Water Resources Survey of the Western Victoria River District: Amanbidji Station - A Report for the Station Manager
WATER RESOURCES SURVEY OF THE WESTERN VICTORIA RIVER DISTRICT

AMANBIDJI STATION

A Report for the Station Manager
POWER AND WATER AUTHORITY  
WATER RESOURCES DIVISION  

WATER RESOURCES SURVEY OF THE  
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A Report for the Station Manager.  

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A REPORT FOR THE STATION MANAGER
ON THE WATER RESOURCES OF AMANBIDJI STATION

LIST OF CONVERSIONS

1. INTRODUCTION

2. EXISTING PROPERTY AND WATER RESOURCES MANAGEMENT PRACTICES

3. WATER REQUIREMENT

4. FUTURE WATER SUPPLY DEVELOPMENT

5. CONCLUSIONS

6. ACKNOWLEDGEMENTS

7. REFERENCES

FIGURES

1. Locality Diagram
2. Landform Map of Amanbidji Station
3. Schematic Diagram of the Geology of Amanbidji Station

PLATES

PLATE 1: View north west from basalt hills adjacent to Amanbidji Homestead. Inland plains extend to basalt plateau of Rosewood Station.

PLATE 2: View north over Amanbidji Community to inland plains country. Remnant basalt capped hills jut from the siltstone and shale plains.
LIST OF CONVERSIONS

1 mm = .04 inches (4 points)
1 m = 3.3 feet
1 km = 0.6 miles
1 L = 0.22 gallons
1 kL = 220 gallons
1 ML = 220,000 gallons
1 L/s = 800 gallons per hour
1. INTRODUCTION

Amanbidji Station (PL 706) covers an area of 2830 square kilometres of siltstone plains and sandstone plateau country in the western Victoria River District (Fig.1). However a little over a quarter of this area is useful stock carrying country, and the assessed carrying capacity is about 6,300 head of cattle. The station is variously known as Amanbidji or Kildurk, and has been an Aboriginal owned pastoral lease since 1973. It is currently under claim as Aboriginal freehold title.

Road access to the homestead and Aboriginal community is via the Victoria Highway for 105 km west from Timber Creek (the closest township), and then south along 60 km of formed track. Amanbidji is reached by air throughout the year, and by road during the dry season. Wet season road access is usually not available over the black soil and numerous creeks of this locality.

The landform types within Amanbidji Station are shown in Figure 2. The Amanbidji lease includes rugged mainly sandstone hill country to the south and east of the West Baines River, with deep gorges and very poor, mostly spinifex pastures drained by numerous streams (including Leichhardt and Crooked Creeks), and bare flat lying siltstone plains in the vicinity of the Amanbidji community (Plate 1). Geologists refer to the sandstone as the Jasper Gorge Sandstone and the siltstone as the Angalarri Siltstone (for the relationships between these rocks see Figure 3).

Although these areas occupy 75% of the lease, they are only capable of carrying an assessed 14% (870 head) of the proposed station capacity. Due to the low stock carrying capacity, and difficulty for mustering, much of the area lying to the east and south of the West Baines River is not currently utilised. In these hilly areas bloodwood trees with spinifex grasses grow on the poor soil covering the sandstone and siltstone rock.

Erosional remnants consisting of resistant basalt caps over sandstone and siltstone jut from the siltstone plains in the region of the community (Plate 2). To the west of the community extensive plateaux consisting of the same basalt extend to the Western Australia border.

Blue grass plains characterised by areas of low paperbark or eucalyptus woodland occupy, for the most part, the channel country of the West Baines River, and Condon and Kildurk Creeks in the north west of the lease. The undulating basalt at the edge of the western basalt plateau, and the shale and siltstone plains of Dashalong and Pullout paddocks support good Mitchell Grass pasture. These three zones occupy only 25% of the station, but have potential for supporting 86% of the lease's proposed carrying capacity of 6,300 head, due to the relatively fertile cracking clays and/or alluvial soils developed on them.
The West Baines River is flanked by broad alluvial flats where it floods out over the plains. While enabling large numbers of cattle to be carried it is, however, difficult to fence and muster due to the deep channels which flood annually. All of the watercourses on Amanbidji drain towards the West Baines River, which flows to the north east becoming a major tributary of the Victoria River.

The rivers and creeks of the station flow for a short time after the Wet, eventually forming unconnected waterholes. However, by the end of the dry only a few major pools (eg. Leichhardt Waterhole) and spring fed streams (eg. Boxers Spring Creek) in the basalt and sandstone country still hold water. Springs are common in the basalt country. They are commonly found where impermeable siltstone beds underly the basalt.

The availability of stock water is a major influence on stock management since virtually all of the annual rainfall, which averages 606 mm, occurs in the short hot monsoonal wet season between December and March. For the remainder of the year, known as the Dry, temperatures are warm and very little rainfall is experienced. During the Wet, when the streams flow, much low lying country is inundated by water. Recharge to shallow groundwater aquifers occurs at this time. During the Dry evaporation rates of about 7 mm per day (2.4 m per year) ensure that water levels in waterholes and tanks decline rapidly.

Air temperatures are high throughout the year. At nearby Auvergne Station the mean monthly maxima range from about 30 to 31 degrees in June and July to 37 to 39 degrees in October and November. The corresponding mean monthly minima are 12 to 14 degrees and 24 to 26 degrees.

The station has five bores and two offstream tanks available for stock. The existing waterholes and bores enable most of existing fenced area to be within grazing range of relatively permanent water. However, if stock numbers are to be increased to the proposed carrying capacity then improved distribution of watering points is required.

The accompanying map entitled "Water Resources Development Map of Amanbidji Station" summarises the findings of a survey undertaken by the Water Resources Division of the Power and Water Authority. It aims to provide information to enable the station manager to select the best type of water supply development, ie. tanks, bores or piping, for an improved distribution of water supply points throughout Amanbidji Station.

For more detail on tank design and bore siting the report entitled "A Guide to the Water Resources Management of Amanbidji Station" (hereafter called the guidelines report) should be consulted.
2. EXISTING PROPERTY MANAGEMENT PRACTICES

Current management is based on the fencing of Amanbidji into paddocks to allow the control of stock movement dependent on pasture and water availability. These paddocks are restricted to the inland plains country in the north western sector of the station. When fully stocked these paddocks could on average accommodate up to about 600 head of cattle.

Although there is a moderate distribution of watering points on the station the existing tanks and bores do not have the capability to support potential carrying capacities of 600 head in a paddock. The problem is primarily the result of the unavailability of adequate bores on the good grazing country of the inland plains. In excess of 80% of bores drilled in the Angalarri Siltstone forming the plains are dry or salty. Bores in the Jasper Gorge Sandstone provide good supplies in the poor grazing country where it outcrops, but bore siting on the plains is difficult due to the overlying Angalarri Siltstone.

To offset the lack of good bores two shallow tanks (Dashalong and Magdaba) have been constructed in the inland plains area. These tanks, though capturing some wet season flow do not contain sufficient water to last for the duration of the Dry. All fenced paddocks are dependent to some extent on surface water from wet season rainfall. Some, eg. Bullhole Paddock, are solely dependent on surface water, but most have some input from the four or five operating bores.

Reliable bores often service more than one paddock. M.P. Bore is at the junction of four paddocks, with stock often congregating at this junction. Severe overgrazing has occurred in this area.

At the start of the Dry cattle are dispersed throughout the station to take advantage of full waterholes and pasture. At this stage the maximum recommended distance of 6 km between grazing and drinking areas is easily maintained. As the surface water depletes throughout the Dry cattle are moved to paddocks where more reliable water is available, until by about September when stock are concentrated on the most reliable watering points. These include the areas serviced by Hurricane and Pullout Bores, and to a lesser extent M.P. and Lightning Bores. Pasture adjacent to these water supplies is usually overgrazed while more remote pasture remains relatively untouched.

3. WATER REQUIREMENT

Cattle require, on average, 50 litres per day per head. Therefore a tank servicing 600 head of cattle for 11 months of the year will require a volume of about 10 megalitres (ML) plus an extra 2.4 m depth of water to make up for evaporation losses. Design dimensions for offstream excavated tanks with this capacity are included in the guidelines report.

Similarly a paddock of 600 head that is totally dependent on a single bore for water supply will require that bore to be
capable of pumping for 24 hours a day at 0.4 L/s. Thus a bore reliably yielding 1.6 to 2 L/s could potentially service four paddocks by utilising pipelines.

Bores with capacities in this range are sometimes present in the Jasper Gorge Sandstone, but not in the Angalarri Siltstone. Aquifers in the Angalarri Siltstone, yielding about 0.3 L/s on a continuous basis (these yielded up to 3.3 L/s when drilled), have been located in the community borefield area, but many dry bores were also drilled. Details on the aquifers of Amanbidji are included in the guidelines report.

These demand figures do not take into account that for some of the Dry bore and tank supplies will be supplemented by waterholes remaining from the Wet. Thus the figures should provide a safety factor.

4. FUTURE WATER SUPPLY DEVELOPMENT

Because of the poor groundwater potential of the lease the construction of well designed excavated tanks, or the piping of water from proven bores or waterholes, will be the key to the improved distribution of reliable watering points.

The recommended type of development for a specific area is summarised in the accompanying map entitled "Water Resources Development Map of Amanbidji Station". This map is supported by two others available with the guidelines report. The map entitled "The Hydrogeology of Amanbidji Station" is to assist in the selection of bore sites, while "The Land System and Land Unit Map of Amanbidji Station" provides a general indication (taken from the CSIRO 1:1,000,000 scale map entitled "Lands of the Ord - Victoria Area, WA and NT") of what surface materials to expect if constructing an excavated tank. These maps are held in GIS format and in future the information, including land unit data being compiled by the Conservation Commission of the Northern Territory, could be combined onto other maps at the request of the pastoralist.

Briefly the recommendations for future development of water supplies at Amanbidji are:

- the provision of reliable water supplies with a maximum grazing radius of 6 km throughout the good pasture of the plains should be a priority in future management plans for Amanbidji;

- excavated tanks constructed in drainage areas without a clearly defined creek system (an excavated hillside storage at Police Hole, just north of the Amanbidji - Auvergne boundary, has proven to be a very effective structure for surface water containment), and sited to harvest sheet flow from the plains country, and the piping of water from reliable supplies (waterholes, bores in the Jasper Gorge Sandstone) will be the keys to improved water supply development;

- the drilling of bores should only be undertaken where a
target is available in the Jasper Gorge Sandstone, or as a last resort in selected sites in the Angalarri Siltstone where short term yields of up to 0.4 L/s are adequate;

- the water resources development map should be used to determine the type of water supply most appropriate to a specific area on Amanbidji Station. In areas where alternative options are available economics will normally determine the final development type selected;

- advice should be sought from geotechnical engineering consultants when considering the construction of excavated tanks, or from groundwater consultants or Water Resources Division for detailed bore siting information.

The water resources development map is divided into 5 zones.

**Zone 1**

Plains country with moderate to good pasture. Good surface runoff. Water supply development should focus on the construction of surface water impoundments, with excavated tanks away from clearly defined drainages being the preferred type. Excavated hillside storages with bunds on three sides (as at Police Hole) are possible where the ground surface shows some slope. Site investigations are necessary before undertaking construction work, but cracking clays of between 0.5 and 2 m depth should be present, with good excavation and water holding properties. Piping of water from reliable natural waterholes or bores may be a cost effective alternative where these are present.

**Zone 2**

Plains country and alluvial channels with variable pasture. Moderate surface runoff. Preferred options as for Zone 1, but the presence of loamy and skeletal soils, sand, and shallow shale/siltstone (watertight but high excavation costs) make detailed preliminary site investigations more critical. High intensity flood damage and silting of tanks is likely where structures are constructed too close to major creeks and rivers.

**Zone 3**

Rocky and sandy gently dipping hill country to the east and south east of the inland plains. Poor pasture. High runoff. Although this is poor grazing country with difficult access there is up to an 80% probability of encountering groundwater supplies of between 0.5 and 5 L/s at selected sites in the Jasper Gorge Sandstone. Aquifers usually struck before 80 m. These supplies could be useful for pumping to areas of good pasture.
Zone 4

Plains and alluvial channel country with variable pasture and runoff rates. Up to 50% (often about 1 in 3 of these bores is successful) probability of obtaining groundwater supplies of between 0.5 and 5 L/s in bores targeting Jasper Gorge Sandstone at depths up to 150 m. Bore site selection is very important and the area should not be drilled before seeking specialist advice (eg. groundwater consultants or Rural Advisory Section, Water Resources Division). If bore sites are available then bores of 1.6 L/s or more have potential to supply up to 4 paddocks with piping, thus being an economical alternative to excavated tanks. If bore sites are not available then there is potential for surface water alternatives as in Zone 2. Piping of water from remote bores may also be viable.

Zone 5

Rugged and rocky ridge country with high runoff rates. Because of very poor access and stocking rates, combined with poor aquifer potential, this area is economically and physically unsuitable for water supply development. Natural springs and waterholes may provide limited supplies, especially in the basalt escarpment country.

As a last resort aquifers in the Angalarri Siltstone within zones 1, 2, and 4 could be investigated, but these are considered generally unreliable for paddocks holding 600 head, and individual paddocks may require more than one bore. Past experience has shown that only 1 in 5 bores in the Angalarri Siltstone will be capable of continuous pumping at 0.3 L/s (enough for 300 head).

5. CONCLUSIONS

The increased stocking of Amanbidji Station, together with decreased land degradation, is dependent to a large extent on upgrading of the present distribution of reliable water supplies. Because of the very poor groundwater potential of most of the good grazing country the improvements will be due to the construction of well designed excavated tanks (preferably sited on the plains country in drainage areas without a clearly defined creek system), or the piping of water from reliable waterholes and bores.

The accompanying map is a key tool in planning future water supply development at Amanbidji. The required distribution of water supply points should be marked on a pastoral map and the type of development then determined from this water resources development map. The final decision on how to proceed with development should be based on consultation with the guideline report and specialists (eg. Water Resources Division, consultants) and site investigations.
6. ACKNOWLEDGEMENTS

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7. REFERENCES


HIGHWAY

Newry

Victoria

KEY

INTERMITTENT TABLELANDS, RIDGES AND MESAS

INLAND PLAINS

GENTLY SLOPING PLATEAU

PLATEAU, MESAS AND CUESTAS WITH STRUCTURAL BENCHES

LATERITE PLATEAU

LANDFORM DIVISIONS OF AMANBIDJI STATION

Fig. 2
PLATE 1: View north west from basalt hills adjacent to Amanbidji Homestead. Inland plains extend to basalt plateau of Rosewood Station.

PLATE 2: View north over Amanbidji Community to inland plains country. Remnant basalt capped hills jut from the siltstone and shale plains.