

Katherine and Ooloo Water Allocation Plans - comparison

The following table provides a comparison of proposed water management arrangements documented in the Draft Katherine Tindall Limestone Aquifer Water Allocation Plan 2019-2029 and the Draft Ooloo Dolostone Aquifer Water Allocation Plan 2019-2029.

The two plan areas are within the Daly Roper Beetaloo Water Control District, and while they relate to different groundwater resources, they have overlap in surface water management and cross over catchment boundaries. The area covered by the Katherine plan relates to discharge to the Katherine River between Ironwood and Wilden gauging stations. The Ooloo plan considers all the rivers of the Daly River system overlying the Ooloo Dolostone Formation, from the Katherine River downstream of Wilden gauging station to the Daly River approximately 2 km downstream of the confluence of Douglas and Daly rivers.

Component	Draft Katherine Tindall Limestone Aquifer Water Allocation Plan (2019-2029)	Draft Ooloo Dolostone Aquifer Water Allocation Plan (2019 2029)
Hydrogeology	<ul style="list-style-type: none"> The Daly River catchment comprises the sedimentary fill of the Daly Basin and is made up of four formations - three are aquifers. The lowermost aquifer is the Tindall Limestone aquifer overlain by the Jinduckin Formation and then the Ooloo Dolostone aquifer. The Florina Formation is the uppermost unit and is not used as a water resource, The Tindall and Ooloo are the primary aquifers with the Jinduckin Formation only being a viable water resource where it is more karstic. The Tindall Limestone aquifer discharges to the Katherine River from the unconfined part of the aquifer between Ironwood and Wilden Gauging Stations. The Ooloo Dolostone aquifer discharges to the Katherine, Daly and Douglas Rivers and from Stray Creek downstream of Wilden Gauging Station. Wilden is the surface water crossover point between the two plans. 	
Resource	Katherine Tindall Limestone Aquifer and groundwater discharges from the aquifer to Katherine River	Ooloo Dolostone Aquifer and groundwater discharges to the Daly River and tributaries including the Katherine River.
Location	Plan cover 5,860 km ² including Katherine township.	Plan covers 5,277 km ² . Includes Florina and Douglas Daly agricultural districts.
Water Advisory Committee	Current Katherine WAC formed February 2017. Ten meetings held to date. Chaired by Ms Marie Piccone, horticulturalist.	Current Ooloo WAC formed August 2016. Thirteen meetings held to date. Chaired by Dr John Childs, consultant.
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Web link	www.denr.nt.gov.au/katherinewaterplan	www.denr.nt.gov.au/oolloowaterplan

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Plan area	<ul style="list-style-type: none"> • Groundwater discharge to surface water from the Tindall Limestone Aquifer within the catchment of the Katherine River, between the Ironwood gauging station and Wilden gauging station on the Katherine River. • Groundwater in the Tindall Limestone Aquifer within the catchment of the Katherine River excluding the catchment of the Dry River and Durrinyan Creek. 	<ul style="list-style-type: none"> • Groundwater discharge to surface water from the Ooloo Dolostone Aquifer within the plan area from Wilden gauging station on the Katherine River to approximately 2 km downstream of the confluence of the Douglas and Daly rivers. • Groundwater in the Ooloo Dolostone Aquifer.
Water resource	<p><u>Considers Katherine Tindall Limestone Aquifer (deeper formation than Ooloo Dolostone).</u> Natural water balance not available.</p> <p>Groundwater:</p> <ul style="list-style-type: none"> • Mean annual recharge 71 GL/yr • Median annual recharge 53 GL/yr • Based on dataset 1960/61 – 2017/18, with the water year defined as 1 October to 30 September. <p>Surface water:</p> <ul style="list-style-type: none"> • River flow between Ironwood and Wilden gauging stations. Discharge from the aquifer to the river in this section is from Tindall Limestone. • At Wilden, Tindall Limestone becomes confined (overlain) by Ooloo Dolostone formation and Katherine River receives discharge from the Ooloo Dolostone. 	<p><u>Considers Ooloo Dolostone Aquifer (shallower formation than Tindall Limestone).</u> Natural water balance available</p> <p>Groundwater:</p> <ul style="list-style-type: none"> • Mean annual recharge 549 GL/yr • Median annual recharge 365.7 GL/yr • Mean annual discharge 526 GL/yr • Dataset 1967/68 – 2017/18, with the water year defined as 1 May to 30 April. <p>Surface water:</p> <ul style="list-style-type: none"> • River flow plan from Wilden gauging station on the Katherine River to downstream of the confluence of the Douglas and Daly rivers. <p>Management zones:</p> <ul style="list-style-type: none"> • There are three groundwater management zones.
Non-consumptive water requirements	<ul style="list-style-type: none"> • Lack of information available to set long volumetric figure for non-consumptive water requirements identified as a significant gap in knowledge. • Needs to be addressed during plan implementation. • Annual announced allocations used to reserve water for non-consumptive uses under various scenarios (based on flows measured at Katherine River at Wilden). 	<ul style="list-style-type: none"> • Non-consumptive water requirements 429 GL/yr (81.5% of the median groundwater discharge). • Based on the estimated volume of groundwater discharge needed to sustain environmental flows (Erskine et al 2004). • Annual announced allocations used to reserve water for non-consumptive uses under various scenarios (based on flows measured at Dorisvale, Ooloo and Mt Nancar).

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Estimated sustainable yield	<ul style="list-style-type: none"> • ESY = 38,391 ML/yr • In absence of non-consumptive water requirements and inability to set a specific ESY, adopts an ESY based on the interpretation of ESY from current plan: • Critical to review and update ESY prior to any additional water extraction licences issued. • ESY allocates more water in wet and very wet years through the AAA process 	<p>ESY = 97,300 ML/yr</p> <ul style="list-style-type: none"> • Based on Erskine et al. (2004) criteria. • ESY based on median flows • ESY doesn't allow more allocations in wet and very wet years through the AAA process.
Consumptive water requirements	<ul style="list-style-type: none"> • Total existing GWELs, SWELs and exempt use (as at January 2019) = 42,163 ML/yr • Referred to as 'water extraction limit'. 	<ul style="list-style-type: none"> • Total existing GWELs, SWELs and exempt use (as at 1547 2019) = 87,470 ML/yr. • Referred to as 'total existing entitlements'.
Water availability	<ul style="list-style-type: none"> • ESY (38,391) – water extraction limit (42,163) = -3,772 ML/yr • No groundwater management zones. • Therefore system over allocated. • Plan is not able to modify existing water extraction licences. • Recommendation that no new or increased water extraction licences are issued until ESY is revised. 	<ul style="list-style-type: none"> • ESY (97,300) – existing entitlements (87,470) = 9,830 ML/yr • Groundwater management zones: • Southern = 4,094 ML/yr available. • Central = 6,730 ML/yr available. • Northern = -994 ML/yr over allocated • New allocations will only be from the Strategic Aboriginal Water Reserve
Current water use	<ul style="list-style-type: none"> • Average (mean) water use 2013-2018 = 12,410 ML/yr (30%) • Total reported use 2017/18 = 15,947 ML (38%) 	<ul style="list-style-type: none"> • Average (mean) water use 2015-2018 = 21,454 ML/yr (33% of annual entitlement) • Total reported use 2018/19 = 23,283 ML (31.6%)

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Objectives	<ul style="list-style-type: none"> • Meet the environmental water requirements of water dependent ecosystems. • Protect Aboriginal cultural values associated with water by ensuring their water requirements are met. • Ensure security of supply for future public water supply and rural stock and domestic purposes. • Provide access to water resources to support local Aboriginal economic development. • Provide fair access to water to support ecologically sustainable regional economic development. • Ensure sufficient water of appropriate quality is available to support recreation activities and community services. 	<ul style="list-style-type: none"> • Protect the environmental and cultural values of the region, particularly focusing on groundwater base flows to the Daly River and other groundwater dependent ecosystems. • Protect existing consumptive beneficial uses of groundwater. • Enable development of the groundwater resource to realise its potential for use in the region. • Communicate plan objectives, management principles and resource status. • Establish a framework for learning and continuous improvement to maximise environmental, social and economic outcomes.
Beneficial uses	<p>Beneficial use allocations: Allocates water to the following beneficial uses (surface and groundwater combined):</p> <ul style="list-style-type: none"> • Environmental (nominal 20 ML/yr) • Public Water Supply (4,076 ML/yr) • Rural Stock and Domestic (1,964 ML/yr) • 'All other consumptive beneficial use classes' (note, these need to include: Agriculture, Aquaculture, Environment, Cultural, Industry, Mining Activity, Petroleum Activity (32,331 ML/yr – note: this is 3,792 ML/yr less than extraction limit). • Strategic Aboriginal Water Reserve (treated as a subclass of other beneficial uses until the Water Act is amended) – 3,233 ML identified as a notional allocation. 	<p>Beneficial use allocations: Allocates water to the following beneficial uses (surface and groundwater combined):</p> <ul style="list-style-type: none"> • Environment (nominal 60 ML/yr) • Public Water Supply (0 ML/yr) • Rural Stock and Domestic (1,547 ML/yr) • 'All other consumptive beneficial use classes' (Agriculture, Aquaculture, Cultural, Industry, Mining Activity, Petroleum Activity (95,693 ML/yr). <p style="margin-top: 20px;">Strategic Aboriginal Water Reserve (treated as a subclass of other beneficial uses until the Water Act is amended) – 19,316 ML/yr (9,830 ML/yr available, the remainder is a notional allocation).</p>

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Annual announced allocations (AAAs)	<p>Allocates more water in wet and very wet years. Maintains approach from 2016-2019 plan, updated to Wilden as measurement site. Between 13% and 30% of flow is able to be impacted by extraction. Combined effect of all groundwater and surface water extractions should not reduce natural flows in Katherine River at Wilden:</p> <ul style="list-style-type: none"> • Very dry: modelled natural flow on 1 November is less than 1.8 cumecs (155 ML/day). 87% of flow protected. • Dry: modelled natural flow on 1 November is between 1.8 and 2.1 cumecs (155 ML/day to 181 ML/day). 80% of flow protected. • Average: modelled natural flow on 1 November is between 2.1 and 2.9 cumecs (181 ML/day to 250 ML/day). 70% of flow protected. • Wet: modelled natural flow on 1 November is between 2.9 and 3.6 cumecs (250 ML/day to 311 ML/day). 70% of flow protected. • Very wet: modelled natural flow on 1 November is greater than 3.6 cumecs (311 ML/day). 70% of flow protected. 	<p>Doesn't allocate more water in wet and very wet years. Allocation is limited to median flows. Guided by Erskine et al. (2004). Flow thresholds defined for Dorisvale, Ooloo Crossing and Mt Nancar gauging stations. 20% of groundwater discharge available for extraction in normal dry season flow conditions reducing to 8% in low flow periods. The combined effect of all groundwater and surface water extractions should not reduce natural flows in the Daly River:</p> <ul style="list-style-type: none"> (a) at Dorisvale Crossing gauge station G8140067 by <ul style="list-style-type: none"> (i) >8% whenever natural flow is ≤ 6.2 cumecs; or (ii) >20% whenever natural flow is >6.2 cumecs (b) at Ooloo Crossing gauge station G8140038 by <ul style="list-style-type: none"> (i) >8% whenever natural flow is ≤ 12 cumecs; or (ii) >20% whenever natural flow is >12 cumecs (c) at Mount Nancar gauge station G8140040 by <ul style="list-style-type: none"> (i) >8% whenever natural flow is ≤ 12 cumecs; or (ii) >20% whenever natural flow is >12 cumecs.

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Licence security and reliability	<ul style="list-style-type: none"> • Modelling based on existing licences (as at January 2019) and Wilden as measuring point. • Four licence security categories: Total, High, Medium and Low. • Licence reliabilities (the percentage of years that stated extraction limits would have been equalled or exceeded, calculated by determining the climatic scenario and the proportion of water required to be reserved for non-consumptive water uses: <ul style="list-style-type: none"> • Public water supply: not subject to AAAs • High security: 75% reliability (1960/61 – 2017/18) • Medium security: 55% reliability (1960/61 – 2017/18) • Low security: 25% reliability (1960/61 – 2017/18). 	<ul style="list-style-type: none"> • Three licence security levels: High (includes licences where security level is not specified), Medium, Low. • Reliabilities (estimated 1967-2015): <table border="1" data-bbox="1305 363 2110 544"> <thead> <tr> <th>GMZ</th> <th>High</th> <th>Medium</th> <th>Low</th> </tr> </thead> <tbody> <tr> <td>Southern</td> <td>37%</td> <td>29%</td> <td>22%</td> </tr> <tr> <td>Central</td> <td>71%</td> <td>71%</td> <td>69%</td> </tr> <tr> <td>Northern</td> <td>94%</td> <td>82%</td> <td>53%</td> </tr> </tbody> </table> 	GMZ	High	Medium	Low	Southern	37%	29%	22%	Central	71%	71%	69%	Northern	94%	82%	53%
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Groundwater discharge protection areas	<p>One area specified:</p> <ul style="list-style-type: none"> • Zone 1 from current plan renamed groundwater discharge protection area. • This is the area where extraction from the groundwater is expected to impact river flows within 1 year. 	<p>There are four groundwater discharge protection areas specified:</p> <ul style="list-style-type: none"> • Katherine River (1,500m) • Daly River – Stray Creek (3,000m) • Stray Creek (1,500 m) • Daly River - Douglas River (1,500m). • This is the area where groundwater extraction is expected to impact river flows within 1 year (one dry season). 																

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Water trading	<p>The following guidelines established:</p> <ul style="list-style-type: none"> • Trading into public water supply possible, but not trading out of public water supply. • Mining and petroleum should not be traded to other beneficial uses. Water returned when activity ceases. • Can trade into mining and petroleum beneficial uses. • No trade from outside to inside groundwater discharge protection area. • Surface water can only be traded to a downstream extraction point (i.e. no upstream surface water trade). • Trade from SWR in accordance with relevant policy. • Subject to general NTG water trading guidelines. 	<p>The following guidelines are established:</p> <ul style="list-style-type: none"> • Permanent trading between GMZs not permitted unless the receiving GMZ is under allocated. • Trade not permitted if it would result in a reduction in the reliability of existing licences. • Temporary trading of groundwater between GMZs could be permitted. Any temporary trade between GMZs should require additional scenario modelling, including meeting the flow requirements in the river and reliability analysis. • Temporary trade within the same GMZ does not require additional scenario modelling and reliability analysis if it is for less than three years. • A permanent or temporary trade maintains its security level as long as the trade does not result in a reduction in the reliability of existing licences in the receiving GMZ. • Trade from surface water to groundwater entitlements downstream of the Wilden Station (G8140536) is permitted on a temporary or permanent basis within the same GMZ. • Trade of a licensed entitlement into a GDPA should not be permitted. • Trade between beneficial uses generally permitted except trade from public water supply to other beneficial uses. • Trade of water from the Strategic Aboriginal Water Reserve in accordance with the relevant policy framework. • Subject to general NTG water trading guidelines.

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<p>Plan implementation, monitoring and review</p>	<ul style="list-style-type: none"> • Until such time that the ESY is reviewed and takes into account non-consumptive water requirements, an adaptive management framework cannot be fully constructed. • A monitoring, evaluation, reporting and improvement (MERI) program will be developed as part of implementation – activities, responsibilities, timings and costings to be developed. • Water committees – one to provide external oversight of plan implementation; one to provide advice on determination of revised ESY. • Whole of Daly Aboriginal Reference Group to be established providing direction for cultural value water requirements and input into SWR. 	<ul style="list-style-type: none"> • Adaptive management framework included. • Web-based annual reporting: Integrated annual report on monitoring and water use. • Overall assessment of plan implementation at time of plan review or new plan development. • Water committees to provide external oversight of plan implementation. • Whole of Daly Aboriginal Reference Group or similar to be established providing direction for cultural value water requirements and input into SWR.