital all other holes have been filled or paved with rubbish

Rec'd 14/8.

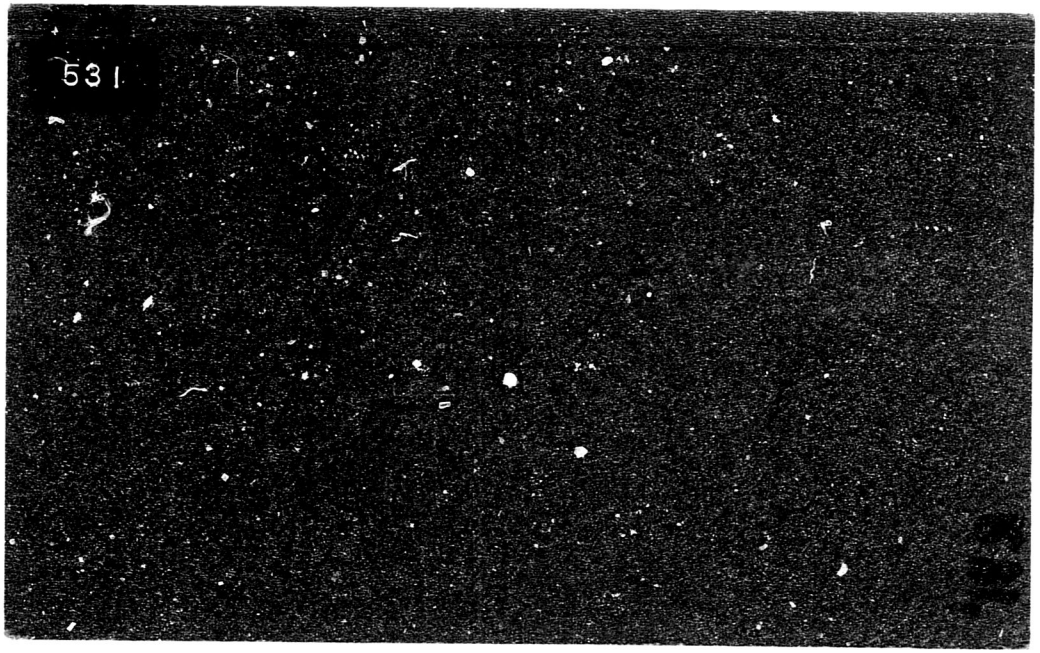
(B. ATKINS)
B. Atk


3 Hour PUMP Test
Hospital well
RN 2765
6/8/70
SWL 32.35
TOTAL DEPTH 61.3
DISCHARGE Q = 5506 GPH
1000
100
10
1
00
1
2
3
4
5
6
7
FEET IN 1/4
ALLIANCE No HL 9 3 CYCLE LOG x 10THS


3 HOUR PUMP TEST
HOSPITAL WELL
RN 2765 IN 30/7
6/8/70
TIME IN MINUTES
0 1 2 3 4 5 6 7
RECOVERY IN FEET.
ALLIANCE No. HL 9 3 CYCLE LOG x 10THS



4-HOUR PUMP TEST
HOSPITAL WELL
RN 2765 1N 80/172
18-10-63 to 21-10-63
Depth of well 61'
S.W.L. 30.2'
OIC M.H. VOGEL
Time - minutes
HARDING & HALDEN—AUSTRALIA
ALLIANCE No. 9L. 3 CYCLE LOG X 10THS


531

531.

NORTHERN TERRITORY ADMINISTRATION

MINES-WATER RESOURCES BRANCH

GROUNDWATER SECTION

TECHNICAL NOTES

PROJECT PUMP TEST OF WELL IN DARWIN HOSPITAL GROUNDS R.N. 2765.

Signature

N.T.A. 141A

INDEX

Description	Page
BORE DETAILS	
BORE NAME HOSPITAL WELL	
REG N° 2765	
TOTAL DEPTH 61·3	
STANDING WATER LEVEL 32·35	
CASING DETAILS 7' WELL	
DRAWDOWN MEASURED WITH MEGGLER	
MEASURING POINT TOP OF HOLE	
PUMP USED JET PUMP	
PUMP SETTING 13	
DISCHARGE MEASURED BY 4 GALLON DRUM	
LOCATION OF BORE DARWIN HOSPITAL	
ACTUAL TIME TEST COMMENCED 0900 6/8/70	
DURATION 180 MINUTES	

6/8/70

READINGS FROM PUMPED BORE

DRAW-DOWN

S.W.L. = 32·35 FEET

ACTUAL TIME C.S.T.	TIME SINCE PUMPING STARTED E. MINS	DRAW DOWN IN FEET	DISCHARGE MEASURED BY $\frac{1}{2}$ gal. IN SECS	DISCHARGE G.P.H.	REMARKS
0900	1				
	2				
	3				
	4				Clear Water
	5				
	6	·2			
	7	·27			
	8	·46	27 32·5	550	
	9	·72			
	10	·46			
	15	·72			
	17	·84			
	20	1·05			
	25	1·28			Sample BS11
	30	1·62	32·5	550	
	35	1·97			
	40	2·20			
	50	2·71			
1000	60	3·1			
	80	3·96			
	100	4·70			
1100	120	5·35	32·5.	550	
	150	6·21			
1200	180	6·96		1150	Sample BS37

ACTUAL TIME C.S.T.	TIME SINCE PUMPING STARTED E. MINS	DRAW DOWN IN FEET	DISCHARGE MEASURED BY $\frac{1}{2}$ gal. IN SECS	DISCHARGE GAL/HOUR	REMARKS

READINGS FROM PUMPED BORE [redacted]T.

RECOVERY

ACTUAL TIME C.S.T.	TIME SINCE PUMPING STARTED t MINS.	TIME SINCE PUMPING STOPPED t_1 MINS	RESIDUAL DRAW DOWN S_1	CALCULATED RECOVERY $(S-S_1)$	$\frac{t}{t_1}$
1201	184	1	6·95		
		2	6·95		
		3	6·95		
		4	6·95		
		5	6·94		
		6			
		8			
	190	10	6·89		
		15	6·89		
	200	20	6·84		
		25	6·80		
	210	30	6·79		
	220	40	6·69		
	230	50	6·60		
1300	240	60	6·51		
	260	80			
	280	100			
1400	300	120	6·00		
1500	360	180	5·50.		
0900.	1540.	1360	1·27		

ACTUAL TIME C.S.T.	TIME SINCE PUMPING STARTED t mins	TIME SINCE PUMPING STOPPED t_1 mins	RESIDUAL DRAW DOWN S_1	CALCULATED RECOVERY $(S-S_1)$	$\frac{t}{t_1}$

APPENDIX F

Historic Aerial Imagery

Photo 1 1941

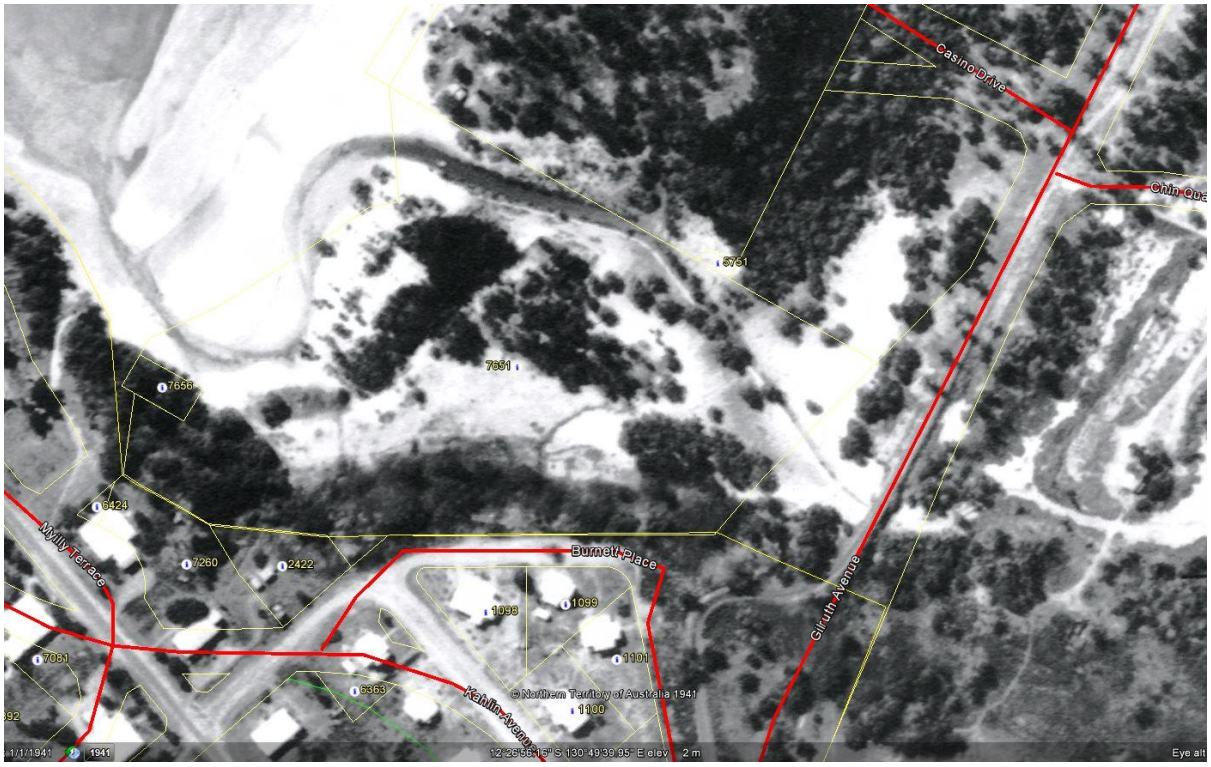


Photo 2 1975

Photo 3 1999

Photo 4 2008

Photo 5 2009

Photo 6 2010

Photo 7 2012

Photo 8 2014

Photo 9 2015

Photo 10 2016

APPENDIX G

Photography log – Initial Site Inspection

Photo 1 Collapsed walking track adjacent to foreshore

Photo 2 Evidence of dumping in Mindil Creek

Photo 3 Reference to historic dumping on information signs

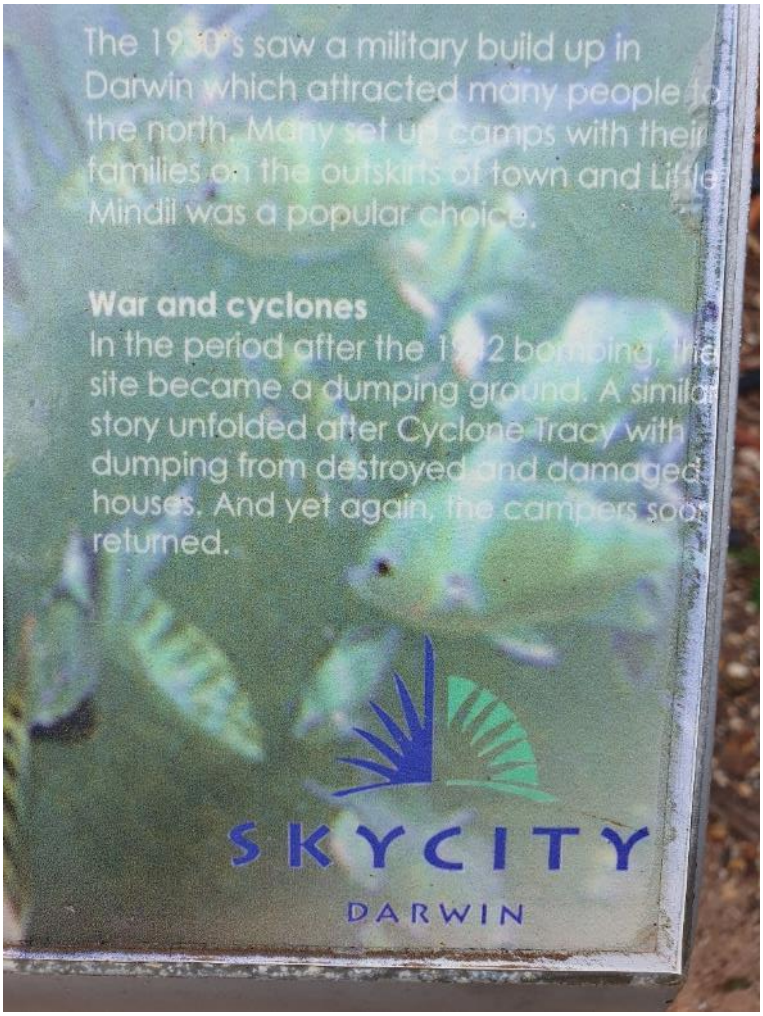
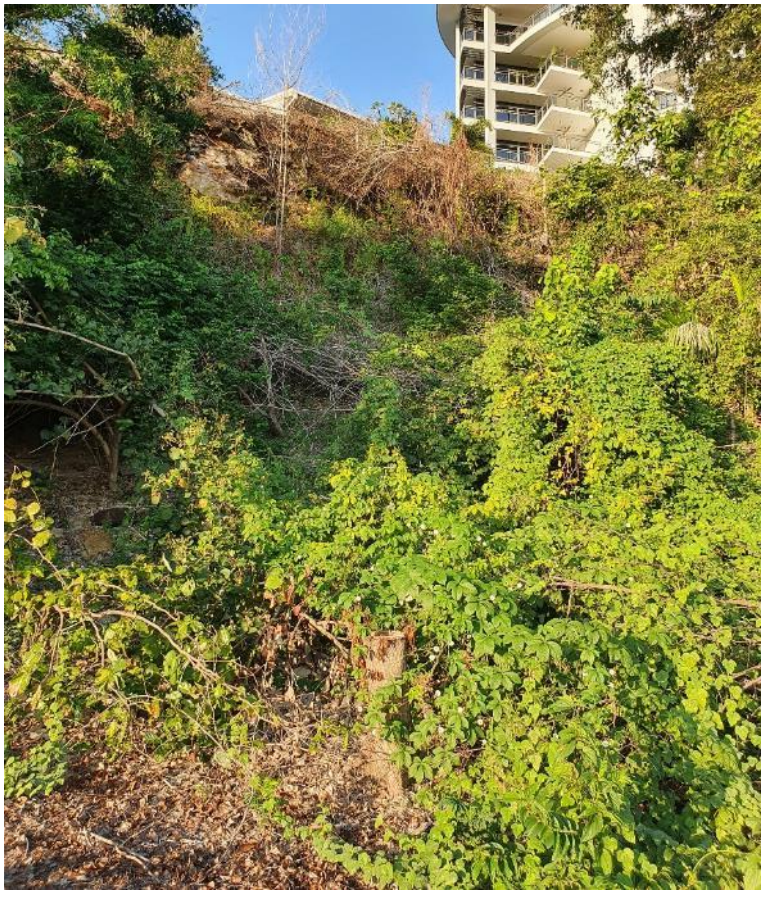


Photo 4 Underground services

Photo 5 Pedestrian access across site

Photo 6 Environmental weeds



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