

# **Background Brief – Oolloo Dolostone Aquifer Water Allocation Plan**

**August 2016**

## Document History

Version	Date	Author
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## 1. Introduction

The Ooloo Dolostone Aquifer is the uppermost formation of the Daly groundwater basin, located just north of the Douglas and Daly River confluence and extending south-east to beyond the Katherine River. This aquifer currently provides reliable, good quality water supply for agricultural production and maintains ecosystem health by contributing to base flows in the Daly River. Water from the Ooloo Aquifer also maintains the condition of places that are culturally important to Aboriginal people in the Daly region and places that have significant tourism and recreational values.

There is no Declared Water Allocation Plan for the Ooloo Dolostone Aquifer. A draft plan was prepared in 2012 following significant consultation through public meetings, requests for public comment, and consultative engagement with the Daly River Catchment Advisory Committee and the Daly River Aboriginal Reference Group. Research projects investigating the hydrology, hydrogeology and the social, cultural and economic values of water in the Daly River catchment were in progress throughout this period.

These activities and the data, information and knowledge developed during this time establish a strong foundation from which to continue the development of the Water Allocation Plan for the Ooloo Dolostone Aquifer.

The Water Allocation Plan will define the rules for the sharing and allocation of water for the next 10 years.

### Purpose of This Report

This document is intended to provide background information for the Ooloo Water Advisory Committee and includes the following:

- Context about water allocation planning in Australia and the Northern Territory (Section 2);
- A brief history of water planning for the Ooloo Dolostone Aquifer (Section 2);
- Details about the Daly River region and the Ooloo Dolostone Aquifer, current allocations and usage (Section 3);
- Key water issues that will need to be considered during development of the plan and background on what was include in previous drafting of the plan (Section 4);
- How the community will be consulted and role of the Ooloo Water Advisory Committee in developing the plan (Section 5);
- Timetable for the planning process (Section 6);

## 2. Context

### Water Allocation Planning in Australia

Water Allocation planning is well established in many jurisdictions throughout Australia and internationally. The National Water Initiative (NWI) was established by the Council of

Australian Governments in 2004 to create a national approach to water resource management. All States and Territories are signatories to the NWI which seeks to achieve the following:

- Transparent, statutory based water planning;
- More confidence for investment through defined water licence security and risks that may arise from future changes to water availability;
- Provision of water for environmental flows and other public benefit outcomes;
- Provision of water to meet the needs of Indigenous people;
- Water trading for more profitable use of water;
- Enhanced water use efficiency in urban and rural areas;
- Water use metering to provide accurate information for planning and management;
- Recognition of the connectivity between surface and groundwater.

### **Water Allocation Planning in the Northern Territory**

The Northern Territory is a signatory to the National Water Initiative and is committed to developing water allocation plans for water resources where current or potential water use could pose a possible risk to the ongoing availability and/or health of the resource.

The NT Water Act 1992 (the Act) is the legislation which provides for the investigation, allocation, use, control, protection, management and administration of water resources by the NT Government. This includes the protection of water supply to environmental, recreational, social and cultural uses. The Act allows the declaration of Water Allocation Plans within water control districts and these must allocate water to specific beneficial use categories. Water control districts and beneficial uses are described in the Section 3 of this document. The Act also allows the creation of Water Advisory Committees, to ensure stakeholder input into the development of water allocation plans. This is discussed in more detail in the Community Consultation part of this report.

Table 1 (over page) gives an overview of the Water Allocation Planning Process.

**Water allocation planning for the Ooloo Dolostone Aquifer**

Water within the Ooloo Dolostone Aquifer supports a range of industries and values including agricultural production, tourism, groundwater dependent ecosystems and indigenous cultural values. A water allocation plan for the Ooloo Aquifer will set out a statutory framework to protect environmental and cultural assets and provide secure access to water users by ensuring water is allocated in a manner that can be sustained into the future.

Table 1 DLRM Water Allocation Planning Process

Phase	Objective	DLRM Planning activities	Consultation
Problem definition	Define purpose and objectives for water management within the Water Allocation Plan Area	Articulate purpose & objectives consistent with the Water Act, the NT water policy framework and NWI  Confirm beneficial uses for water in the WCD	Identify stakeholders  Establish WAC  Stakeholders consulted (e.g. on beneficial uses)
Information	Obtain research / evidence based understanding of water availability (supply), water use (demand) and water dependent assets (environmental & cultural)	Assessment / modelling of water resource characteristics  Assessment of current and forecast demand  Identification of water dependant environmental and cultural assets	Information sought from stakeholders regarding forecast demand  Consult with Indigenous people and other relevant stakeholders to identify cultural assets
Alternatives	Generate one or more plan alternatives (e.g. sustainable yield or water allocation scenarios)	Preparation of one or more planning scenarios	Stakeholders input into formulating planning scenarios
Assessment	Assess plans against key criteria (including policy purpose & objectives)	Model scenarios (e.g. varying levels of water extraction) to evaluate possible impact on water sources and water dependent assets  Objectively assess options against key policy criteria	Stakeholders invited to provide feedback on options
Decision	Final water allocation plan, including sustainable yield and water allocations decided	DLRM team consider assessment of options and provide preferred plan to the Controller of Water  Controller of Water may accept the proposed plan or request changes (return to assessment stage)  The Minister may approve the plan (after the Controller of Water has approved) or may request changes	Stakeholders informed
Review	Manage risk and uncertainty in planning; noting the inherent limitations of water supply / demand modelling to accurately predict future consequences	Monitor plan implementation and impacts / response of water extraction  Undertake review, within 5 years, using the above process (commencing at information phase). Review will account for new knowledge or improved understanding of water resources including their response to extraction	Stakeholders engaged as per above steps

### 3. The Oolloo Dolostone Aquifer, current allocations and usage

#### Oolloo Aquifer Water Allocation Planning Area

The Oolloo Dolostone Aquifer Water Allocation Plan applies to all water within the Oolloo Dolostone Aquifer (Figure 1). The Oolloo Dolostone Aquifer lies wholly within the Daly Roper Water Control District which was declared in 2008. A map of the Daly – Roper Water Control District is included in Attachment A. Water allocation in the Oolloo Dolostone Aquifer is intrinsically related to water allocation decisions throughout the Katherine and Daly River region groundwater and surface water systems. These relationships are taken into account by the plan however, the management instruments of the plan are defined for the Oolloo Dolostone Aquifer only.

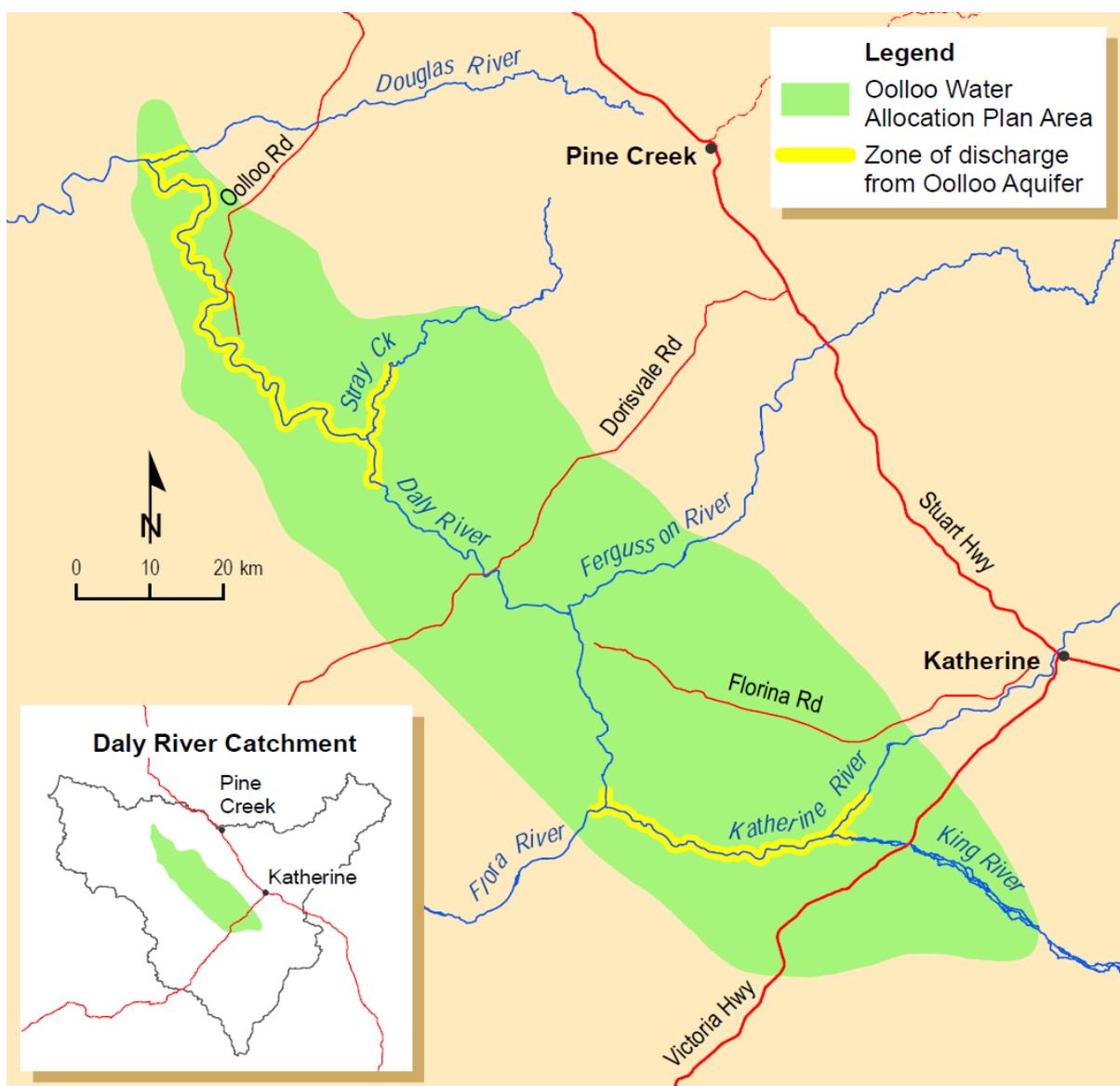


Figure 1 Map of the Oolloo Dolostone Aquifer

## Groundwater of the Ooloo Aquifer

When rain falls on land, some water evaporates, some flows to streams and rivers, and some seeps into the soil and is absorbed by plant roots. Excess water in the soil may percolate further down until it reaches a level known as the water table where all the pores or fractures in the sediment or rock are saturated with water. Water in the saturated zone below the water table is called groundwater. Where the sediment or rock type show similar characteristics within the saturated zone, this is called an aquifer. Figure 2 shows a conceptual groundwater diagram.

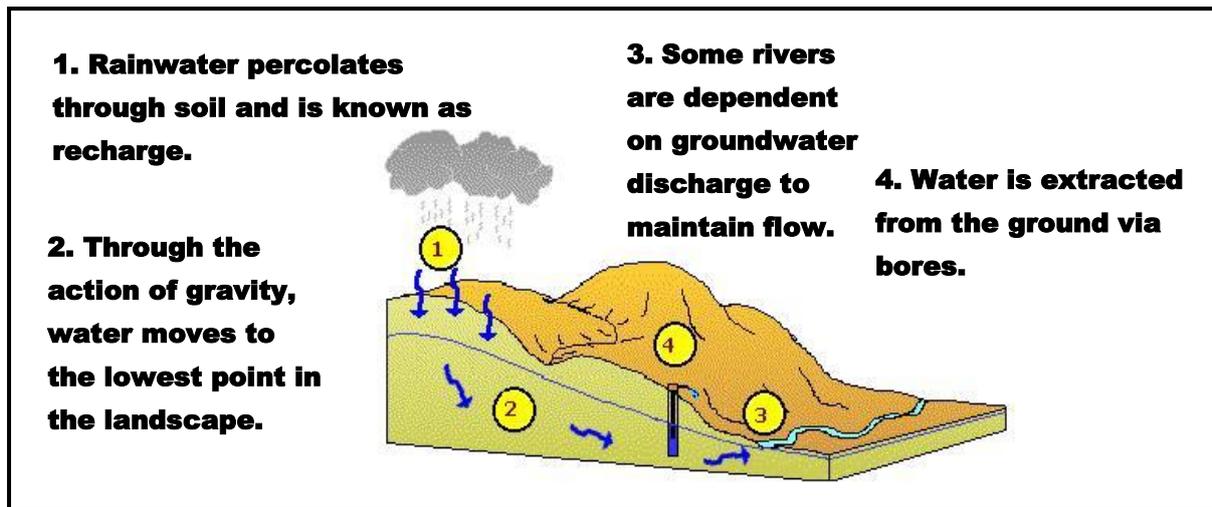


Figure 2 Conceptual Groundwater Diagram

The Ooloo Dolostone Aquifer is the youngest and uppermost formation of the Daly geological basin which includes the Tindall Limestone Formation, Jinduckin Formation, Ooloo Dolostone Formation and the Florina Formation. Groundwater in the Ooloo Dolostone Aquifer can flow through fractures, cavities and caverns which range from sub-millimetre scale up to the scale of caves and sinkholes.

Rainfall in the region is highly seasonal and the majority of aquifer recharge occurs in the wet season months between November and April. In some areas the aquifer is overlain by younger, Cretaceous aged rocks which can reduce the amount of recharge that occurs in these areas. Groundwater flows through the aquifer from the south east to the northwest and discharges to the Katherine River in the south and the Daly River in the north. The greatest discharge from the aquifer is along the middle reaches of the Daly River, around the confluence with Stray Creek. The Katherine and Daly rivers are perennial. Dry season river flows are sustained by groundwater discharge from the Tindall Limestone Aquifer and the Ooloo Dolostone Aquifer.

The Ooloo Dolostone Aquifer is underlain by the Jinduckin Formation. Groundwater flow in the Jinduckin Formation is thought to be predominantly horizontal, within bedding that transmits water more readily than adjacent, lower permeability bedding. There is not a groundwater connection between the Tindall Limestone Aquifer and the Ooloo Dolostone Aquifer, because of the intervening Jinduckin Formation.

Figure 3 is a conceptual diagram showing the various inputs (eg. rainfall, recharge into sinkholes) and outputs (eg. discharge to rivers, evapotranspiration and extraction) to the

Ooloo Dolostone Aquifer. It shows how the Jinduckin formation separates the Ooloo and Tindall Aquifers, along with the general direction of groundwater flow.

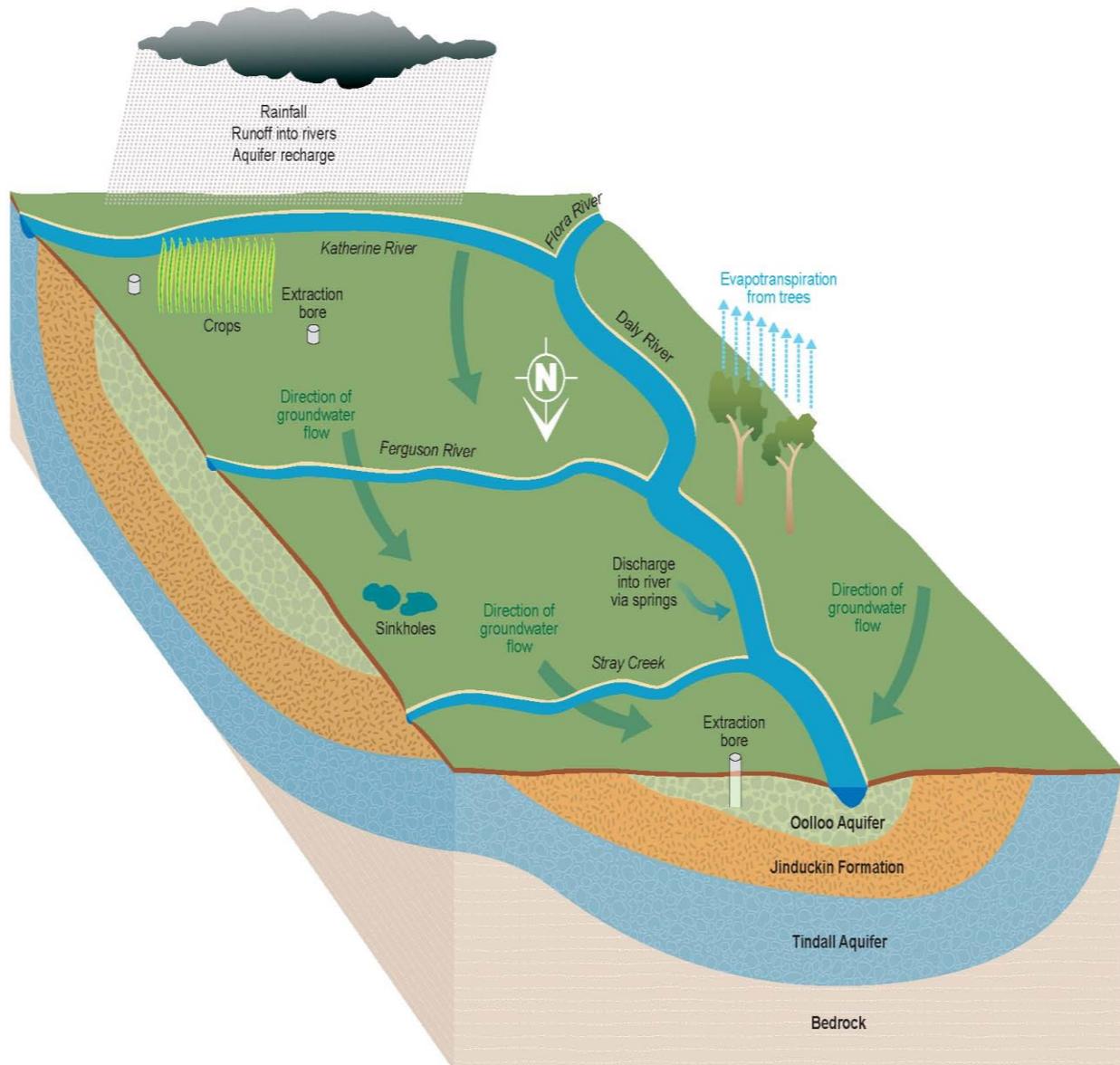


Figure 3 Conceptual diagram of the Ooloo Dolostone Aquifer

The Department uses the integrated groundwater and surface water models for the Daly River Catchment to provide coordinated accounting of all water extractions throughout the Daly River catchment including existing licensed and unlicensed uses. It is an advanced water balance assessment tool which enables assessment of how groundwater and surface water flows and levels might change in response to climate or changes in water management approaches. The modelling software and approach is considered a suitable choice for modelling the complex and highly connected groundwater-surface water system in the Daly River catchment. The groundwater and surface water models are linked together and can represent many processes in the catchment including:

- Catchment rainfall runoff

- Rainfall infiltrating into the soil and down into groundwater
- Flow in the creeks and rivers
- River losses into the aquifer
- Groundwater discharge into the river
- Water extractions from the river and from the aquifer

### Beneficial Uses

The Act requires that Water Allocation Plans allocate water to beneficial uses. Beneficial uses summarise the different purposes for which water is used and valued. They are separated into two categories; non-consumptive uses and consumptive. Non-consumptive use is the water necessary for maintaining environmental and cultural values. Consumptive use is the water that is extracted for consumptive purposes and will only be allocated after the non-consumptive uses have been met.

The beneficial uses of the Ooloo Dolostone Aquifer are shown in Table 2 **Error! Reference source not found.** Attachment B is a map of the gazetted beneficial uses in the Katherine – Daly region.

*Table 2 Ooloo Aquifer Beneficial Uses*

Beneficial Uses	
Non-Consumptive	Environmental
	Cultural
Consumptive	Rural Stock and Domestic
	Agricultural
	Industry

### Licence Security Levels and Reliability

Groundwater extractions from the Ooloo Dolostone Aquifer have the potential to impact on flows in the Katherine and Daly Rivers. Environmental Water Requirements for the Daly River are set out in Erskine (2004). These environmental water requirements are used along with the integrated groundwater and surface water model to estimate the volume of water that may be taken from the aquifer.

Because recharge to the aquifer varies from year to year, the volume of water that can be taken from the aquifer (the consumptive pool) also varies from year to year. To account for the variable nature of the consumptive pool, licences are issued with security levels. Each year an announced allocation is made which sets the annual entitlement volume for each licence, based on its security level.

There are three licence security levels that have been issued for the Ooloo Dolostone Aquifer: High, Medium and Low Security.

The integrated surface water – groundwater model is used to determine the Annual Announced Allocations in April each year by evaluating the maximum extractions that can occur without adversely impacting on the environmental water requirements of the Daly River. The Annual Announced Allocations are applied to Low Security licences first then Medium Security Licences, and lastly, High Security licences.

To assist licence holders to understand their security category and the likely water availability over the 10 year term of the licence, the Department estimates a statistic called Reliability. Reliability is a percentage number representing how many years the total volume of licence entitlements would have been available in full if all licences were extracted at their maximum entitlement for 30 years, under the same aquifer recharge and river flow conditions that have been observed over the last 30 years.

Water is considered to be available in full for any year where this hypothetical maximum groundwater extraction does not cause a change in modelled flows by more than the change allowed by the environmental flow criteria on any given day in any year for the last 30 years. A reliability of 37% means that in 11 out of 30 years, an announced allocation of less than 100% may be required in order to maintain the environmental water requirements of the Daly River.

### **Current Water Entitlements**

At the time that the 2012 draft plan was prepared, the maximum licenced entitlements were capped at 60,000 ML/year. Since 2012, further entitlements have been granted for the beneficial use of Agriculture. Total maximum groundwater extraction permitted from the Ooloo Dolostone Aquifer is 90,842 ML/year. There are 36 licences in the Ooloo Aquifer which convey the following maximum annual entitlements:

- High security: 24,636.1 ML/year,
- Medium security: 43,909 ML/year
- Low Security: 20,891 ML/year

The estimated Stock and Domestic demand for the aquifer is 1,406 ML/year.

Underpinning the assessment of new licences were the tools and management criteria that have been developed for the Daly Basin aquifers and the Daly River Catchment over the last decade including:

- The integrated groundwater and surface water models for the Daly River Catchment which provide coordinated accounting of all water extractions throughout the Daly River catchment including existing licensed and unlicensed uses.
- The Environmental Water Requirements of the Daly River, developed in consultation with expert advice, department staff and the Daly River Community Reference Group (Erskine et al. 2004).

Reliability of the total consumptive pool was estimated for each additional licence decision. The Reliability of the total consumptive pool (90,842 ML) is estimated to be 37%.

### **Estimated Water Use**

Reported water use for the Ooloo Dolostone Aquifer for the 2015/16 water accounting year (1 May 2015 to 30 April 2016) was 18,653 ML.

### **Compliance Activities**

30 out of the 36 licences for the Ooloo Dolostone Aquifer were inspected in the 2015/16 water accounting year. These represent 89% of the total volume of licenced entitlements valid in the 2015/16 water accounting year.

32 out of 36 licences have all licenced and equipped bores metered except for eight cases where a licenced bore is not metered but is used for stock and or domestic use only.

## 4. Key water issues that DLRM suggests will need to be considered

Table 3 sets out some of the key elements of the water allocation plan that could be discussed during the planning process along with some background information.

*Table 3 Some of the Key elements of the water allocation plan that will require discussion*

Water Allocation Plan Element	Where we need to get to	Where we were in 2012	Where we are in 2016
Plan Objectives, Outcomes and Performance Indicators	Define purpose and objectives for water management within the Ooloo WAP area. Define the ways we will measure our progress towards meeting those objectives.	The draft plan set out Plan Objectives, Outcomes and Performance Indicators	Plan Objectives, Outcomes and Performance Indicators should be reviewed to ensure they are complete, up to date and representative of beneficial uses.
Risk Assessment	The plan should identify the environmental, economic and social risks associated with water allocation decisions and set out the ways in which the plan will minimise these risks	The draft plan did not include a risk assessment	A risk assessment will need to be completed and should have input from stakeholders
Environmental Water Requirements	A statement of the environmental water requirements for the Ooloo aquifer and the Daly River which will underpin the estimation of the sustainable yield for the aquifer. Identification of knowledge gaps, prioritisation and timelines for work to address them.	The draft plan referenced the Environmental Water Requirements of Erskine et al (2004), however, they were applied to plan reporting sites at Dorisvale and Beeboom Crossing	The current policy is that the Environmental Water Requirements of Erskine et al (2004) are used in full i.e. the plan reporting sites should be Dorisvale Crossing, Ooloo Crossing and Mount Nancar
Cultural Water Requirements	A statement of the cultural water requirements for the Ooloo aquifer and the Daly River which will underpin the	The draft plan assumed that cultural requirements would be met by providing for the environmental water requirements,	To be discussed to ascertain whether this is still the state of knowledge.

Water Allocation Plan Element	Where we need to get to	Where we were in 2012	Where we are in 2016
	<p>estimation of the sustainable yield for the aquifer. Identification of knowledge gaps, prioritisation and timelines for work to address them.</p>	<p>stating that cultural water requirements have not been defined for the Daly River or for the Oolloo Aquifer, and that these are likely to be maintained through maintenance of environmental water requirements.</p>	
<p>Consumptive Pool volume and estimates of Reliability</p>	<p>A statement of the Consumptive Pool for the Oolloo Aquifer. Estimates of reliability for each security category which are clearly explained and which can inform the business decisions of licence holders.</p> <p>Should reliabilities not align with the expectations of a majority number of stakeholders, strategies for achieving desired reliabilities should be identified and discussed.</p>	<p>The draft plan estimated the consumptive pool to be 60,000 ML/year using rainfall-recharge information from 1900 to 2010.</p> <p>Two sets of licence Reliabilities for the consumptive pool were estimated. The draft plan presents estimates based on the rainfall-recharge conditions from the two different periods 1981-2010 and 1900-2010.</p>	<p>The Department considers that the best guide for future water availability for at least the next 10 years is given by the rainfall-recharge conditions observed over the last 30 years (1986 to 2015).</p> <p>The Consumptive pool has been increased to 90,842 ML/year. Reliability of the total consumptive pool volume has been recalculated and presented in statements of decisions for each of the licences granted since 2013. Reliabilities for each licence security level and for each groundwater management zone will be recalculated as part of the planning process.</p> <p>Licence Reliabilities require further discussion.</p>
<p>Annual Announced Allocations</p>	<p>A clear description of the annual announced allocation methodology. Note that Annual Announced Allocations are critical to the sustainability of licenced water extractions from the Oolloo Aquifer resource.</p>	<p>The draft plan included Annual Announced Allocations including a methodology.</p>	<p>Further work has been undertaken to better define the scenario modelling based approach to annual announced allocations. This work requires discussion.</p>

Water Allocation Plan Element	Where we need to get to	Where we were in 2012	Where we are in 2016
Water Management Zones	Articulation of water management zones which maximise environmental, economic and social outcomes for ongoing water allocation decisions.	The draft plan defined two water management zones for the Ooloo Dolostone Aquifer.	Three water management zones may be more appropriate. This will be discussed.
Groundwater Licencing Framework	Rules for the granting of licences.	The draft plan set out a framework for groundwater licencing, consistent with the Water Act, 1992, but requiring additional matters to be considered, relevant to the Ooloo Dolostone Aquifer.	The 2012 framework requires review to reflect current policy, the current status of groundwater licencing in the Ooloo Dolostone Aquifer and any further matters that may be raised during consultation.
Transfer of entitlements through property sale or subdivision	Rules for the granting of licences through property sale and subdivision.	The draft plan set out rules by which water could be transferred through property sale and subdivision, consistent with the Water Act, 1992.	The process can be explained more clearly.
Water Trading	Rules for the trading of water on both a commercial or non-commercial basis.	The draft plan enables water to be traded within the Ooloo Dolostone Aquifer, consistent with the NWI.	The process should be described more clearly and more detail can be discussed.
Strategic Reserves	A statement of the strategic reserve for the Ooloo Aquifer. A strategy for how water will be returned to the Strategic Reserve if the Consumptive Pool is considered to be fully allocated. Rules on how and for what duration water will be allocated from the Strategic Reserve.	The draft plan provided a Strategic Indigenous Reserve of 14,400 ML/year.	The policy position on reserves needs to be clarified, including the methodology for quantifying the reserve allocations and the means for distribution
Use it or lose it	A statement of the Use it or Lose It policy and rules and milestones for implementing the policy in the Ooloo	The draft plan did not refer to a use it or lose it policy, however all Groundwater Extraction Licences for the Ooloo	A use it or lose it condition has been applied to all licence in the Ooloo aquifer. How the use it or lose it policy and the

Water Allocation Plan Element	Where we need to get to	Where we were in 2012	Where we are in 2016
	Aquifer.	Dolostone Aquifer include a clause stating either that non-use, or non-use or underutilisation may result in full or partial revocation of the licence.	existing use it or lose it conditions on licences will be implemented can be explained by the plan, along with whether the resulting entitlement would be returned to the consumptive pool (and made available for new licences) or put into a strategic reserve; or whether the resulting entitlement would be taken out of the consumptive pool, effectively increasing licence reliabilities.
Implementation, Monitoring and Evaluation	<p>Detailed description of the milestones for implementation of the plan.</p> <p>Statement of the roles and responsibilities of the Water Advisory Committee, the Department, Licence holders and other relevant parties for implementation of the plan.</p> <p>A detailed description of the data, information and knowledge that will be collected to fill gaps identified by the Plan.</p> <p>A detailed description of the management actions to monitor the performance of the plan.</p> <p>A statement of the reporting obligations for implementation of the plan.</p> <p>A timetable for the review of the plan including any circumstances that may warrant an early review of the plan.</p>	The draft plan set out detailed monitoring requirements that were linked to outcomes and objectives	These should be reviewed to ensure they are adequate and up to date, especially in the context of new scientific work being undertaken in the next three years as part of the NESP project in the Daly River catchment along with ongoing improvement to the numerical groundwater and surface water models used for water planning in the Daly Basin.

Water Allocation Plan Element	Where we need to get to	Where we were in 2012	Where we are in 2016
	A description of the process for plan review and how stakeholders will be involved.		

## **5. How the Community will be consulted and the role of the Ooloo Water Advisory Committee**

Whilst there has been significant engagement and development of a substantial body of knowledge about the values and interests of the community in the past, it is essential that the community and key stakeholders continue to have input to the development of the Plan.

A Community and Stakeholder Engagement Strategy has been prepared that sets out how the Department of Land Resource Management will seek the views and knowledge of community members and key stakeholders to guide the further development of the Plan.

Key stakeholders will be represented on the Ooloo Water Advisory Committee. The role of the committee is to identify issues, critically evaluate information and to offer suggestions for water management strategies that support the potential beneficial uses and maximise opportunities for ecological sustainable development in the region.

Community Information Sessions will be held at centres in the Katherine-Daly region to inform the community about the planning process and facilitate an exchange of information about the Ooloo Dolostone Water Allocation Plan.

Public comment will also be invited upon release of the final draft plan.

### **Ooloo Water Advisory Committee**

Members of the Ooloo Water Advisory Committee are appointed by the Minister for Land Resource Management. The members selected by the Minister ensure that a diversity of representation is achieved and that all beneficial uses are represented. Committee members have a range of backgrounds and recognised experience including in water use and planning, regional development, pastoral enterprise, irrigated agriculture, horticulture, mining, tourism, community interests, environmental protection, water engineering and water management, Aboriginal enterprise and Aboriginal cultural values.

The Terms of Reference for the Ooloo Water Advisory Committee will be published on the Department's website along with a list of committee members and minutes of each committee meeting as they become available.

Stakeholders were previously represented by the Daly River Management Advisory Committee (DRMAC). The DRMAC committee Terms of Reference were much broader than the Terms of Reference for the Ooloo Water Advisory Committee and included consideration of catchment management issues more broadly including for example Land Clearing. The Ooloo Water Advisory Committee will consider matters relating to water allocation planning for the Ooloo Dolostone Aquifer only, unless directed otherwise by the Minister.

## **6. Timing for finalising the Plan**

It is anticipated that the final draft of the Water Allocation Plan for the Ooloo Dolostone Aquifer will be prepared and available for public comment by the end of January 2017 and that it will be declared in March 2017.

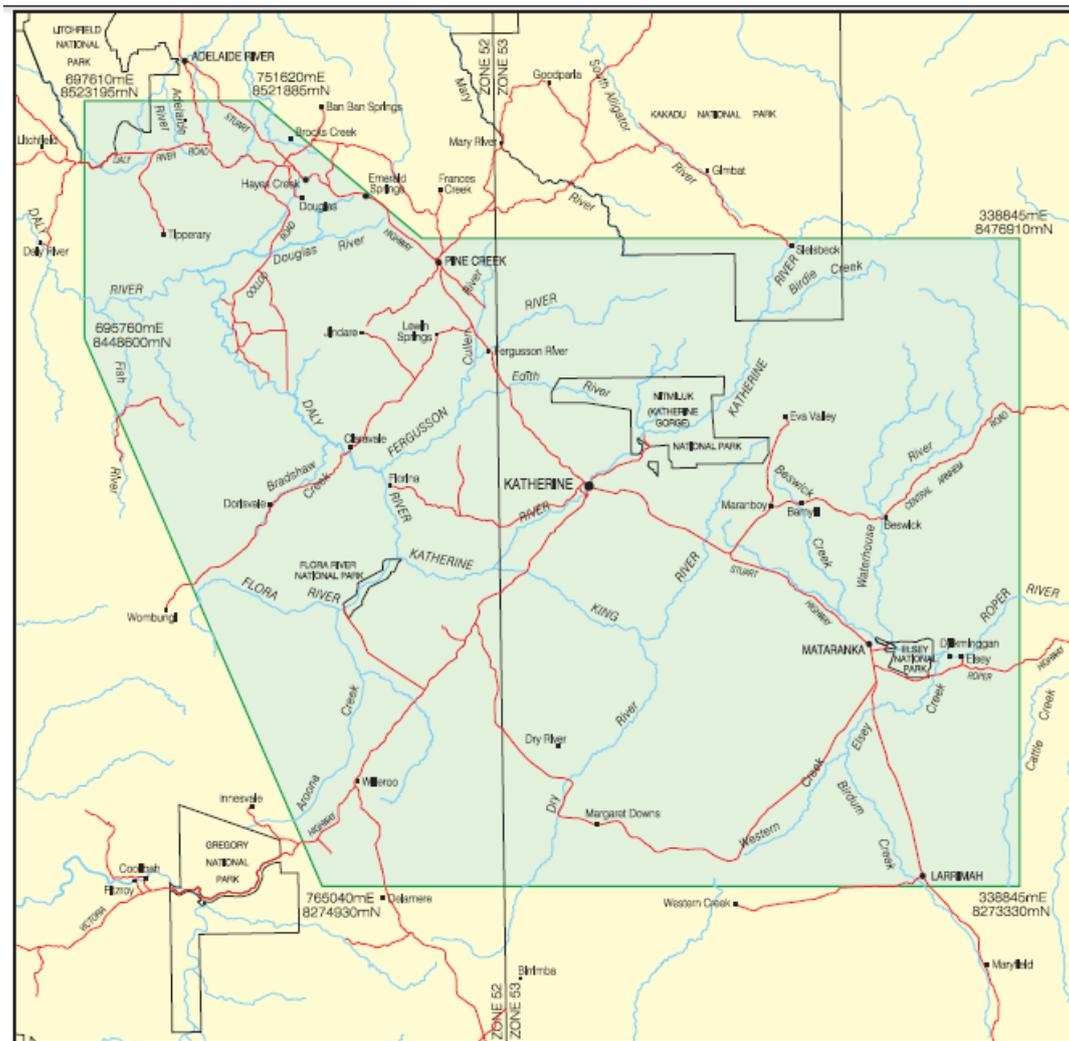
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# Attachment B – Declared Beneficial Uses



km 0 20 40 60 80  
 Design File: Kath\_gw\_bu.dgn

### MAP LOCALITY



### LEGEND

-  Declared area
-  Highway
-  Road
-  River or creek

### Notes:

- 1; Beneficial Uses are raw water for drinking water, raw water for agriculture, and raw water for industrial purposes.
- 2; For declaration and description see Northern Territory Government Gazette No. G22, 9 June 1999.
- 3; Prepared by Natural Resources Division, September 1999.



## DECLARATION OF BENEFICIAL USES AND QUALITY STANDARDS OF GROUNDWATER KATHERINE AREA