

REPORT
INDEPENDENT REVIEW OF WATER
EXTRACTION LICENCES
(NORTHERN TERRITORY)

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GLOSSARY

ABBREVIATION OR NAME	TERM OR DEPARTMENTAL DOCUMENT NAME (IF RELEVANT)	DESCRIPTION (IF RELEVANT)
AAA	Annual Announced Allocation	Annual volume of water that may be taken by a licensee in accordance with the licence, calculated as a proportion of the licensed entitlement. Proportion depends on security level and the size of the consumptive pool in the relevant year.
Controller	Controller of Water Resources	The Controller is appointed under the Water Act as the responsible officer for certain decisions under the Water Act including decisions to grant, refuse or vary water extraction licences.
department	Former Department of Land Resource Management, Northern Territory, or Department of Environment and Natural Resources, according to context	References to the department in the context of the review period (2012 – 2016) are references to DLRM. References to the department in the context of the conduct of this review, are references to DENR.
entitlement	N/A	Quantity of water to which a licensee is entitled, as specified on a water extraction licence; may be subject to annual modification through AAA.
ESY	Estimated sustainable yield	The quantity of water that may be taken from a water resource on a sustainable basis. The NT WAP Framework sets out how the ESY is to be determined for both surface water and groundwater resources in the Top End and Arid Zone.
FEFLOW	N/A	A model for simulating groundwater flow.
FIFS	First in first served	Policy governing order of assessment of licence applications for a given resource whereby applications are assessed in the order in which they are received.
Form 11, or application form	<i>0_Form 11_Application Grant or Renewal SWEL.doc</i>	SWEL application form in use during review period.
Form 14, or application form	<i>0_Form 14_Application Grant or Renewal GWEL.doc</i>	GWEL application form in use during review period.
GDE	N/A	Groundwater dependent ecosystem
GWEL	groundwater extraction licence	A licence issued under s 60 of the Water Act authorising a person to take water from a bore.
MIKE11	N/A	A model for routing surface water.
NoD	Notice of Decision	Notice of a water extraction licence decision. Section 71D of the Water Act requires a NOD to be made in a particular way, and contain particular matters.
NoI	Notice of Intention	Notice of Intention to make a water extraction licence decision (s 71B).
NWC	N/A	National Water Commission
NWI	N/A	National Water Initiative (2004)
review period	N/A	Period falling within scope of this review, i.e. 30 August 2012 – 30 August 2016.
s 30 review	N/A	A review, undertaken by the Minister under s 30 of the Act, of a water licence decision made by the Controller.

ABBREVIATION OR NAME	TERM OR DEPARTMENTAL DOCUMENT NAME (IF RELEVANT)	DESCRIPTION (IF RELEVANT)
SIR	Strategic Indigenous Reserve	A portion of the consumptive pool set aside in a WAP for future allocation to Indigenous People for indigenous economic development.
SoD	Statement of Decision	Full statement of a water extraction licence decision. Section 71C of the Water Act requires a SoD to include particular matters.
Summary document	<i>Water Licensing Review - Supporting Documentation Summary_FINAL.pdf</i>	Document provided to review panel by department (January 2017) summarising departmental processes for licence application assessment and grant.
Supporting Information Form (SIF)	<i>00_Supporting-Info-WEL-App-2013.pdf</i>	Information applicants were required to provide in support of Form 11 or Form 14 during review period. Also referred to in Forms 11 and 14 as the 'Property Development Plan'.
SWEL	Surface water extraction licence	A licence issued under s 45 of the Water Act authorising a person to take surface water.
TLA	Tindall Limestone Aquifer	A water source relevant to the licences under review.
Top End	N/A	The water resource districts referred to in the NT WAP Framework as 'Top End', being those areas in the northern third of the Northern Territory.
TRIM	N/A	A proprietary records' management system, in general use in the public and private sector and in use at the department.
WALAPS	Water Act Licensing and Permits System	A custom-built software system and database for managing the water extraction licence process from receipt through to grant, in use only during the end of the review period.
WAP	Water allocation plan	A plan declared by the Minister under s 22B of the Water Act, to provide for the management of water resources within a WCD, including for the allocation of water within the estimated sustainable yield for declared beneficial uses. E.g. <i>Alice Springs Water Allocation Plan 2016-2026</i> .
WCD	Water control district	An area declared by the Minister under s 22 of the Water Act. Water Control Districts are areas declared where there is a need for enhanced management for the sustainability of groundwater reserves and river flows. Within a WCD a bore construction permit is required, water allocation plans can be developed and water extraction licences are required unless there is a specific exemption in place.
water extraction licence	water extraction licence	Licence to take water granted under s 45 (surface water) or s 60 (groundwater) of the Water Act.

1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

The Department of the Chief Minister of the Northern Territory required an independent review of the processes used by the former Department of Land Resource Management¹ between 30 August 2012 and 30 August 2016, to prioritise, assess and allocate water entitlements for new or increased water extraction licences. The full Terms of Reference are set out in Appendix A.

The review was conducted by a panel comprising Ms Megan Dyson (Chair) and Dr Annette Davison. Scientific advice relating to the overall approach and a selection of individual licence grants was provided to the panel by Dr Glenn Harrington. Together the reviewers have expertise in administrative and environmental law, water allocation and licensing policy, public health microbiology, auditing, and groundwater science with speciality in recharge estimation, surface water - groundwater interaction, arid zone hydrology and numerical modelling.

In addressing the Terms of Reference, the review focused on the following questions:

1. *Was the overall administrative approach appropriate?* The panel considered whether processes and procedures, including template documents, checklists data bases, record management and other practices existed to support administrative decision-making, and whether decision-making was informed by an appropriate scientific approach.
2. *Was an appropriate process applied to each licence grant under review?* The panel considered the extent to which departmental practices and procedures were applied to each licence grant, and the extent to which requirements of the Northern Territory Water Act, and for good administrative decision-making, had been met in each case.

The review was not a 'merits review'; that is, the review panel did not consider whether documentation relating to any licence warranted a different outcome in terms of the grant of a licence or conditions included on it. Nevertheless, the Terms of Reference required the panel to assess whether, having regard for proper process, public accountability and responsible management of water resources, there was any evidence in relation to a grant which indicated that there should be a further investigation of the grant process. This aspect of the review necessarily meant that the panel considered the way in which legal requirements and government or departmental policies and guidelines were applied to the facts of individual licence applications.

The Department of Environment and Natural Resources provided the review panel and Dr Harrington with copies of documents relevant to the review, and provided further assistance throughout the review including by giving oral presentations, explanations and additional information as required.

1.2 REPORT CONTENTS

This review report comprises six chapters:

Chapter 1 – Executive Summary and recommendations: outlines the nature of the review and highlights key findings documented in the report, as well as providing an overview of findings against each of the Terms of Reference. The chapter also presents the report's recommendations grouped into three priority levels, for implementation between the next 6

¹ Now the Department of Environment and Natural Resources.

months to 3 years. The table of recommendations includes examples of particular actions that should be considered when implementing each recommendation.

Chapter 2 – Methodology: sets out the scope of the Terms of Reference and details the approach adopted by the review panel and Dr Harrington as scientific reviewer.

Chapter 3 – Administrative framework: reviews the policies and processes applied by the department during the review period, summarising the review panel’s findings of the extent to which they were consistent with relevant requirements of the Water Act and conducive to meeting administrative law requirements for decision-making.

Chapter 4 – Scientific basis for licence decisions: provides an assessment of the extent to which best practice evidence-based science was available to decision makers when assessing applications for water licences during the review period. The chapter assesses the overarching policy framework (NT WAP Framework) and groundwater modelling tools, and explores the basis for the WAPs and draft WAPs relevant to the licences under review.

Chapter 5 – Licence review: ToR 1: provides an overview of the panel’s findings on assessment of licence files against the first Term of Reference. ToR 1 asks whether grant processes adhered to the requirements of the Water Act.

Chapter 6 – Licence review: ToR 2 – ToR 8: summarises the panel’s findings on assessment of licence files against the remaining Terms of Reference. ToR 2 – ToR 8 required the panel to examine various specific aspects of the grant processes.

1.3 CONTEXT

The review period was a time of increased focus on access to water resources as a driver for economic development in the Territory. While some of the licence applications reviewed involved very small quantities², more than half were for quantities exceeding 1,500 ML/y, almost exclusively for irrigation of annual and permanent crops.³ Reflecting increased competition for water resources, applications made after mid-2013 were for significantly higher quantities than those made before that time.

Water licences currently held in the Territory total 298,454 ML/y.⁴ The four-year review period saw the grant of new and increased entitlements involving nearly half of that total - 133,403 ML/y.⁵

During the review period, 389 licence applications (involving grants, renewals and amendments) were processed, 85 of these being outstanding as at the commencement of the review period in August 2012. The workload was administered by six staff, although only three of these were available during 2015. Staff combined their water licensing functions with other duties such as water resource planning, bore drillers’ licensing and bore permit processing. Up to two other staff members were available to assist with modelling work associated with applications in the Daly and Roper river catchments.

² 10 applications were for less than 10 ML/y; most of these related to minor industrial applications such as caravan parks.

³ The median size of entitlements granted was 1,240 ML/y, while 27 grants exceeded 1,500 ML/y. 30 grants were for quantities exceeding 1,000 ML/y, 9 were for more than 5,000 ML/y, and 3 were for more than 10,000 ML/y. The largest grant was for 15,400 ML/y.

⁴ Figures provided by Department of Environment and Natural Resources, January 2017.

⁵ Of the 57 decisions reviewed, one of the decisions related to a change in ‘staging’ (that is bringing forward the quantities to be used over the life of the licence, to accommodate an increased rate of development). Another decision involved an extension in the term of an existing licence. Neither decision is included in the water quantities mentioned here.

The administrative procedures set by the Water Act are prescriptive and relatively onerous in comparison with water licensing legislation in other Australian jurisdictions. The procedures must be applied to every application for a new or increased water entitlement, regardless of the degree of risk that might be associated with an application in terms of potential impacts on water resources, the environment generally, or other water users. In particular, the Act requires that a formal statement of decision (SoD) is prepared for every decision on an application. The SoD must state the reasons for the decision and also set out the way in which all matters relevant to the decision were taken into account. It is essential that these requirements are met, and failure to do so can in some circumstances threaten the validity of the resulting decision.

1.4 KEY FINDINGS

In broad terms, the review panel found that most requirements of the Water Act were met. Although there were various instances of departure from statutory requirements and best practice decision-making, these were mostly minor in nature and the panel considers it unlikely that deficiencies noted would have warranted a licence decision being set aside on the grounds that it had been improperly made.

There was clear evidence of improvements in process over the review period for administrative, scientific (modelling) and communicative aspects (for example, improved explanations of reasons for decisions in the SoDs). On the administrative front in particular, the panel commends the department's electronic Water Act Licensing and Permits System (WALAPS), which was introduced at the end of the review period and now provides a sound platform for administration of licences. Further development of WALAPS will assist implementing a number of the recommendations contained in this report and provide opportunities for further improvement and streamlining of the assessment and grant process.

1.4.1 Administrative framework and licence grants

The panel was required to review the application, assessment and approval processes for water licences, and assess whether grants of new or increased entitlements were made in compliance with the Water Act, Water Regulations and relevant government policies.

The panel found that the administrative framework existing during the review period in general terms indicated an understanding of and adherence to the Water Act procedures and administrative law requirements, and included administrative processes to support the department's ability to meet those requirements. The introduction of WALAPS at the end of the review period helped to improve formality in procedures and record keeping.

Various deficiencies in aspects of the grant process, or the process as applied to individual licence decisions, stood in the way of excellence. The report's recommendations are aimed at improvements in these areas. In particular:

- Procedures for administering licence applications, document control and record keeping lacked formality, thereby increasing the likelihood of errors or inconsistencies in the grant process.
- There were no written procedures guiding the assessment of applications. Some errors were evident in the assessment stage, such as the practice of 'batching' together groups of applications for the purposes of assessment and decision-making; this is not consistent with the Act and obscured the decision-making process applied to individual licences. It was noted that the practice of batching ceased in 2015.

- Files generally contained good, albeit indirect, evidence that applications had been assessed for their potential impacts on water resources and other users. However, there was lack of direct on-file evidence of the way in which relevant aspects of all applications had been assessed (such as for example potential local impacts on groundwater dependent ecosystems or other users, water quality matters, and commenters' concerns). Evidence of advice provided to the Controller was also generally absent from files, although it could for most matters be inferred from the SoD.

Improved practices would include:

- formalising administrative processes and guidelines for the receipt, processing and assessment of licence applications
- processes that ensure that comprehensive information and advice about that information is placed before the Controller, forming a strong evidentiary basis for the Controller's decision
- obtaining legal advice on aspects of interpretation of the Act rather than relying on officers' working understanding.

All licence files indicated an appropriate separation in functions as between the department, Controller and Minister. There was no suggestion in any licence file of political interference or Ministerial intervention.

Specific aspects of the licence grants, including the extent to which concerns raised by the community were taken into account, are the subject of the Terms of Reference and detailed in chapters 5 and 6.

1.4.2 Scientific basis for licence decisions

The review was required to incorporate an assessment of whether best-practice evidence-based science was available to decision makers, and to determine whether evidence-based scientific analysis was sought and considered in relation to each application.

The scientific methodologies used to assess licence applications for most groundwater resources were found to be robust, defensible and in some cases, commendable in approach.

Of the 57 licence decisions reviewed, 43 related to the Daly Roper Water Control District (WCD). The Daly Roper WCD covers a number of water resources including the Katherine, Daly and Roper rivers, and the Tindall Limestone and Ooloo Dolostone aquifers. The review panel was told of a focus on improving modelling capacity for this WCD during the review period; this work meant that the way in which the estimated sustainable yield and the impacts of granting new licences were calculated and expressed for the Ooloo and TLA Mataranka aquifers improved considerably during the review period. It also means that the majority of decisions were assessed, in terms of the quantity of water available for allocation, under the integrated Daly and Roper river catchment models.

Applications not assessed under the Daly or Roper river integrated models were assessed in accordance with the NT WAP Framework, using available models. The estimated sustainable yield (ESY) for these resources was determined based on the rules contained in the NT WAP Framework.

The NT WAP Framework provides a conservative and sensible approach to holistic water and natural resource management in the Top End, in the absence of robust scientific research on environmental, social and cultural water requirements such as that which currently exists for the Daly River. For the Arid Zone, principles in the Framework reflect that rivers in the desert rarely flow, and when they do the environmental water provisions are critical. Contemporary recharge to most aquifers is very

low, which means that any development is a trade-off with acceptable levels of stress, and the resource is effectively mined over a defined lifetime.

Notwithstanding the general findings, a number of areas for improvement were noted to strengthen the evidence base for future decisions.

Model uncertainty was not assessed as part of the water availability predictions and, therefore, was not considered as part of the licence decision-making process. At a minimum, model parameter uncertainty should be reflected in model-based decision making, at least in advice to water planners about the confidence with which the models can simulate natural flows and predict altered flows. The current approach of reporting modelled change in flow against measured flow helps to reduce some of the uncertainty, however there remains inherent errors in any modelling analysis that need to be properly communicated.

Water availability assessments may be compromised by the department's current approach of only using the past 30 years of historical climate data to determine future water availability and reliability of licences, rather than the full historical record. While the panel considers this to be appropriate for the 10 year term of a granted licence, the Controller and licensees need to be better informed that the last 30 years of historical climate data is not a reliable indicator of long-term future water availability; the implication is that the likelihood of renewal of licences after each 10 year term is highly uncertain, and thus needs to be factored into business investment decisions.

While the Daly and Roper river catchment integrated models are considered best-practice, it is recommended they be recalibrated to, or at least validated against, more recent (2009-2016) measurements of groundwater levels, river flows and spring discharges, in order to continue to improve confidence in the model outputs and support robust water licensing decisions into the future.

Documentation of the evidence base and detailed methods of modelling process and analysis of results was generally lacking for the determination of the ESY, assessment of licence reliability, and setting of AAAs. This made it very difficult for the panel to determine whether best practice evidence-based science was always available to form the basis for the recommendations made to the Controller. As a result of this, the water scientist relied heavily upon the information provided through interviews with key department staff, whom were forthcoming and helpful.

Impacts on water quality were often lacking and need to be better incorporated into licence assessments. For example, there is a long-term risk to high quality (TDS <500 mg/L) groundwater resources in the arid zone due to mixing with or entrainment of poorer quality groundwater. A comprehensive hydrochemistry and environmental isotope assessment of the Mereenie Aquifer Systems should be a priority to provide further confidence about the security of the future public water supply for Alice Springs. The SoD for the relevant licence decision in the review period commits to developing a numerical groundwater flow model, and one of the Licence Conditions provides for future assessment to be conducted and considered for the licence renewal

The basis for these findings is detailed in chapter 4.

1.4.3 Summary of findings on Terms of Reference

Findings in relation to each ToR, and the basis for these findings, are detailed in chapters 5 and 6. Findings are summarised in the table below.

TERM OF REFERENCE	SUMMARY OF FINDINGS
<p>ToR 1: Whether the process adhered to the requirements outlined in the Act and Regulations, in particular sections 90, 71B-71E and 30 of the Act</p>	<p>Overall, the processes applied to licence grants adhered to requirements of the Water Act and regulations in most if not all material respects. Instances of departure from requirements were in the panel’s view unlikely to have been sufficiently serious to warrant a licence decision being set aside (i.e., had any person taken judicial review proceedings to challenge a licence decision on the grounds that it had been improperly made).</p> <p>There is opportunity for improvement in procedures for the receipt, processing and assessment of applications to ensure that statutory requirements including timeframes are met and documented, and to ensure a strong brief of evidence to support all aspects of the Controller’s decision.</p> <p>Processes applied to s 30 reviews met statutory requirements.</p> <p>Recommendations P1-1 to P1-12, and P2-1 to P2-3 pertain to this ToR.</p>
<p>ToR 2: Whether the process adhered to the relevant Water Allocation Plan (WAP), or draft WAP, for a declared Water Control District, or the existing NT Water Allocation Planning Framework where there is no WAP</p>	<p>Assessment against water quantity provisions of WAP, draft WAP or NT WAP Framework could be inferred from each SoD although direct evidence of assessment was seldom included on the licence file.</p> <p>WAP: Where a declared WAP applied (5 licences), each licence was granted within the ESY specified in that WAP. A small number of specific WAP rules relating to licence conditions and involvement of the Water Advisory Committee were not applied.</p> <p>NT WAP Framework: SoDs indicated that the Framework was taken into account in all but one case. Three ‘own motion’ grants contained no indication that the Framework had been taken into account.</p> <p>Draft WAP: SoDs generally indicated that ESYs proposed by draft WAPs were taken into account in licence decisions. Draft WAP ESYs were usually not applied, in favor of the NT WAP Framework coupled with more recent knowledge. There was no on-file evidence that other draft WAP provisions relating to assessment and grant of licences (e.g. requiring assessment of existing use for applications for increases, or granting large applications in increments of not more than 1,000 ML at a time) had been taken into account.</p> <p>It is not mandatory for the Controller to apply a draft WAP during decision-making, but in most cases such a document will be a relevant matter that should be taken into account. Over the course of the review period, SoDs improved in the extent to which they explained differences between the ESY stated in a draft WAP, and the department’s current estimate of ESY.</p> <p>Recommendations P1-1, P1-3, P1-12, P2-2 and P2-4 pertain to this ToR.</p>

TERM OF REFERENCE	SUMMARY OF FINDINGS
<p>ToR 3: Whether the grant was made in accordance with the relevant government policies</p>	<p>FIFS: The way in which FIFS was implemented in relation to individual licence grants was often unclear. It was not possible to determine how FIFS was applied to each application, as:</p> <ul style="list-style-type: none"> • licence files contained no evidence of the date on which an application was deemed to have been lodged for the purposes of the Water Act, or of the date on which an assessment as to availability of water had been carried out • there was no formalised explanation of how FIFS was applied, either in departmental procedures or on licence files. <p>UIOLI: Current policy (2014) is that a licence not used in full in the first three years may be reduced by 50%, and by a further 50% if the remaining balance is not used within the following three years. All licences granted after April 2013 included two conditions referring to the expectation that the entitlement will be used. Conditions currently included on licences may enable implementation of UIOLI, although not in precisely the terms of the policy statement.</p> <p>AAAs: AAA conditions were applied to all Top End licences in the review period. AAA was intended to operate so that reliability of existing licences was preserved when recommending subsequent grants. New licences would not be granted if they would cause a reduction in reliability of existing licences. Licences in one batched set were granted contrary to this intent; the SoD explicitly acknowledged that their grant would reduce the reliability of existing licences, but did not mention the reason for granting the new licences in spite of this effect. The panel was informed that the department determined the reduction to be reasonable as the final reliability was in line with recommendations in the draft WAP.</p> <p>10-year terms: Licences were in almost all cases granted with 10-year terms. Applications to amend licences by increasing their entitlement were also granted with a fresh 10-year term commencing from the date of grant, in effect as a new licence. For existing 10-year licences, this meant an extension of term beyond 10 years.</p> <p>No SIR: The government’s determination that Strategic Indigenous Reserves would not be provided in WAPs did not directly apply to licences under review.</p> <p>Recommendations P1-3, P1-6, P1-7, P1-12 and P2-4 pertain to this ToR.</p>
<p>ToR 4: Whether the approval of the water licence application and entitlement was consistent with advice provided by the former Department of Land Resource Management’s scientists and expert practitioners during the assessment and approval process</p>	<p>In each case, approval of the application and entitlement was consistent with the recommendation contained in the departmental memo to the Controller.</p> <p>Advice provided by DLRM scientists and expert practitioners during the assessment process was not detailed on licence files or included in the package of material put before the Controller. The evidence base for recommendations was therefore inferred from the contents of the SoD. SoDs generally indicated only that assessment relating to water availability on a regional scale had been carried out, and did not mention assessment in relation to other aspects of applications.</p> <p>Recommendations P1-1, P1-3, P1-12, P1-13, P1-14 and P3-1 pertain to this ToR.</p>
<p>ToR 5: The extent to which comments received from the community were considered during the assessment and approval process</p>	<p>Evidence that comments had been taken into account was inferred from the contents of the SoDs. In most licence files, SoDs adequately summarised comments and explained how they had been taken into account.</p> <p>SoDs for some ‘batched’ files included errors in itemisation of comments or summarisation of concerns. Some SoDs implied that the existence of the ‘no SIR’ policy meant that social and equity concerns relating to access to water resources need not be considered by the Controller.</p> <p>Constraints on knowledge and modelling of local processes might have prevented some specific concerns from being assessed.</p> <p>Recommendations P1-1, P1-3, P1-9, P1-10, P1-12, P2-4 and P3-1 pertain to this ToR.</p>
<p>ToR 6: Whether the volume of water applied for and allocated</p>	<p>Intended use: Most licences were granted for a quantity consistent with the intended use, as indicated by the crop water use estimates which were either</p>

TERM OF REFERENCE	SUMMARY OF FINDINGS
<p>was consistent with both the intended use set out in each licence application, and the sustainable yield of the relevant source of water</p>	<p>provided in applications or undertaken or verified by the department. Where an application was for industry, public water supply or aquaculture use rather than crop irrigation, there was less evidence of assessment of the applicant's requirements. Licence files did not indicate that assessments were formally brought to the Controller's attention and they were sometimes not included in the package of documents provided to the Controller.</p> <p>An applicant's current or intended use for permanent crops did not appear to have been considered when granting low-reliability licences. There was no indication that applicants were informed of the suitability of low-reliability licences for permanent crops.</p> <p>Sustainable yield: ESY was considered in relation to each licence granted. Licences were generally granted accordingly, as outlined in relation to ToR 2.</p> <p>Recommendations P1-1, P1-3, P1-12, P1-13, P2-5 and P3-1 pertain to this ToR.</p>
<p>ToR 7: Whether there was demonstrated separation of the decision making powers between the former Department of Land Resource Management, the Controller of Water Resources and the Minister in granting each new and increased licence entitlement</p>	<p>Departmental officers played an appropriate role in the administration and provision of advice for both licence applications and s 30 reviews. There are opportunities for improvement in the provision of formal advice by the department to the Controller, as mentioned in previous ToR.</p> <p>There was no evidence of contact between the Minister and department or Controller in any of the licence files reviewed, other than the provision of formal briefings by the department to the Minister in respect of each s 30 review.</p> <p>Recommendations P1-1, P1-3, P1-9, P1-12 and P2-3 pertain to this ToR.</p>
<p>ToR 8: Whether, having regard to the need for proper process, public accountability and responsible management of water resources, there is any evidence regarding the making of the grant which indicates that there should be further investigation of the grant process</p>	<p>Review of the licence files revealed a number of opportunities for further investigation and improvement of the grant process overall.</p> <p>Particular areas for improvement are as identified in the Recommendations.</p>

1.5 RECOMMENDATIONS

The review panel acknowledges the wealth of experience and knowledge of departmental staff in their subject matter areas, and the admirable progress with WALAPS and its implementation. As noted at the start of this chapter, during the review period the department administered a large number of applications under a prescriptive statutory process with a relatively small number of resources. Acknowledging this context, the panel identified a number of areas for improvement, particularly in formality of process and evidence base for decisions.

Recommendations have been designed to address key findings summarised in section 1.4, and to provide the department (including modelling, resource planning and administration staff) with better underpinning systems to administer the grant process. While implementation will require additional resources in the shorter term, investment will pay off in the form of a strong basis for decision-making and streamlined processes, resulting in better quality decisions which can be conveyed to stakeholders clearly and with confidence.

Recognising that not all recommendations are required for immediate implementation, the recommendations have been grouped into the priorities shown in Table 1-1, based on the level of risk the review panel perceives is associated with each area.

Recommendations are set out in Table 1-2. Each recommendation is supported by additional detail regarding matters which should be considered for inclusion when implementing the recommendations.

Table 1-1. Priority groupings for recommendations.

PRIORITY	RISK BASE	TIMEFRAME
P-1	Approaches which are currently providing a significant area of risk to the grant process and need to be modified soon.	Develop and Implement within 6 – 12 Months
P-2	Approaches which are providing a modest degree of risk to the grant process and need to be modified within a moderate.	Develop and Implement within 1-2 Years
P-3	Approaches and frameworks which are providing a lesser degree of risk to the grant process and can be modified over a longer time frame.	Develop and Implement within 1-3 Years

Table 1-2. Recommendations of the Independent Review of Water Extraction Licences.

RECOMMENDATION	CONSIDERATIONS FOR INCLUSION
P1-1. Develop checklist and process for preparing Controller’s brief	<p>Controller’s brief should contain all relevant material, including:</p> <ul style="list-style-type: none"> ○ verification that all procedural requirements have been met ○ detail of all assessments, advice and recommended findings ○ details of NoI comments received (including copies of all comments), the way in which they have been assessed, and advice about how they should be taken into account. <p>Ensure that requests by Controller for additional material relating to an application are documented, and that responses to those requests are also documented (including for example by provision of an amended SoD or additional advice).</p>
P1-2. Develop checklist for receipt and processing of licence application	<p>Checklist should include items that will ensure that:</p> <ul style="list-style-type: none"> ○ applications are complete before being accepted ○ application amendments are clearly documented ○ date on which completed application is lodged is recorded (seek legal advice on this aspect) ○ applicant is correctly identified (including ensuring that applicant is a legal or natural person) ○ clear distinction made and maintained between applications for new licence, for entitlement increase of existing licences, and for renewed licence with entitlement increase.

RECOMMENDATION	CONSIDERATIONS FOR INCLUSION
<p>P1-3. Develop and implement formal processes for assessment of licence application</p>	<p>Ensure process applies FIFO policy to the extent it is relevant (see also P1-7).</p> <p>Process should ensure assessment of all relevant aspects of each application:</p> <ul style="list-style-type: none"> ○ is undertaken and clearly documented on file ○ is verified by appropriate officer ○ has a sound and documented factual basis (including scientific basis where relevant) ○ is carried out individually on its merits (assessments should not be ‘batched’). <p>Process should:</p> <ul style="list-style-type: none"> ○ include assessment guidelines that implement a risk-based approach to assessment, that is fit for purpose (i.e., the nature and extent of assessment should be tailored to the specific risks presented by each application) ○ be efficient and designed to achieve processing without delay and within statutory timeframes. <p>Assessment guidelines should be prepared, covering assessment of all aspects.</p>
<p>P1-4. Develop and implement processes to ensure NoI requirements fulfilled and evidenced</p>	<p>Ensure processes are established so that NoI requirements are accurately carried out and documented. These should include –</p> <ul style="list-style-type: none"> ○ clarity around when a new NoI is required to be published for an altered application ○ ensuring new NoI made for each new application, and a single NoI for each application (NoI should not be ‘batched’) ○ ensuring NoI template distinguishes between applications for new licence, amendment (increase of entitlement), and renewal (with increase of entitlement) ○ training in use of template use to ensure correct completion of NoI ○ clearly conveying the ESY, if included in NoI ○ retaining evidence on file of publication of NoI publication and provision to adjacent landowners and occupiers. <p>Ensure Controller’s brief includes verification and substantiation of procedural requirements being met.</p>
<p>P1-5. Develop process to ensure licence conditions are consistent with SoD and application</p>	<p>Process should include:</p> <ul style="list-style-type: none"> ○ Reviewing inclusion of standard conditions for each licence to ensure suitable and adapted to SoD ○ Ensuring that conditions are included that reflect requirements of declared WAP ○ Seeking legal advice in relation to inclusion and drafting of any non-standard conditions ○ Ensuring licensee correctly named.
<p>P1-6. Ensure licence durations are consistent with Water Act</p>	<p>Seek legal advice regarding practice of granting licence amendment (i.e. increase in entitlement) as a new licence, with fresh 10-year term.</p>
<p>P1-7. Formalise FIFO practices</p>	<p>Formalise the approach to implementing FIFO, in particular whether there should be difference in priority as between applications for new licences, amended (increased) licences, and/or renewals with increase.</p> <p>Ensure approach is consistent with Water Act requirements for processing applications, and with requirements of any declared WAP. Take into account any draft WAP and review as WAPs are developed and finalised.</p> <p>Ensure processes are in place to support FIFO (in particular, ensuring clarity as to date of lodgement of application, and in assessment procedures (see recommendation P1-3)).</p>

RECOMMENDATION	CONSIDERATIONS FOR INCLUSION
<p>P1-8. Review practice of issuing licences with AAA conditions in areas with limited water trading opportunity</p>	<p>Ensure that applicant’s intended use and crop water requirements are taken into account during licensing decisions in areas that do not have WAPs.</p> <p>Ensure applicants for permanent crops are aware of risks associated with low reliability licences, in particular where no trade is available.</p> <p>Expedite WAPs in Top End resources which are at or approaching full allocation.</p> <p>Review water trading provisions in Water Act to allow development of efficient water market.</p>
<p>P1-9. Develop best practice in administrative decision-making</p>	<p>Institute regular training and professional development in administrative decision-making (including in the preparation of material for the Controller, and drafting of SoDs).</p>
<p>P1-10. Improve systems to ensure sound document control</p>	<p>Develop and implement a policy for the approval and use of process-related documents such as Standard Operating Procedures, forms and templates.</p> <p>Include provision for review and control, and (where required) for formal approval of documents for the purposes of Water Regulations.</p> <p>Review forms and templates (both those contained within WALAPS and those otherwise in use) to ensure accuracy and remove any obsolete items; seek legal assistance as required.</p> <p>Ensure relevant staff receive regular training in use of templates and procedures.</p>
<p>P1-11. Improve systems to ensure sound record management</p>	<p>Continue to improve the capacity of WALAPS to record and maintain records of all aspects of licence assessment and determination.</p> <p>Ensure that staff are trained in and create records of all activities that form part of the process including file notes or other records of discussions within the department, with applicants, and with any other person in relation to the application.</p>
<p>P1-12. Develop policy for preparing SoD and prepare SoD template</p>	<p>Policy should include:</p> <ul style="list-style-type: none"> ○ appropriate use of maps and explanatory material to convey reasons for decision to range of readers ○ ensuring that past SoDs identified as ‘best practice’ are used as exemplars but not as templates ○ ensuring basis of material findings is substantiated ○ adequate summarisation of Nol comments and explanation of how they were taken into account in the decision ○ ensuring that a single SoD is prepared for each application (SoDs should not be ‘batched’).
<p>P1-13. Document integrated model-based assessment procedures and improve reporting on inherent uncertainties</p>	<p>Ensure that current practices of modelling for ESY determination, licence reliability and AAA determination are formalised. Details should include:</p> <ul style="list-style-type: none"> ○ model version ○ filenames and metadata for source input files ○ date of model runs and success of each run ○ date and filenames of model output and post-processing of results. <p>Roper River catchment methodologies should be a priority.</p> <p>Assess and report on the uncertainty in model-based predictions of water availability. Reflect uncertainty in model-based predictions in the decision making, at least in advice to planners.</p>

RECOMMENDATION	CONSIDERATIONS FOR INCLUSION
<p>P1-14. Undertake a comprehensive hydrochemistry and environmental isotope assessment of the Mereenie Aquifer System</p>	<p>Assessment of groundwater resource dynamics including recharge, flow and potential for mixing between different water types.</p> <p>Results should feed into industry best practice groundwater flow model to assess impacts of current and future allocations on consumptive pool and water quality impacts.</p>

RECOMMENDATION	CONSIDERATIONS FOR INCLUSION
<p>P2-1. Improve processes for communicating and publishing licence decision</p>	<p>Ensure that NoD is approved for publication only after licence decision has been made.</p> <p>Retain evidence on file of publication of NoD in newspapers and provision to applicant.</p>
<p>P2-2. Develop policy and assessment process for own motion grants</p>	<p>Establish policy re when to use own motion; obtain legal advice to ensure that policy is consistent with Water Act (i.e., own motion cannot be used for licence increases).</p> <p>Ensure necessary evidence is gathered so that own motion grant still takes into account all relevant s 90 factors.</p>
<p>P2-3. Develop formal process for preparing Ministerial briefing for s 30 review</p>	<p>Formalise current processes to ensure briefing:</p> <ul style="list-style-type: none"> ○ contains all relevant material, which is accurately referred to and labelled ○ correctly represents and addresses each ground of review ○ correctly represents Minister’s role on s 30 review ○ is prepared and signed off by senior officer other than Controller. <p>Ensure process includes quality control measures to provide confidence that briefing is complete and accurate, and that attachments are accurately labelled.</p>
<p>P2-4. Formalise key approaches to water allocation</p>	<p>Identify, develop and formalise key approaches to water allocation, including as to weight to be given to draft WAPs.</p> <p>Improve clarity in the way that different allocation approaches are conveyed (i.e. expression of ESY as a long-term annual average per current draft WAPs, vs expression of ESY as proportion of actual annual water available per current practice in some resources).</p> <p>Ensure that allocation policy is clearly disseminated within the water licensing decision process and to Water Advisory Committees, and that personnel understand its requirements.</p> <p>Support the ongoing review, revision and renewal of WAPs, including by establishing and maintaining statutory advisory committees.</p>
<p>P2-5. Develop, recalibrate or refine key models</p>	<p>Recalibrate or at least validate the integrated Daly River catchment model, using more recent observation data post 2009.</p> <p>Continue to refine the integrated Roper River catchment model, including by improving confidence in the relationships between modelled and measured groundwater recharge, water levels and spring flows.</p> <p>The existing groundwater flow model for the Ti Tree Basin should be used in future to provide science-based estimates of sustainable yield, rather than relying on current and known future allocations to set the ESY. The model could also be used to assess individual licence applications, particularly as the total level of allocation increases, to enable assessment of the potential for saline intrusion to the better quality groundwater resource.</p>

RECOMMENDATION	CONSIDERATIONS FOR INCLUSION
<p>P2-6. Establish local pumping rules for the Ooloo Aquifer</p>	<p>Rules should be used to protect specific GDEs (e.g., springs) from intolerable seasonal drawdown caused by localised pumping centres.</p>

RECOMMENDATION	CONSIDERATIONS FOR INCLUSION
<p>P3-1. Commit to ongoing monitoring and investigations</p>	<p>Improve the science base for water allocation planning, including studies of groundwater recharge and flow, processes affecting water quality, and non-baseflow GDEs.</p> <p>Determine improved estimates of recharge/ discharge for the Jinduckin Aquifer, Revisit the work of Jolly (1984) and undertake further field-based investigations, including specific environmental water requirements for Douglas River.</p>

2 METHODOLOGY

2.1 PURPOSE AND OVERVIEW

The purpose of the review, as expressed in the Terms of Reference, was

to independently review the processes used to prioritise, assess and allocate water entitlements issued between 30 August 2012 and 30 August 2016 [the ‘review period’], for both new and increased water extraction licences.

Broadly, the review was to assess the extent to which grants of new and increased licences during the review period adhered to the Northern Territory Water Act, relevant government policies, and legal principles governing proper administrative decision-making. It was also to determine whether best practice evidence-based scientific analysis was sought and considered in relation to each licence grant.

The full Terms of Reference are set out in Appendix A. Fifty-seven licences were subject to review.

The review panel comprised Ms Megan Dyson (Chair) and Dr Annette Davison. Advice relating to the scientific basis for licensing processes and individual licence grants was provided by Dr Glenn Harrington. Together the reviewers have expertise in administrative and environmental law, water allocation and licensing policy, public health microbiology, auditing, and groundwater science, with speciality in recharge estimation, surface water - groundwater interaction, arid zone hydrology and numerical modelling.

In addressing the Terms of Reference, the review panel focused on the following questions:

3. *Was the overall administrative approach appropriate?* The panel considered whether processes and procedures, including template documents, checklists and other practices existed to support administrative decision-making, and whether decision-making was informed by an appropriate scientific approach.
4. *Was an appropriate process applied to each licence grant under review?* The panel considered the extent to which departmental practices and procedures were applied to each licence grant, and the extent to which requirements of the Northern Territory Water Act, and for good administrative decision-making, had been met in each case.

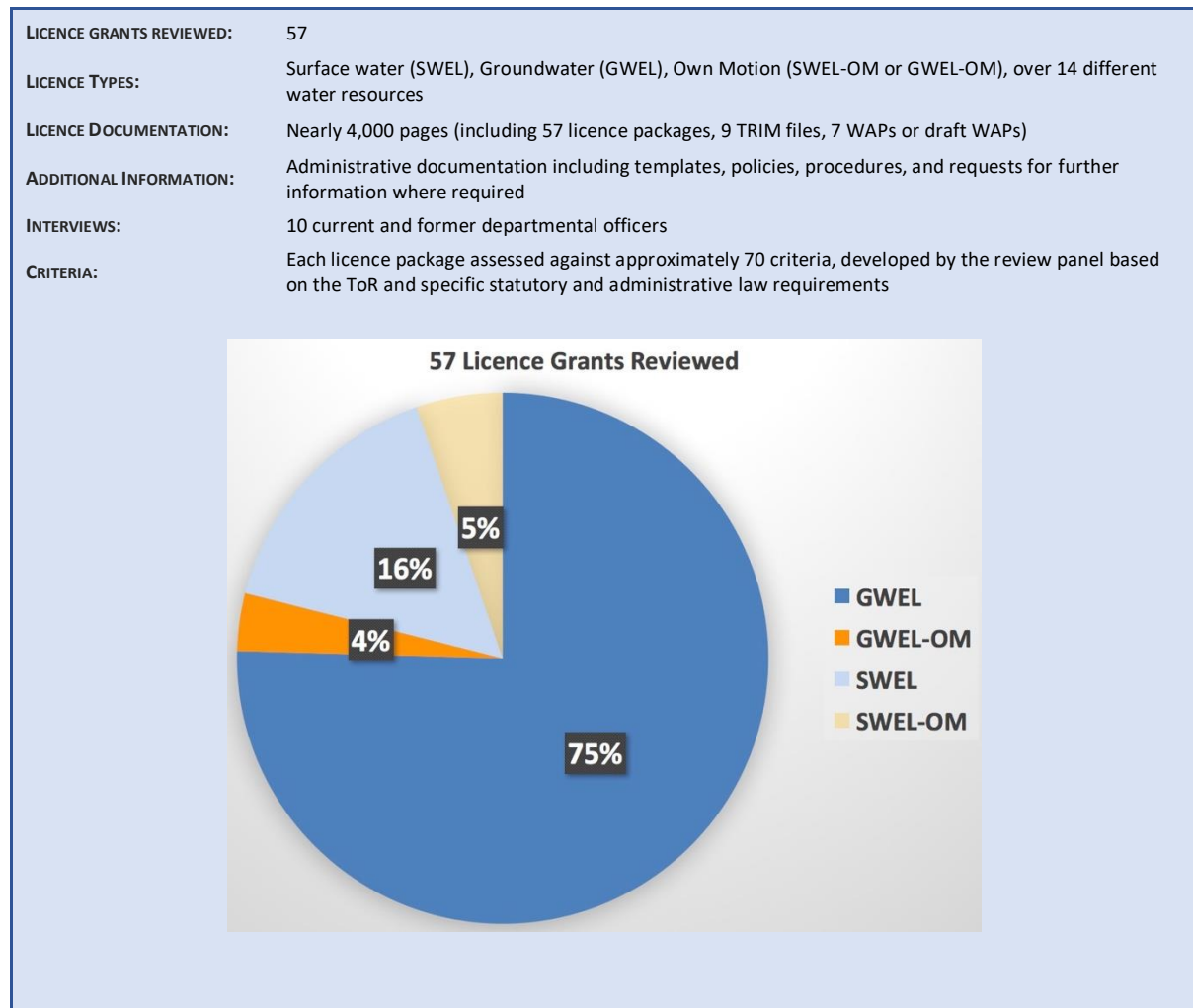
The review of licences was not a ‘merits review’; that is, the review panel did not consider whether the merits of any case warranted a different outcome in terms of the grant of a licence or conditions included on it. Nevertheless, the Terms of Reference required the panel to assess whether, having regard for proper process, public accountability and responsible management of water resources, there was any evidence in relation to a grant which indicated that there should be a further investigation of the grant process. This aspect of the review has necessarily meant that the panel considered the appropriateness of the way in which government or departmental policies and guidelines were or were not applied to the facts of individual licence applications.

2.2 REVIEW OF ADMINISTRATIVE FRAMEWORK AND LICENCE DOCUMENTATION

2.2.1 Outline

Box 3-1 indicates the extent of the review of the department’s administrative framework and of individual licences. The systematic approach applied by the review panel in reviewing the licence grants is broadly outlined in Appendix E.

Box 2-1. 'Snapshot' of review extent.



2.2.2 Information provided by department

Criteria relating to the administrative framework were developed by the review panel into tables, with questions asking the department to provide evidence of the policies, procedures, forms or templates applying during the review period. The department was also asked to identify any other operating procedures or policies used to administer the relevant provisions of the Act and Regulations.

Prior to the first set of interviews by the review panel, the department provided:

- a response to the criteria tables
- a written overview of departmental practices during the review period (*Water Licensing Review - Supporting Documentation Summary*)
- WAPs and draft WAPs relevant to the review period, as well as modelling documentation
- copies of forms and templates in use by the department during the review period
- a Licence Summary Table summarising in tabular form various details relating to the licences under review, including the quantity of water allocated, applicable water allocation plan (if any), and the date on which each application was received and granted.

The department also provided a 'licence package' for each of the 57 licences under review, as a pdf file. The review panel was informed that this package contained all information that had been provided to the Controller for the purposes of the Controller's consideration and determination of each application.

The review panel also sought additional information (Requests for Information) from the department to supplement that provided in the licence package, as required to clarify matters arising during interviews and the review of documentation. Information included TRIM files for a selection of licences.

2.2.3 Review of administrative framework

Material provided by the department relating to the administrative framework was supplemented by interviews with departmental staff in Darwin during February and March 2017. A preliminary summary of the panel's understanding of the administrative framework was provided to the department in order to provide an opportunity to correct any errors of a factual nature.

Chapter 3 of this report contains a summary of findings from this part of the review, highlighting potential for process improvement.

2.2.4 Review of individual licence grants

Each licence package was reviewed and assessed against the specific licence review criteria.

Each licence package included a Memo to the Controller, recommending that the Controller grant the licence, and attaching a draft Statement of Decision (SoD), notice of decision (NoD) and licence. Memos sometimes also included letters for the Controller's signature to those persons who had responded to the NoI, advising them of the decision and their right to seek review.

Memos usually referred to procedural steps in the application and assessment process and, with increasing consistency over the course of the review period, referred to labelled attachments to the Memo as evidencing compliance with those procedural steps.

To determine the potential relevance of other material created by the department in relation to each licence application but not included in the licence package (and therefore not before the Controller in documented form), the review panel also viewed the TRIM records of 9 of the licence files selected from across the review period and from the various water resources, and the business server record for one of the licence files. Although review of these additional materials showed some inconsistency between what was included in the licence package and the contents of TRIM and the business server, the review panel did not see additional documents that would have been likely to have altered the Controller's decision in any matter.

The review panel completed the review of each licence on the assumption that the package given to Controller for the purposes of making a water extraction licence decision did not include material

TYPICAL 'LICENCE PACKAGE' CONTENT

- Form 11 (SWEL application) or Form 14 (GWEL application)
- SIF
- Departmental assessment e.g. crop water use assessment
- Communications with applicants
- NoI to make a water extraction licence decision
- Advertisements of NoI
- Letters to landowners or occupiers with NoI
- Title / pastoral lease search/es
- Comments from respondents to the NoI
- Letter to NoI respondents acknowledging comments
- Memo to Controller enclosing the draft SoD, NoD and G/SWEL
- Letter to applicant enclosing G/SWEL
- Advertisements of NoD
- Letters to NoI respondents enclosing copy of NoD and SoD
- S 30 review package (where relevant)

additional to that in the licence package provided to the review panel. However, the panel also notes that in some instances the package given to the Controller contained less material relating to the application than that which was provided to the panel.

Chapters 5 and 6 of this report contain a summary of findings from review of the licence grants, relevant to each of the Terms of Reference.

2.3 REVIEW OF SCIENTIFIC BASIS

Specialist scientific input to the review was provided by Dr Glenn Harrington. The scope of Dr Harrington's appointment is set out in Appendix B.

The scientific review commenced with an assessment of the overarching policy framework and the purpose-built regional groundwater modelling tools, before exploring the four relevant Water Allocation Plans (WAP), these being:

1. the draft Oolloo Aquifer WAP,
2. the draft TLA Mataranka WAP,
3. the lapsed Ti Tree Region WAP and
4. the declared Alice Springs WAP.

Several licences for each water resource, including those resources that are covered by a WAP and those that are not, were then used as case studies to examine the science base captured in SoDs and accompanying documents on file. Interviews with departmental officers were used either to clarify technical information available on file, or to seek further explanation of models and other assessment methodologies.

Chapter 4 contains a summary of findings in relation to the scientific basis for water licensing.

3 ADMINISTRATIVE FRAMEWORK

This chapter:

- (a) provides an overview of relevant requirements of the Water Act (NT) and associated administrative law requirements,
- (b) provides an overview of the department's approach during the review period, including the practices and procedures adopted by it in administering the Water Act, and
- (c) summarises outcomes of the review panel's assessment of whether the practices and procedures were adequate to ensure adherence to those requirements.

3.1 REQUIREMENTS OF THE WATER ACT AND ADMINISTRATIVE LAW

3.1.1 Water Act

Decisions about the grant, renewal and amendment of water extraction licences are made by the Controller of Water Resources, a statutory appointment under the Water Act. In deciding whether to grant, renew or amend a licence, the Controller must take into account factors set out in s 90 of the Act (the 's 90 factors').

Part 6A of the Water Act sets out procedural requirements that apply to –

- applications for the grant and amendment of water licences, and
- applications for renewal which include an increase in quantity of the licensed entitlement.

Amongst other requirements in Part 6A, the Controller must give public notice of the intention to make a decision about an application, must take into account all comments received in response to that notice, and must give a written statement of reasons for the licence decision.

The Controller also has the power to grant a licence in the absence of any application. These types of decisions are referred to in this report as 'own motion' grants. Part 6A does not apply to own motion grants, but the Controller is still required to take into account the s 90 factors.

A person aggrieved by a decision of the Controller may apply to the Minister for review of that decision under s 30 of the Water Act (a 's 30 review').

3.1.2 Administrative law

Administrative law requires that statutory decision-makers adhere to certain rules. In the case of the Water Act, this requirement applies to both the Controller and also (where a person has applied for a s 30 review) to the relevant Minister.

Rules for administrative decision-making have evolved to ensure that decisions are made correctly, soundly and fairly. In broad terms, proper administrative decision-making requires that:

- legislation under which a decision is made is properly understood and applied, and any particular procedures required by law are rigorously followed

LICENCES: KEY POINTS

- Decisions are made by the statutory position of 'Controller of Water Resources'.
- Licences are granted under the Water Act either under Part 6A, or as 'own motion' grants.
- A licence decision can be reviewed under s 30.

- all relevant considerations are to be taken into account (and irrelevant matters ignored), and the decision must not be unreasonable. While the decision-maker may apply policies to assist in making consistent decisions, policies are not to be inconsistent with the relevant legislation, and the decision-maker still must consider each individual case on its merits
- the decision-maker must not be biased, and the decision is not to be made in bad faith or for improper purposes; sometimes it is necessary to give a person affected by a decision a fair ‘hearing’.

Underpinning all of the above are good records – that is, evidence, consistently and diligently created and kept, demonstrating that each requirement of administrative law has been met.

The prescriptive nature of the Part 6A requirements, as detailed in chapter 5, makes good documentation of procedural steps, assessment and the decision-making process, of particular importance.

ADMINISTRATIVE LAW: KEY POINTS

- A framework of rules to ensure that decisions are made correctly, soundly and fairly.
- Requires that legislation is understood and procedures rigorously followed.
- Requires that individual cases are considered on their own merits.
- Requires demonstration of good faith and integrity in decision-making.
- Underpinned by sound records management.

3.2 APPROACH APPLIED BY THE DEPARTMENT AND CONTROLLER DURING THE REVIEW PERIOD

3.2.1 Overview

The department and Controller’s approach to water licence decisions during the review period was shaped by both formal government policies and longstanding departmental practices. Further departmental practices evolved over the review period, in part to address rapidly increasing demand in water for development. Some of these approaches developed in response to particular licence applications, and were then applied as a matter of practice to future licence decisions.

Key policies or practices applying during the review period are outlined in the table below.

Table 3-1: Policies and practices applied during review period

POLICY OR PRACTICE	SUMMARY ⁶
Northern Territory Water Allocation Planning Framework (NT WAP Framework)	Policy for sharing of water between consumptive users and non-consumptive users (i.e. water for environmental and other public benefit outcomes). Had been applied in licensing and planning decisions since 2000. Included in the NT Implementation Plan for NWI (accredited by NWC, 2006); re-endorsed for Top End resources by NT Government in 2014.
Declared water allocation plans (WAPs)	WAPs declared under s 22B of the Water Act are government policy formalised as statutory instruments. Declared WAPs for three regions were relevant to the review: Alice Springs (2007 and 2016), Ti Tree (2012), and TLA Katherine (2009 and 2016).
First in first served (FIFS)	Approach to processing water extraction licences whereby applications are assessed in the order in which they are lodged. Was departmental practice both prior to and throughout the review period. Use of the approach formally endorsed by NT Government in 2014.
Use it or lose it (UIOLI)	Policy under which under-used entitlements will be reduced or removed.

⁶ The summary and origin of each policy or practice is derived from information provided by the department to the review panel.

POLICY OR PRACTICE	SUMMARY ⁶
	<p>UIOLI was applied from 2001, as a note on prescribed licence forms. The note was later (prior to the review period) replaced with a licence condition.</p> <p>NT Government strengthened the parameters for implementation of the policy in 2014.</p>
Annual announced allocations (AAAs) and security classes	<p>Water allocation approach under which water entitlements each year are the product of (a) the total licensed entitlement and (b) a factor determined by the Controller as required to ensure that take from the water resource will remain within the estimated sustainable yield for that year. Licences are issued in different security classes, so that licences in the lowest security class are reduced before those in higher security classes.</p> <p>Use of AAAs with security classes was formally incorporated in the TLA Katherine WAP in 2009. Security classes used were 'total' (maximum allocation every year except in extreme circumstances), 'high' (maximum allocation in about 70% of years, 'medium' (30% of years) and 'low' (15% of years).</p> <p>Departmental practice since April 2013 is to use AAAs throughout all Top End resources, whether or not there is a WAP in place.</p>
10-year licence terms	<p>Licences have been able to be granted for a period up to 10 years since amendments to the Water Act in 2000 removed the previous 2-year limit.</p> <p>Prior to the review period, departmental practice was to grant annual licences until a WAP had been declared for a resource. Thereafter, 10-year licences could be granted.</p> <p>Commencing at the beginning of the review period, the department adopted a practice of issuing licences for 10-year terms in areas both covered and not covered by WAPs.</p> <p>Formally endorsed by NT Government in 2014.</p>
No Strategic Indigenous Reserve (SIR)	<p>Policy stating that there is no need for WAPs to set aside water specifically for the future economic benefit of Indigenous landholders.</p> <p>Determined as policy by NT Government in March 2013.</p>
30-year climate record	<p>Departmental practice throughout the review period was to use climate data for the 30-year period prior to a licence grant as the basis for estimates of water resource availability over the ten years of the licence grant. Supported by advice from BoM Darwin in mid 2015.</p>

These policies and practices were generally applied to individual licence grants, as outlined in chapter 5.

3.2.2 FIFS

Operation of a FIFS requires decisions be made about the place that each application will occupy in a queue. The review panel saw no written practice or procedure around this aspect of FIFS; in particular, licence files did not record the date on which an application was determined to have been received for the purposes of determining the applicant's place in the queue. In areas of high demand, where higher security licences were close to full allocation, this date could mean the difference between a higher and lower security licence.

3.2.3 AAA

Variable annual allocation is clearly a cornerstone of the Controller's allocation decisions for Top End water resources, developed in response to the very high variability in annual water availability. Under a AAA policy, water entitlements each year are the product of the licensed entitlement and a factor determined by the Controller as required to ensure that take from the water resource will remain within the ESY for that year. AAAs were first applied in the TLA Katherine WAP, in 2009.

Beginning in 2013, the department adopted a practice of applying AAAs to all Top End water resources. Adoption of the practice was not formally documented; it commenced with a licence grant made early in the review period, and was applied to each Top End licence after that, including resources for which there was no WAP.

Detail of the department's approach to the use of AAAs, including as to the calculation of reliability and security of entitlements for the purposes of the AAA scheme, and an explanation of how allocations are reduced in accordance with their security level, was contained in a document titled '*Licence Application, Assessment and Decision Process*' prepared in late 2016, describing processes followed by the department in relation to applications for licences in the Ooloo Dolostone aquifer. The document has not been formally endorsed as a departmental guideline on licence assessment.

The AAA approach operates in a FIFS setting so as to provide 'first-comers' with equal access to licences of the highest level of security. Once demand is such that the reliability of licences in that security class could no longer be met with the grant of an additional licence, a new, and lower, security class is created, to which all subsequent applicants have equal access. Progressively lower security classes may be developed. In the TLA Katherine, licences in the lowest security class can expect to receive their maximum entitlement in only around 15% of years. Operation of FIFS in this way can be contrasted with the approach of only issuing licences until reliability of all licences falls to an unacceptably low level, at which time no further licences are issued.

The Water Act does not explicitly provide for a system of AAAs but may permit its implementation through licence conditions. Other Australian jurisdictions that operate under variable annual allocations have explicit legislation to support the regime.

The department's practice of applying AAAs to all Top End resources, in the absence of WAPs, means that low-reliability licences have been issued in circumstances in which there is no or limited ability for a licensee to trade water allocations during dry years. The point is discussed in more detail in section 6.5 in the context of factors taken into account by the Controller when making licence decisions.

3.2.4 Other practices

Licence files indicated that other, less formal and not explicit, approaches were applied to licence assessments and grants. These included for example:

- assessing each applicant's proposed crop water use requirements as a precondition to accepting an application
- assessing the availability of water as a precondition to accepting an application
- giving priority to existing licensees' applications for increased licence quantities over applications for new licences
- processing applications in the absence of bores capable of taking the quantity sought by the applicant, on the understanding that the applicant would drill relevant bores later
- granting applications for amendment of licences (i.e. to increase their entitlements), as fresh licences, with new 10-year terms.

AAA: KEY POINTS

- Under AAA, water entitlements each year are the product of (a) the licensed entitlement and (b) a factor determined by the Controller as required to ensure that take from the water resource will remain within the ESY for that year.
- AAAs were applied to all new and increased Top End water licences after April 2013.

These practices are significant, and in every case influenced both the material prepared by the department for the Controller, and the Controller's decision. In many cases, these practices affected the applicant's place in the FIFS queue.

3.3 PROCEDURES APPLIED BY THE DEPARTMENT DURING THE REVIEW PERIOD

3.3.1 Procedure for receipt and processing of licence applications

There was during the review period no formal departmental procedure or guideline about receipt and processing of licence applications, until the commissioning of an online Water Act Licensing and Permits System (WALAPS) at the very end of the review period. The panel was informed that the process followed throughout the review period was as outlined in the *Water Licensing Review – Supporting Documentation Summary* prepared by the department for the review.

The introduction of WALAPS has ensured far greater consistency in processes followed after October 2016. In the department's words, '*WALAPS has enabled the licensing and permitting system to move away from an ad hoc paper based system to an on-line web based interface linked to a secure database for consistent document management*'.⁷

3.3.2 Procedure for assessment of licence applications

There was during the review period no formal departmental procedure or guideline for assessing licence applications, nor for assessing whether a licence should be granted of the Controller's own motion.⁸ Likewise, there was no formal procedure regarding documentation of the assessment process.

A document describing the method applied to assessment of matters relating to availability of water (in particular, impacts on water quantity) was prepared specifically in relation to applications for the Ooloo Dolostone aquifer, in late 2016 (outside of the review period).⁹ The panel was advised that the method described was applied in the Top End throughout the review period (as appropriate to the different resources). The document has not been formally endorsed as a departmental procedure.

There is no documented guidance as to assessing other aspects of an application, such as localised impacts on other users or environmental assets, existing and projected future demand for water for domestic purposes, or potential impacts on water quality.

Inconsistencies and apparent anomalies were noted by the review panel in both assessment processes followed, and resulting licence grants. Some specific examples of these are contained in chapter 5.

3.3.3 Forms and templates

The review panel assessed forms and templates that were used in relation to the making, receipt, processing, assessment and grant of water licence applications.

Minor errors were noted in some forms and templates, which would not have been material to the Controller's decision. There was also lack of clarity around whether some templates or procedures

⁷ Supporting Documentation Summary, p 8.

⁸ Sections 45 and 60 of the Act allow the Controller to grant a licence of his or her 'own motion'. The procedural requirements of Part 6A do not apply to own motion grants. Own motion grants are specifically discussed in chapter 5.

⁹ Licence Application, Assessment and Decision Process

were approved for use, or were in fact used, during the review period, due to document control practices.

3.3.4 Processing applications in ‘batches’

Between February 2013 and January 2015, 36 of the 57 licences reviewed were subject to ‘batching’. Batching was the preparation of a single SoD and NoD for a group of licence applications that related to the same water resource. In a number of cases, Nol were also batched, so that two or in some cases more applications were advertised in the same Nol.

There was no written policy or procedure formalising the practice of batching.

The panel was informed that batching had been undertaken primarily to expedite the assessment of licence applications from the same water resource, to help clear a licence application backlog that existed at that time. Batching meant that modelling of impacts of licences could proceed more rapidly, as the applications were grouped and modelled as one. The practice was in large part driven by resource constraints¹⁰ as well as the instability of the model used at that time.¹¹

The practice of batching ceased in early 2015; the panel was informed that from that time, the backlog had been largely cleared, and the model was much quicker to run. However, there was no formal policy or direction calling it to a halt.

Batching is inconsistent with the Water Act and principles of administrative law (that is, assessment and determination of each application on its merits). Transitional provisions in the Water Act permitted the batching of Nol – but not assessment and SoD - for applications received but not determined before November 2008.¹² As none of the licences granted during the review period fell into this category, the transitional provisions did not apply.

Batching affected applications in a range of ways:

- The statutory timeframe within which a Nol must be published was usually not met (a Nol must be published within 30 days of application).
- It was not possible confidently to distinguish, from a batched SoD, the reasons for the decision on an individual application.
- Batched packages presented to the Controller for decision, generally only distinguished between applications in so far as different applications might have received different comments in response to the Nol. There was no evidence on individual licence files to indicate how the Controller took into account relevant matters in relation to each application, and therefore no evidence that each application was considered on its own merits.

BATCHING: KEY POINTS

- The preparation of a single NoD and SoD (and in some cases a single Nol) for a group of applications.
- Was used to expedite assessment and clear backlog.
- Meant that each application was not considered on its own merits, and FIFS not applied as between applicants in a batch.
- While not consistent with principles of administrative law, was unlikely to have caused a grant to be set aside.

¹⁰ The panel was informed that 389 licence applications (involving grants, renewals and amendments) were processed during the review period, 85 of these being outstanding as at the commencement of the review period in 2012. Just six staff (with only 3 during 2015) worked on water licence processing, along with other duties such as water resource planning, bore drillers’ licensing and bore permit processing.

¹¹ The panel was informed that during 2013 and 2014, each model run took about 3 days; the model frequently crashed and had to be re-run. Early difficulties were due to inadequate processing power in the computer hardware for modelling in the Daly and Roper river catchments. Two new computers were purchased in mid-2015 to rectify this problem.

¹² Water Act s 110.

- FIFS was not applied as between applicants in a batch.

The panel considers it unlikely, although possible, that the deficiencies inherent in batching would have warranted a licence decision being set aside.

3.4 SUMMARY OF KEY FINDINGS

The administrative framework as summarised above generally demonstrated an understanding of and adherence to the requirements of the Water Act.

Key allocation approaches (such as implementation of a system of AAAs and FIFS as a method for determining the priority of applications) and administrative practices and procedures to support those approaches, lacked formality. While informality does not necessarily result in material inconsistency with the Water Act or requirements of administrative law, it increases the risk of minor or more substantive errors being made. It also hinders clear articulation of the department's practices to stakeholders, and makes it impossible to ensure consistent application of those practices over time.

There is room for improvement in these areas. In particular, key allocation policies and practices applied through the water extraction licence process should be formalised to ensure that they are well-developed and consistently applied. Processes and procedures, particularly in the area of documentation of assessment, and provision of formal advice to the Controller outlining the assessment undertaken as a basis for the SoD, should likewise be formalised.

The review panel also noted various generally minor inconsistencies between departmental procedures and templates and the requirements of the Water Act, as well as examples of confusion about currency of documentation and incorrect use of templates. These concerns would be addressed by development and implementation of formal processes for receipt, processing and assessment of applications, and improved systems for document control and records management.

In this context, the review panel notes the development of WALAPS by the end of the review period has brought about significant improvement in record-keeping and introduced an improved level of formality to practices and procedures. There is opportunity to further

develop WALAPS for continual improvement in these areas, and to complement this with officer training to ensure correct and consistent use of the platform.

Legal advice should be sought when formalising procedures (including templates) to ensure consistency with the Water Act. The potential need for legal advice and ongoing support in all aspects of administering licence applications should be understood, and advice promptly sought and applied where required.

Many of the above matters are discussed in more detail in chapter 5, as they relate primarily to ToR 1.

ADMINISTRATIVE FRAMEWORK: KEY POINTS

- The administrative framework generally demonstrated an understanding of and adherence to administrative law requirements.
- However there was a lack of formality in key allocation approaches and supporting administrative practices.
- Formalisation of allocation policies and practices would clarify departmental practices and ensure that they are consistently applied.
- The more recent introduction of WALAPS has helped to improve formality in procedures and record keeping.

4 SCIENTIFIC BASIS FOR LICENCE DECISIONS

4.1 INTRODUCTION

In accordance with the Terms of Reference for this review, the following chapter provides an assessment by an independent water science expert of whether best practice evidence-based science was available to decision makers when assessing the relevant applications for water extraction licences. The scope of the water science expert's appointment is set out in Appendix B.

The scientific review commenced with an assessment of the overarching policy framework and the purpose-built regional groundwater modelling tools, before exploring the four relevant water allocation plans (WAP), these being:

5. the draft Ooloo Aquifer WAP
6. the draft TLA Mataranka WAP
7. the lapsed Ti Tree Region WAP
8. the declared Alice Springs WAP.

Several licences for each water resource, including those resources that are covered by a WAP and those that are not, were then used as case studies to examine the extent to which the science base was conveyed to the Controller and captured in SoDs and accompanying documents on file.

This chapter presents the key findings of the scientific review. Recommendations to strengthen the evidence base for future decisions are presented in chapter 1.

4.2 NORTHERN TERRITORY WATER ALLOCATION PLANNING FRAMEWORK

The NT WAP Framework (reproduced at Appendix C) provides the guiding principles for allocating water for environmental and other public benefit, and consumptive use, in the absence of directly related research for specific water resources. It also provides the approach to licensing when current and future use is likely to exceed threshold limits, specifically determining that new groundwater or surface water licences will not be granted unless supported by directly-related scientific research. In the Top End, if such research is not available, then new groundwater licences may still be granted if hydrological modelling can be used to demonstrate that total groundwater discharge will not be reduced by more than 20%.

In the Top End the '80:20' policy or rule was developed as part of the NT Implementation Plan¹³ for the National Water Initiative. Allocation limits are set as follows:

- Rivers – at least 80% of flow at any time in any part of river is retained for environmental and other public benefit water provision
- Rivers – no more than 20% of flow at any time in any part of river may be taken for consumptive use
- Aquifers – at least 80% of annual recharge retained for environmental and other public benefit water provision
- Aquifers – no more than 20% of annual recharge may be taken for consumptive use.

¹³ NT Government (June 2006). Northern Territory Implementation Plan for the Intergovernmental Agreement on a National Water Initiative. Northern Territory Department of Natural Resources, Environment and the Arts.

The 80:20 policy is reflected in the NT WAP Framework. The approach acknowledges the dynamic and interconnected nature of the rivers and groundwater systems in the Top End. By way of comparison, there are numerous examples of stressed groundwater systems in the Murray-Darling Basin that have historically been allocated at fractions approaching 100% of average annual recharge. This has led to the widely-mapped areas of declining groundwater levels and disconnected streams, with harsh environmental consequences. The Murray Darling Basin Plan¹⁴ has set 'Sustainable Diversion Limits' for all groundwater systems from 2019, many of which have an 'Environmentally Sustainable Level of Take' that is derived by factoring the total recharge volume by 70%, reflecting an effective allocation to the environment of 30% (cf. 80% in the Top End of the Northern Territory). Hence this review finds the 80:20 policy provides a conservative and rational approach to holistic water and natural resource management in the Top End.

This review finds the 80:20 policy provides a conservative and rational approach to holistic water and natural resource management in the Top End.

In the Arid Zone, however, allocation limits are set very differently, as follows:

- Rivers – at least 95% of flow at any time in any part of river is retained for environmental and other public benefit water provision
- Rivers – no more than 5% of flow at any time in any part of river may be taken for consumptive use
- Aquifers – no deleterious impacts to groundwater dependent ecosystems
- Aquifers – total extraction over no less than 100 years shall not exceed 80% of total (pre-development) storage.

These principles reflect the fact that rivers in the desert rarely flow, and when they do the environmental water provisions are critical, and contemporary recharge to most aquifers is very low. Hence any groundwater development is a trade-off with acceptable levels of stress, and the resource is effectively mined over a defined lifetime.

4.3 INTEGRATED SURFACE WATER – GROUNDWATER MODELS

Coupled numerical surface water – groundwater models have been developed for several different areas in the Top End, with those most relevant to the current review being the integrated Daly River and Roper River catchment models. The Daly River coupled FEFLOW-MIKE11 model (Knapton, 2005; 2006; 2011)¹⁵ simulates interaction between the Tindall Limestone and Ooloo Dolostone aquifers and all connected rivers in the Daly River catchment (e.g., the Katherine, Daly, Edith and Flora rivers). Likewise, the Roper River coupled FEFLOW-MIKE11 model (Knapton, 2009a; 2009b; 2009c)¹⁶

¹⁴ Federal Register of Legislative Instruments F2012L02240

¹⁵ Knapton, A. (2005). Preliminary groundwater modelling of the Ooloo Dolostone. Report No. 37/2005A, Department of Natural Resources, Environment and the Arts, Alice Springs NT.

Knapton, A. (2006). Regional Groundwater Modelling of the Cambrian Limestone Aquifer System of the Wiso Basin, Georgina Basin and Daly Basin. Report No. 29/2006A, Department of Natural Resources, Environment and the Arts, Alice Springs NT.

Knapton, A. (2011). NWC Low Flow Project, Case Study – Recalibration of a coupled surface water – groundwater model to the low flows in the Daly River catchment. Report No. XX/2011A, Department of Natural Resources, Environment, The Arts and Sport, Alice Springs NT.

¹⁶ Knapton, A., (2009a). Gulf Water Study: An Integrated Surface – Groundwater Model of the Roper River Catchment, Northern Territory, Part A - Coupled Surface – Groundwater Model. Water Resources Report number 15/2009, Department of Natural Resources, Environment, The Arts and Sport, Darwin.

Knapton, A., (2009b). Gulf Water Study: An Integrated Surface – Groundwater Model of the Roper River Catchment, Northern Territory, Part B – MIKE11 Surface Water Model. Water Resources Report number 31/2009, Department of Natural Resources, Environment, The Arts and Sport, Darwin.

simulates interaction between the Tindall Limestone Aquifer and all connected rivers in the Roper River catchment.

Both models have had a long history of development, review and refinement. They use historical climate data from 1900-present and have been calibrated to measured groundwater levels, river flows and spring discharges between the early 1960s and the late 2000s. Their primary use for water allocation purposes is to determine long-term average annual recharge and to predict daily dry season flows, which are driven by groundwater discharge, at key environmental reporting sites along the rivers. The TLA Mataranka model has recently been peer reviewed and was determined to be, for the most part, consistent with industry best practice (Middlemis, 2015)¹⁷. Whilst not a modelling issue per se, the only significant issue raised by that review related to the length of historical climate record that is used to predict future water availability, but this has also been identified in the current review and will be discussed later.

As with all groundwater models, the Daly and Roper models have many simplifying assumptions in the processes they represent and the lumped parameters used as their input. During interview, departmental officers highlighted several of these problems. For the Daly model it was explained that recharge to the Florina Formation is currently set as zero, and that this will have to be changed for future simulations of dry season flow and water availability determinations in the Flora River immediately upstream of the Florina Formation. However, the department subsequently advised¹⁸ the following:

“The Florina Formation is not considered to contribute substantially to flows in the Daly River. Therefore, it is not represented in the current model (nor will it be included in the next phase of development planned for the Daly Model). This is a conservative approach. The absence of the Florina Formation in the model has no bearing on licensing decisions which are largely based on impact at key indicator sites on the Daly River.”

The simulated daily flows at Dorisvale gauging station are consistently overestimated by approximately four cumecs compared to measured flows, a problem that is currently managed through manual adjustment of model output. The difference in modelled natural and impacted flows is represented as a percentage of the measured flow. This approach was endorsed as good practice by the Goyder Institute¹⁹ in regard to the Daly Model and Middlemis (2005) in regard to the Roper Model. For the Roper model, the department advised that until recently the low flows in one section of the Roper River were consistently underestimated by approximately two cumecs, so planners had previously used a spreadsheet to manually adjust the model results. Recent model improvements to incorporate groundwater discharge from southern flow paths have reportedly fixed this problem.

4.3.1 Model calibration and uncertainty

Given the importance of the coupled numerical models for regional water allocation planning and individual licence assessments, it is important to understand how the models were calibrated, how

Knapton, A., (2009c). Gulf Water Study: An Integrated Surface – Groundwater Model of the Roper River Catchment, Northern Territory, Part C – FEFLOW Groundwater Model. Water Resources Report number 32/2009, Department of Natural Resources, Environment, The Arts & Sport, Darwin.

¹⁷ Middlemis, H. (2015). Roper Basin Modelling Methodology Review. Prepared by Hydrogeologic Pty Ltd for Northern Territory Department of Land Resource Management. 28 April 2015.

¹⁸ Department comments on an early draft of this chapter made on 13 June 2017.

¹⁹ Cox, J.W., Cook, P.G., Overton, I.C., Pusey, B.J., Oliver, D.P. and Akeroyd, M.D. (2015). Science Review of Environmental Water Requirements for the Daly River, Northern Territory. Goyder Institute for Water Research Client Report No. 15/1, Adelaide, South Australia.

sensitive the calibration was to various input parameters and, ultimately, how uncertain the predictive modelling results may be.

The Daly River and Roper River models used by the department were developed prior to the publishing of the current Australian Groundwater Modelling Guidelines (Barnett et al., 2012)²⁰ however the department advised that the previous Middlemis (2001)²¹ guidelines were used during model development. Regardless of which set of guidelines was used, it is industry best practice to incorporate uncertainty analysis in predictions for water resources management purposes. Barnett et al. (2012) explains this as follows:

MODEL CALIBRATION AND UNCERTAINTY: KEY POINTS

- How are the models calibrated?
- How sensitive is the calibration to various input parameters?
- How uncertain are the predictive modelling results?

“Because a single true model cannot be constructed, modelling results presented to decision makers should include estimates of uncertainty.”

This review has found no evidence of undertaking uncertainty analysis in model predictions for licence decisions made during the review period, regardless of whether the uncertainty is due to

There was no evidence of uncertainty analysis in model predictions for licence decisions made during the review period.

Uncertainty was therefore not presented to the Controller, as part of the SoD.

measurement error (often termed parameter uncertainty) or model structural error. Accordingly, the level of confidence for individual licence decisions and the accuracy of licence reliability determinations were not provided in the SoDs.

It was not until after the review period (that is, post August 2016) that a formal uncertainty analysis was performed for the integrated Daly model (CloudGMS, 2016).²² That study found simulated groundwater discharges to the Daly River were most sensitive to recharge scaling factors that account for climatic changes across the model domain. Uncertainty in all parameter data sets was shown to cause variability in absolute discharge fluxes of ± 1.5 cumecs ($\pm 30\%$) at Dorisvale and ± 2 cumecs ($\pm 10\%$) at Mount Nancar. However, the discharge variability was shown to be much less when the prediction was represented as the difference between two model results (i.e., less than ± 0.1 cumecs or less than $\pm 10\%$ of the groundwater extraction impact).

The Goyder Institute review provides recommendations for further uncertainty analysis on this model to enable greater transparency in communicating the results of licence reliability assessments. Two key examples are as follows:

“The overall approach does not adequately consider the potential impact of model error on the licence reliability calculation. The current approach adopts the modelled streamflow impact series without considering the uncertainty in this time series, and without quantifying how this translates into uncertainty in the licence reliability outcome.”

and

²⁰ Barnett, B., Townley, L.R., Post, V., Evans, R.E., Hunt, R.J., Peeters, L., Richardson, S., Werner, A.D., Knapton, A. and Boronkay, A. (2012). Australian Groundwater Modelling Guidelines. Waterlines report 82, National Water Commission, Canberra.

²¹ Middlemis, H., Merrick, N., Ross, J., and Rozlapa, K. (2001). Groundwater Flow Modelling Guideline. Prepared for Murray–Darling Basin Commission by Aquaterra, January 2001.

²² CloudGMS (2016). Daly River coupled surface water – groundwater model uncertainty analysis. Version 0.2, Prepared for Department of Land Resource Management by CloudGMS Pty Ltd.

“The accuracy of the licence reliability calculations cannot be verified until the effect of model output uncertainty on modelled streamflow impact and licence reliability has been tested and documented.”

The Daly and Roper models each comprise two independent models – one is a MIKE11 model for routing surface water and the other a FEFLOW model for simulating groundwater flow – that are coupled in such a way that the exchange fluxes are transferred from one model to the other via common model nodes. Accordingly, calibration generally cannot be achieved independently for each model, instead relying on an iterative approach until both models are simultaneously calibrated. In any case, calibration of hydrological models generally involves the manual or automated adjustment of input parameters within measured or acceptable bounds until such time that a ‘good fit’ is achieved between simulated and observed data. For the Daly and Roper models, the observed data is historical measurements of groundwater levels and spring discharges, and river flow gauging information from the early 1960s until the time the models were calibrated in the late 2000s.

The department identified a number of recent model improvements and outstanding challenges for the calibration of both models. For example, the surface water model for the Katherine River has recently been recalibrated to match reliable flow gauging data. However, both groundwater models require recalibration to better match observed heads; around Mataranka and parts of Daly it was suggested that heads are “consistently too low in the south and consistently too high in other areas of model”.

Both the groundwater and surface water models (FEFLOW and MIKE11) should be recalibrated (or at least checked) against more recent (i.e. 2009-2016) measurements of groundwater levels, river flows and spring discharge.

This review recommends that both models be recalibrated to – or at least validated against – the more recent (i.e. 2009-2016) measurements of groundwater levels, river flows and spring discharges. Recalibration of the Daly model could also potentially be further constrained using results of in-stream environmental tracer measurements to quantify spring discharge.

4.4 ESTIMATED SUSTAINABLE YIELD

The methodology used to determine the estimated sustainable yield (ESY) differs between the Top End and the Arid Zone in accordance with the NT WAP Framework. In the Top End, the focus is on understanding the risk that dry season river and spring flows will be reduced below thresholds and how often annual allocations less than 100% will be required to maintain minimum environmental water requirements. Wherever possible, this is assessed using the integrated models (e.g. Daly and Roper river catchments, Koolpinyah Dolomite and Berry Springs). Natural and altered river flows are modelled over the historical past generally from 1960 onwards (having set the model for 1960 based on modelling from 1900). The past climate regime is assumed to be a surrogate for the future. The models also enable the estimation of long-term average annual recharge from historical climate data. ESY is then determined using the ‘80:20 policy’ for both flows and recharge, and in the case of the Daly River catchment, the environmental water requirements of Erskine et al. (2004)²³ are also used for setting the ESY.

²³ Erskine, W.D., Jolly, P. and Smith, I. (July 2004). Environmental Water Requirements of the Daly River: Revision of Recommendations of Erskine et al. (2003), based on Daly Regional Water Allocation Workshop held in Darwin on 5 May 2004, Report 30/2004D, Department of Infrastructure, Planning and Environment, Natural Resources Division, Palmerston NT.

In the Arid Zone, stakeholders in the groundwater resources acknowledge that contemporary recharge is very low and any development needs to be a trade-off with acceptable levels of stress. Accordingly, the regional aquifers are essentially being mined at a rate not exceeding 25% of pre-development storage over no less than a 100-year period. There is also commitment to ensure no deleterious impacts to the discharge required to sustain groundwater dependent ecosystems, although this is not explicitly considered for determining the ESY. If at the time of a water extraction licence decision, no GDEs are known to be present, then no further consideration is given.

4.4.1 Tindall Limestone Aquifer Mataranka

The draft WAP for the TLA Mataranka (2011) proposed that the volume of water available for environmental, indigenous cultural and other public benefit purposes will be a minimum 80% of modelled annual recharge based on the previous wet season (i.e. 1 November to 30 April). The draft WAP also proposed a maximum annual extraction limit for consumptive purposes of 15% of the long-term (1900-2008) average annual recharge, and that the annual consumptive pool will be the lesser of either 20% of seasonal recharge or 19,500 ML/y – that is, 15% of the long-term average annual recharge of 130,000 ML/y. Local pumping rules were also recommended, including a monthly extraction limit of 30% of the AAA, and a restriction on bores pumping more than 20 L/s within 1 km of the Roper River.

Despite having a draft WAP, which still remains to be declared, licence decisions during the review period reported vastly different values for the ESY. Explanations were either absent or unclear. This occurred not only between different licence applications but also between the Nol and SoD for individual applications; in both cases there were also differences in the way the ESY was explained.

For example, Nols made in mid-late 2012 indicated that the ESY was as determined by the draft WAP (i.e., 19,500 ML/y). In contrast, Nols made in 2013 stated:

“the average estimated maximum sustainable yield over at least the next 10 years is expected to be 36,800 ML/year. Due to the variability in wet season rainfall the estimated maximum sustainable yield for any single year over the next 10 years may range from a minimum of 3,000 ML/year up to a maximum of 144,000 ML/year.”

Similar terminology and values of ESY – both in terms of the average and range – were used in all SoDs issued from 2013 to 2015, including the SoDs pertaining to licences where the Nol had quoted the lower ESY of 19,500 ML/y.

The department advised that the new ESYs were based on ‘refined modelling’ carried out in 2013, which had provided an average annual recharge of 184,000 ML/y for a shorter historical period (30 years between 1984–2013) than the 108 year period (1900–2008) used previously. The panel was informed that the 108-year historical climate record contains a very dry period that made the earlier ESY value conservatively low. It was also suggested that there was no need for a precautionary approach as the model results from the 108-year simulation were considered erroneous because spring flows were impacted too early (i.e. within first 10 years).

In a response from the department to comments contained in a number of Nol responses made by the Environment Centre NT it was stated:

“The Bureau of Meteorology has confirmed that the best indicator of water resource availability over the next 10 years is gained by modelling the previous 30 years of data.”

The department advised the panel that:

“BoM confirmed in writing that the previous 30 or 40 years of data is the best indicator of today’s climate. NASY concluded that rainfall and recharge could increase slightly from current values over the next 30 years. DENR thus concluded that the past 30 years modelled data was the best indicator of conditions for at least the next 10 years, which is the term for which water extraction licences are normally granted.”

The panel understands this reasoning and considers it to be appropriate for short-term water allocation planning over the 10 year duration of water licences. However, the Controller and licensees need to be better informed that the last 30 years of historical climate data is not a reliable indicator of long-term future water availability; the implication is that the likelihood of renewal of licences after each 10-year term is highly uncertain, and thus needs to be factored into business investment decisions. A recent review by Middlemis (2015) reached a similar verdict, concluding that the current approach of only using the last 30 years of record fails to assess and communicate the likelihood of very low water availability during prolonged drought conditions.

When the department moved to using only the last 30 years of historical climate records, the long-term average annual recharge increased by almost 50% (130,000 ML to 184,000 ML), and the ESY value almost doubled (19,500 ML to 36,800 ML). However, the increase in ESY going from 2012 to 2013 (and later) was not only a result of the department changing the length of historical record over which average annual recharge is calculated; there was also a decision to change the multiplier for determining ESY from recharge to 20% (cf. 15% used with no scientific basis in the draft WAP). Again, it was indicated by the department during the review that this was because an overly precautionary approach was not warranted.

The past 30 years of historical climate data is appropriate for short-term water planning over the 10-year duration of water licences.

The Controller and licensees need to be better informed that the past 30 years of historical climate data is not a reliable indicator of long-term future water availability.

The likelihood of renewal of licences after each 10-year term is highly uncertain, and needs to be factored into business investment decisions.

4.4.2 Ooloo Dolostone Aquifer

The draft Ooloo Aquifer WAP (February 2012) proposed an allocation framework in which groundwater discharge from the aquifer is carefully managed to preserve minimum flow thresholds at key sites in the Daly River, as defined by robust scientific knowledge of environmental water requirements (Erskine et al., 2004):

- 80% at Dorisvale when flows are above 6.2 cumecs, and 92% when flows are below 6.2 cumecs
- 80% at Ooloo Crossing and Mount Nancar when flows are above 12 cumecs, and 92% when flows are below 12 cumecs.

The draft WAP acknowledged that the majority of groundwater discharge from the Ooloo Aquifer occurred in the Northern Zone around Stray Creek, with minor contributions in the Southern Zone along the Katherine River. Accordingly, separate extraction limits were proposed for the Northern Zone and Southern Zone based on modelled river flow on 1 November at Beeboom gauging station and Dorisvale gauging station, respectively. The maximum annual extraction limit from the Ooloo Aquifer was 60,000 ML/y, comprising 40,000 ML/y from the Northern Zone, and 20,000 ML/y from the Southern Zone. The combined volume equates to 20% of the long-term average annual recharge of approximately 300,000 ML/y as determined using the integrated numerical model.

In mid June 2017, the department informed the panel²⁴ that the draft Ooloo WAP provided to the panel for the purposes of the review had been superseded by a version considered by an advisory committee in May 2013. Specifically, the newer version corrected inconsistencies in the objectives of the 2012 draft, in the treatment of environmental flows in accordance with Erskine et al., 2004.

As a result of these inconsistencies, licence decisions made during the review period reported different values for the ESY of the Ooloo Aquifer compared to those defined in the February 2012 draft WAP.

Nols issued in late 2013 for eleven licences stated the following estimated sustainable yields:

- Northern Zone – 40,000 ML/y
- Central Zone – 20,000 ML/y
- Southern Zone – 20,000 ML/y

The inclusion of a Central Zone with an ESY of 20,000 ML/y suggests, at face value, that the total ESY for the Ooloo Aquifer had increased by 20,000 ML/y above the value stated in the February 2012 draft WAP. However, this was not the case, and the panel was informed that:

“Analysis of modelled changes in river flows at Dorisvale Crossing, Ooloo Crossing and Mount Nancar compared to the “environmental flow thresholds” recommended in Erskine 2004 was the basis of these licence decisions.”

The single SoD issued in May 2014 for these eleven licences (which were batched) did not distinguish separate sustainable yields for the three zones, but instead referred to a total maximum extraction limit of 62,886 ML/y, exceeding the limit proposed in the February 2012 draft WAP by less than 5%.

The following explanation for the increase in ESY was provided in the SoD:

“A range of revisions to that draft plan were agreed to by the Daly River Management Advisory Committee [DRMAC] in May 2013 but the revised plan is yet to be completed.

The most significant revisions that have been accounted for in granting these licences is the more accurate relationships between groundwater extraction from three management zones (southern, central and northern) and the scientifically determined environmental flow requirements in the Daly River; and the coordinated accounting of all water allocation decisions throughout the catchment.”

No documentation of the scientific analysis provided to DRMAC was contained on the licence files. However, interview with departmental officers revealed the details of the rigorous integrated modelling process that was used to inform the licence decisions (section 4.5.2) and to set annual announced allocations (section 4.6) for the Ooloo Aquifer based on meeting minimum river flow thresholds in the proceeding year. The SoDs provide some evidence of the detail of this sequential assessment approach, however the terminology used in Nols issued more recently in June 2014 and November 2015 is an improvement in conveying the complexity of the assessment:

“the latest modelling (2014) has confirmed that the estimated sustainable yield with 67% reliability for the next 10 years is expected to be at least 22,528 ML/yr.”

“the estimated sustainable yield of 91,000 ML/yr is expected to be available with 77% reliability without impacting on environmental lows in the Daly River.”

²⁴ Department comments on an early draft of this chapter made on 13 June 2017.

On the basis of this information and the further detail provided by the department, this review finds the explanation provided in the SoD for changing the value of ESY, and the way in which it is reported, to be adequate and transparent.

The explanation provided in more recent SoDs for changing the value of ESY for the Ooloo Dolostone Aquifer, and the way in which it is reported, is adequate and transparent.

The integrated modelling approach used to simultaneously evaluate the water availability in the interconnected Katherine River, TLA Katherine, Daly River and Ooloo Aquifer is state-of-the-art and highly commendable.

Furthermore, this review finds that the integrated modelling approach used to simultaneously evaluate the sustainable yield of the interconnected Katherine River, TLA Katherine, Daly River and Ooloo Aquifer is state-of-the-art and highly commendable. Notwithstanding the model calibration and uncertainty issues raised in section 4.3.1, the only issue with this approach that may warrant revisiting is the length of historical climate used to inform future water availability, as outlined in the previous section for the TLA Mataranka.

4.4.3 Jinduckin (Formation) Aquifer

The Jinduckin (Formation) Aquifer is not represented in the integrated Daly River catchment model and there is no scientific information available for environmental or other public benefit water requirements from this aquifer. During interview, departmental staff also advised that extraction of groundwater from the aquifer by the only existing licensee would not have any impact on flows in the Daly River at the key environmental reporting sites. Accordingly, the NT WAP Framework forms the guiding policy, limiting total extraction from the aquifer to an amount equivalent to 20% of the annual recharge.

Two groundwater extraction licence decisions were made for the Jinduckin Aquifer, one for granting a new licence (the first licence for the western part of the Jinduckin Formation) and the other for granting an increase (on the same licence/property). In both cases, the estimated average annual recharge was inferred from an historical estimate of average annual discharge from the Jinduckin Aquifer into the Douglas River, which was corrected by departmental planners for an error in the original publication (i.e. Jolly, 1984)²⁵. It is not clear from the documents on file, which included a spreadsheet showing the re-calculation of recharge/discharge, exactly how the final estimate of average annual recharge was determined at the individual property scale for the Upper Unit and Lower Unit of the Jinduckin Aquifer. However, this general approach to estimate sustainable yield is scientifically defensible provided the following two criteria were met:

1. the original data and assumptions used by Jolly (1984) to estimate baseflow contributions from different aquifers are reliable and transferrable to the current climate; and
2. the implicit assumption that all outcropping areas of the Jinduckin Formation contribute an equal quantity of recharge, and hence baseflow to the Douglas River, can be justified.

Neither the documents on file nor the original publication (Jolly, 1984) contain sufficient information to determine whether these criteria were met.

Because the ESY for this aquifer was based solely on 20% of the annual recharge – consistent with the ‘80:20 policy’ – there was no explicit consideration of environmental flow requirements for the Douglas River and nearby Green Ant Creek. While such requirements are implicitly respected by using average annual baseflow to estimate average annual recharge, a best practice scientific approach would be

Future licence decisions for the Jinduckin Aquifer should also consider proximity to the river(s) and any specific groundwater dependent ecosystems that are present.

²⁵ Jolly, P. (1984). Douglas/Daly Groundwater Resource Investigations 1981 – 1983. Report No. 8/1984, Department of Transport and Works, NT.

for licence decisions for the Jinduckin Aquifer to consider proximity to the river(s) and any specific GDEs that are present. The department informed the review²⁶ that such an approach could only be actioned once environmental water requirements for the Douglas River and Green Act Creek were explicitly known, based on scientific research. The department considered the required research to be of low priority in the context of risk to the Daly River aquatic environments.

4.4.4 Ti Tree Basin Aquifer

The Ti Tree Region WAP (2009) expired in October 2014 and has not been replaced. The WAP was primarily concerned with the sustainable management of 'better quality' groundwater resources (TDS less than 1,000 mg/L) within the Ti Tree Water Control District. The WAP states that:

“other groundwater resources have been considered in terms of managing impacts on environmental and cultural values and in terms of economic impacts related to potential saline intrusion into the better quality groundwater areas.”

However, it is not clear how these other groundwater resources have been considered, including whether the groundwater modelling has tested current or potential future development scenarios.

The approach of focusing on better quality groundwater resources in the 2009 WAP was taken apparently because no beneficial uses have been identified for more saline groundwater resources (i.e. TDS > 1,000 mg/L), albeit a large licence granted during the review period was to take water with an expected TDS in the range of 1,000 to 1,500 mg/L (see section 4.5.4). This review finds the general practice of setting extraction limits for only the best quality groundwater resources to be acceptable, however the panel was not provided with sufficient evidence to assess the potential for adverse water quality impacts due to mixing or entrainment of more saline water with the fresher resource. These aspects are explored further below.

The guiding policy for the Ti Tree WAP is consistent with the NT WAP Framework, as follows:

“In the absence of adequate scientific information total extraction over a period of not less than 100 years will not exceed 80% of aquifer storage and will not cause deleterious change in groundwater discharges to wetlands (including rivers and groundwater dependent ecosystems).”

The Ti Tree WAP indicates that groundwater modelling by Knapton (2007)²⁷ shows that pumping at current licensed entitlements for 100 years would cause a regional water table decline of between one and six metres compared to the natural steady state. In addition, natural throughflow from the Eastern to Northern zones would reduce by 7%. These impacts were considered acceptable and enabled a new, slightly higher extraction limit to be set for the WAP. The new limit was 13.65 GL/y based on existing and revised allocations rather than any explicit scenario testing through the numerical groundwater model. Nevertheless, limits were set for each of the four management zones and included provisions for known proposed future developments. The total limit equated to 0.3% of the total volume of water in storage (4,850 GL) representing all water qualities.

This review finds that by not explicitly accounting for the more saline groundwater resources (TDS > 1,000 mg/L) – either in a simple spatial analysis or through representation of water quality zones in the numerical model – the lapsed WAP has not rigorously assessed the potential for saline water intrusion into the fresh resource. This process could potentially affect the long-term sustainability of

²⁶ Department comments on an early draft of this chapter made on 14 June 2017.

²⁷ Knapton, A. (2007) Development of groundwater model for the Ti Tree Basin. Report 18, Department of Natural Resources, Environment and the Arts; Land and Water Division.

The lapsed Ti Tree WAP has not rigorously assessed the potential for saline groundwater intrusion into the fresh resource.

Future WAPs for all Arid Zone groundwater systems should contain further assessment of water quality impacts.

any development, either by pumping of the fresher resource causing entrainment of poorer quality water from surrounding areas, or by pumping of the more saline resource drawing better quality water away from existing developments. In either case, the risk of such water quality impacts under current levels of allocation (and use) is likely to be low. However, it is

recommended that future WAPs for all Arid Zone groundwater systems – including the Ti Tree Region – contain further assessment of water quality.

4.4.5 Alice Springs

The Alice Springs Water Resources Strategy 2006-2015 (the Strategy) was replaced by the Alice Springs Water Allocation Plan 2016-2026 (the WAP) however both documents are relevant to groundwater licence decisions made during the review period (refer section 4.5.5). The WAP states:

“Since 2007, no revision of previous water availability estimates has been undertaken, and there have been no major adjustments made to the allocations available within the Management Zone Area.”

Accordingly, the following review comments relate primarily to the WAP.

The WAP provides a robust framework for the allocation and licensing of groundwater from both local-scale alluvial/Tertiary aquifers and regional-scale Amadeus Basin aquifers. There is currently no significant or licensed surface water extraction in the Alice Springs Water Control District, and there were no new or increased surface water licences granted during the review period.

The WAP adopts the term ‘Maximum Allowable Yield’ for groundwater resources rather than ‘Estimated Sustainable Yield’ to reflect stakeholder recognition that most aquifers in the region are non-renewable and thus a trade-off is required to determine ‘acceptable levels of stress’. Community consultation resulted in agreement to allocate less than the maximum 80% of total aquifer storage over at least 100 years that is allowable under the NT WAP Framework:

“limit water use from Amadeus Basin Aquifers to no more than 25% of estimated groundwater storage over the next 100 years.”

Allocation limits for the Alluvial Aquifers are based on estimated average annual recharge and other relevant components of the local water balance. This is a sound approach provided the water balance components can be reliably estimated. Four different Alluvial Aquifer Management Zones have been established to facilitate licensing in the Town Basin, Inner Farm, Outer Farm and Wannardi areas. In three of these zones, groundwater levels in the river corridors are not permitted to decline below a depth of eight metres to protect groundwater dependent River Red Gum vegetation. Other rules provide for artificial recharge to some basins. Only one licence was granted in the alluvial aquifers during the review period; that was in Wannardi Basin, for which the WAP does not provide for river red gum protection and artificial recharge.

In any case, rigorous monitoring and responsive adaptive management is the key to future sustainability of these shallow, dynamic resources.

The WAP sets allocation limits for the Amadeus Basin aquifers that are equivalent to the agreed limit to water use stated above:

“extractions from the aquifer over not less than 320 years (from 1964) will not exceed 80% of the pre-development storage (to 300m below ground level) with water quality of less than 1,000 mg/L TDS.”

The two Management Zones of Roe Creek and Rocky Hill-Ooraminna both contain the three main Amadeus Basin aquifers: Mereenie Aquifer System, Parcoota Sandstone, and Goyder and Shannon Formations. The Mereenie Aquifer is considered the most important resource as it provides the majority of current public water supply for Alice Springs via the Roe Creek borefield. The Parcoota Sandstone and the Shannon and Goyder Aquifers in the Roe Creek management zone provide supplementary public water supply to extend the operational life of the Roe Creek borefield through blending with water from the Mereenie Aquifer.

However, the Mereenie Aquifer in the Rocky Hill-Ooraminna management zone is recognised as the only feasible long-term source for the Alice Springs future water supply once the Roe Creek borefield ceases to be viable. The initial consumptive pool for this aquifer, which has been estimated as 80% of total storage to a depth of 300 metres below ground, comprises water of different qualities:

- 604 GL for groundwater with TDS less than 500 mg/L and
- 2 400 GL for groundwater with TDS between 500 – 1,000 mg/L.

In addition, there is an estimated 940 GL of groundwater in storage with TDS greater than 1,000 mg/L, although 80% of this resource (i.e. 752 GL) is not explicitly included in the consumptive pool.

The WAP sets an allocation limit for groundwater less than 500 mg/L TDS of 0 ML/y in recognition that this resource should be protected for Alice Springs future water supply. The allocation limits for groundwater of 500 – 1,000 mg/L TDS are 87 ML/y for unlicensed stock and domestic use, 3,595 ML/y for agriculture, and 5 ML/y for licensed industry (rural living). For comparison, the previous Strategy (2006-2015) allowed up to 3,625 ML/y of groundwater with greater than 500 mg/L TDS for agriculture.

Given the close proximity of the two different salinity resources and the priority to protect the fresher resource for future public water supply, this review recommends that all future decisions to allocate water from the Mereenie Aquifer in the Rocky Hill-Ooraminna management zone should carefully consider the potential for adverse water quality impacts. Depending on the size and location of the proposed allocation, such assessments may require detailed numerical modelling to predict the movement and/or mixing of water of different qualities.

Future decisions to allocate water from the Mereenie Aquifer System in the Rocky Hill-Ooraminna management zone should carefully consider the potential for adverse water quality impacts to the future public water supply.

4.5 WATER EXTRACTION LICENCE DECISIONS

4.5.1 Tindall Limestone Aquifer Mataranka

Fifteen water extraction licence decisions were issued for the TLA Mataranka during the review period. The department advised during interview that it does not have an internal working document that sets out the licence assessment method using the integrated model for the Roper River catchment. Instead the department provided a verbal overview of the approach, which includes a rigorous assessment of modelled natural and impacted flows at Judy Crossing. The model

is also used to determine the potential for increases in dry season cease-to-flow events at Red Rock in order to protect the water supply at Ngukurr from estuarine saltwater intrusion.

Groundwater discharge to Rainbow and Bitter springs in Elosey National Park is also assessed for each licence decision. This is achieved using a correlation between measured bore water levels and spring flows to determine from simulated groundwater levels how many days in the 30 year simulation period spring flows would be impacted by more than 20%. The department advised that this correlation approach and the underpinning datasets had not been documented for the review period, so it was not possible for the panel to review the details and understand the uncertainties or limitations of this approach as it applied during the review period. The department subsequently advised²⁸ that detailed analyses of modelling outputs for the TLA Mataranka licence decisions, including documentation of the correlation approach, could be produced. In the time remaining to the review panel, it was determined that it was not necessary to view these. It is noted that these outputs were not referred to or included on licence files as forming the basis for the

Model calibration and uncertainty issues aside, the scientific methodology used to assess licences for the TLA Mataranka appears to be robust and defensible.

Formalisation of the approach and methodology should be undertaken.

recommendations made to the Controller.

Departmental planners use a pivot table to compute the overall reliability of the entitlement based on the number of days river flows and spring flows are impacted. The department advised that the pivot table is derived from the analysis of modelled outputs for

natural and altered river flows plus a simpler summary of the daily natural and altered spring flows from the derived groundwater level versus springflow correlations and modelled natural and altered groundwater levels. Licences are granted and modelling is undertaken during April each year using the previous wet season rainfall to set annual announced allocations (section 4.6).

Other than the issues raised in earlier sections of this report with regards to model calibration and uncertainty, and the length of historical climate record used to inform long-term future water availability, this review finds that the scientific methodology used to assess licences for the TLA Mataranka to be robust and defensible. Documentation of the methodology would enable more consistent workflow and more rigorous review in future.

4.5.2 Ooloo Dolostone Aquifer

Eighteen water extraction licence decisions were issued for the Ooloo Aquifer during the review period. The department has an internal working document²⁹ that explains how licence applications for the Ooloo Aquifer are assessed in accordance with the NT WAP Framework, specifically addressing the environmental water requirements prescribed by Erskine et al. (2004). As outlined in section 4.4.2, the cumulative impact of all groundwater and surface water extractions – including those from the Katherine River, TLA Katherine, Daly River, Flora River, Douglas River and Ooloo Aquifer – shall not reduce natural flows below threshold values at Dorisvale, Ooloo and Mount Nancar gauging stations; not at Dorisvale and Beeboom as proposed in the February 2012 draft Ooloo WAP. The panel did not receive the updated May 2013 draft WAP that was provided to DRMAC, however it is understood this document incorporated the change in key environmental reporting sites.

²⁸ Department comments on an early draft of this chapter made on 2 June 2017.

²⁹ *Licence Application, Assessment and Decision Process – Licence Assessment methods in the Ooloo Dolostone Aquifer* (NT Government, unpublished)

Change in modelled river flow is determined for all existing licences and then all existing licences plus the proposed new licence. Change in flow is compared against measured natural flows at Dorisvale and Mount Nancar. However, due to insufficient reliable flow gauging at Ooloo Crossing gauging station, the modelled natural flow is instead used for reliability assessment at this location. Any year over the modelled 30-year simulation period in which the change in flows exceeds the threshold limit on at least one day causes the reliability for that licence to reduce below 100%. Granting of any new licence will be at a level of security that protects the reliability of existing licences.

Further insight to the licence assessment process was provided by the department during the review. It is apparent that new licence applications are not explicitly assessed with respect to local recharge or discharge for any groundwater resource in the Daly or Roper river catchments. This means that the 80:20 policy is likely compromised at the individual property scale. The department subsequently reminded the panel³⁰ that:

“For the connected Daly River – Ooloo Dolostone Aquifer water systems, the requirements of Erskine et al. (2004) takes precedence over the contingent 80:20 rules of the NT WAP Framework.”

While this is a consistent and accepted approach, it means there is potential for groundwater pumping to cause localised bore interference and drawdown impacts on specific GDEs. The department advised the panel³¹ that there was no written documentation of the:

“standard practice of assessing impact to other users dependent upon local density of users.”

The following information was also provided:

“A spreadsheet based groundwater drawdown calculator was developed during the review period (copy attached) based on groundwater hydraulics. This spreadsheet was seldom, if ever, used in assessing licence applications during the review period but was often used in assessing applications for bore construction permits. In general, based on experience gained in assessing bore construction permit applications and knowledge of regional bore densities associated with licence applications, staff could exercise technical judgment as to the likelihood of interference with other bores in the vicinity of licence applications.”

It is noted that neither the spreadsheet calculations nor technical judgment were referred to or included on licence files as forming the basis for the recommendations made to the Controller.

In terms of the potential for local drawdown impacts on specific GDEs, the department advised there is little knowledge available on the location of local GDEs in the NT.

This review recommends that any future licence decisions for the Ooloo Aquifer, as well as the revised WAP when it is prepared, should include local pumping rules to prevent intolerable levels of seasonal drawdown at specific GDEs such as springs and compartments of significant terrestrial, groundwater-dependent vegetation. Such rules would address the valid concerns raised on at least

Future licence decisions for the Ooloo Aquifer should include local pumping rules to prevent intolerable levels of seasonal drawdown at specific GDEs such as springs and terrestrial, groundwater-dependent vegetation.

³⁰ Department comments on an early draft of this chapter made on 2 June 2017.

³¹ Email of 9 June 2017.

three occasions during the review period by the Amateur Fishers Association of NT about particular areas of springs along the Daly River. Based on the water scientist’s professional modelling experience, and prior use of the Daly River model for the Northern Australia Sustainable Yields project³², the coarse regional modelling approach currently employed to assess applications cannot be expected to provide this level of local spring management.

The department acknowledged that low river flows simulated in the model were consistently overestimated by 4 cumecs at Dorisvale. This was dealt with as soon as it became known – at the time of the last Ooloo Aquifer licence decision in the review period – by adopting the same approach as followed in the Roper River model (i.e., comparison of the change from modelled natural to altered flow against measured flow, rather than comparison against modelled flow). It is not clear to the panel how this may have impacted the licence reliability assessments for all but the last Ooloo Aquifer licence decision. The review notes that all models have errors and uncertainty, and require continual refinement with new data and conceptual understanding. It is important that decision-makers understand model uncertainties, particularly where they relate to areas where there is significant investment in horticulture and forestry.

Other than the issues raised in earlier sections of this report with regards to model calibration and uncertainty, this review finds that the scientific methodology used to assess licences for the Ooloo Aquifer to be robust and defensible.

Model calibration and uncertainty issues aside, the scientific methodology used to assess licences for the Ooloo Aquifer appears to be robust and defensible.

4.5.3 Jinduckin (Formation) Aquifer

Two water extraction licence decisions were issued for the Jinduckin Aquifer during the review period. The second of these decisions was for an increase in the maximum water entitlement of an existing licence, which coincidentally was the subject of the first decision. This increase caused the maximum water entitlement to exceed the ESY by 10%.

The licence conditions indicate this apparent over-allocation will be managed through a AAA, which is consistent with the approach used to manage entitlements for new licences in the Ooloo Aquifer

Given uncertainties in estimating recharge, both as a long-term average for determining ESY and as an annual rate for determining AAAs, a best-practice scientific approach would have cautioned against the grant of a licence whose maximum entitlement exceeded the ESY by 10%.

and other Top End groundwater systems. However, this part of the Jinduckin Aquifer has limited scientific information on which to reliably estimate the average annual recharge and thus the ESY (section 4.4.3). There is also limited knowledge of local environmental water requirements.

The empirical approach used to set AAAs based on rainfall data, which was not provided to the panel, adds a further source of uncertainty to the licence decision. Given these uncertainties, a best-practice scientific approach would have cautioned against the grant of a licence whose maximum entitlement exceeded the ESY by 10%.

4.5.4 Ti Tree Basin Aquifer

Two water licence decisions were issued for the Ti Tree Basin Aquifer during the review period: one for an extension of the duration of an existing licence, and one for a new licence. The application for

³² Knapton, A., Jolly, P., Harrington, G. and Petheram, C. (2011). An investigation into the effects of climate change and groundwater development scenarios on the water resources of the Daly River catchment using an integrated groundwater/surface water model. Technical report for the Northern Australia Sustainable Yields Project, Report WRD11029: Northern Territory Government, Darwin.

extension did not involve an increase in the annual quantity taken under the licence, and accordingly did not indicate that any scientific assessment had taken place.

The decision to grant a new licence related to the Eastern Zone, and, in common with other licence files, the method of scientific assessment for the application was not included on the licence file as forming the basis for the recommendations made to the Controller.

The NOI for the application stated the ESY as being 3,200 ML/y, and the SoD for the decision indicated that grant of the new licence would remain within that ESY. The ESY had been set in the Ti Tree WAP 2009, which had expired by the time the application was made. The expired WAP did not in fact express an ESY for groundwater of the quality that would be taken under the licence (TDS exceeding 1,000 mg/L). However the WAP had provided that, within the ESY of 3,200 ML/y:

“new allocations for proposed horticulture projects include [...] 2 000 ML/yr for the southern part of the [Eastern] zone.”

It appears from the documentation made available for this review, that the new licence had already been allowed for in the WAP declared almost six years earlier.

The review notes that any assessment of the potential for adverse water quality impacts (section 4.4.4) was not referred to or included on licence files as forming the basis for the recommendations made to the Controller.

4.5.5 Alice Springs

Three licence decisions were made for the Alice Springs Water Control District during the review period. Two of these were made to increase entitlements of existing licences, and were assessed under the Alice Springs Water Resources Strategy (2006-2015). One decision was made to grant a new licence, and was assessed under the new WAP (2016-2026). SoDs for each of the three decisions indicated that the allocation framework set by the Strategy and WAP had been applied in assessing the quantity of water available for allocation.

As discussed in section 4.4.5, protecting better quality water in the Mereenie aquifer for future public water supply is a key concern for the Alice Springs groundwater resources. Accordingly, this section focuses on the larger of the two licence increases, which was the grant of an additional 2,125 ML/y on an existing licence of 1,000 ML/y from the Mereenie Aquifer (Rocky Hill-Ooraminna management zone), for the purpose of irrigated agriculture.

Comments received in response to the NOI, including from the public water supplier Power Water Corporation (PWC), expressed significant concerns relating to potential risks to public water supply, on both water quantity and water quality grounds.

There was some evidence of assessment of water quantity impacts included on the licence file, but otherwise, evidence of assessment was inferred from the contents of the SoD. Assessment in relation to impacts on water quantity was based on the outgoing Alice Springs Water Resources Strategy (2006-2015), however it was entirely consistent with regards to the gazetted beneficial uses of the water resource and was within the allocation limit for groundwater of TDS >500 mg/L for the purpose of agriculture.

Commenter concerns in relation to the risk to security of the future public water supply of sufficient quantity were addressed by reference to estimates of water level drawdown on the margins of an adjoining property where a future borefield is likely to be located. The SoD stated that the analysis

used “conservative aquifer hydraulic parameters” and represented “the effect of extraction when there is no recharge”. It concluded by stating:

“Predicted drawdown effects to groundwater resulting from the grant of this licence are not considered to place the security of future water supply [...] at risk.”

Advice to the Controller in relation to drawdown estimates was in the form of a series of emails between departmental planners and the Water Assessment Branch containing estimates of drawdown at various distances from the production bore for different pumping rates; the emails were attached to memo to the Controller enclosing the draft SoD. The method for determining drawdown was not documented, however the magnitude of results is consistent with expected values for an unconfined sandstone aquifer. The source literature for the aquifer hydraulic parameters used in the analysis was documented in one email and confirms that a conservative approach was used. Therefore, this review finds that appropriate scientific advice was provided to planners and the Controller regarding potential drawdown impact.

Irrespective of the predicted drawdown being relatively small, especially when compared to the saturated thickness of the aquifer, the technical assessment for this licence decision did not consider the potential for long-term changes in groundwater quality due to altered hydraulic gradients. Such changes could occur via drawing better quality groundwater away from the future PWC borefield, and/or drawing more saline groundwater into the future borefield area. Meaningful assessment of these processes would require a numerical groundwater model, which was not available to decision makers at the time. This was mentioned in the SoD and one of the licence conditions provided for future assessment to be conducted and considered for the licence renewal.

The SoD addressed concerns regarding contamination and salinization risk by comparing water quality analyses from recent samples collected at three irrigation production bores, with historical analyses for the same bores between 1999–2005. No consistent change in salinity or nitrate concentration was observed after 10 years, so it was concluded that existing development had not had an impact. Further evidence was provided in the form of results from pesticide and herbicide analyses. Results from the second of two sets of samples showed all compounds were below detection levels.

This review finds that the water quality assessment for this licence decision was possibly compromised. First and foremost, it is unlikely³³ the three production bores have a construction

Assessment of potential water quality impacts was possibly compromised due to:

- *Lack of consideration of potential for long-term changes in groundwater quality due to altered hydraulic gradients*
- *Lack of ability to detect a change in groundwater quality from the production bores used for analysis.*
- *Not considering the time lag expected for water quality impacts to manifest.*

that is suitable for obtaining discrete groundwater samples that are representative of only the shallowest part of the aquifer near the water table – which is where any evidence of contamination will first appear. Pumped groundwater samples from the licensee’s production bores are likely to be a complex mixture of water from all depths of the aquifer with different recharge histories. It would therefore be very difficult – if not impossible – to detect a change in groundwater chemistry from such

bores and confidently relate that change to recent irrigation development in the last five years, even if salts or contaminants were being leached to the water table.

³³ The review panel has not investigated the individual bore construction details or lithology logs, so this cannot be confirmed.

The water quality assessment was also problematic because it assumed the scale and duration of the existing irrigation development had been sufficient to allow root zone drainage to already be reaching the underlying water table. Without metered extraction data and high-frequency soil moisture profiles or groundwater level monitoring (at a minimum) it is not possible to determine whether any water quality impact could even be expected over such a short timeframe.

This review concludes that the licence decision was based on insufficient scientific understanding of the Mereenie Aquifer in the Rocky Hill-Ooraminna management zone. In particular, the water quality assessment does not provide confidence that the increase could be granted without adversely affecting security of supplies.

The decision to grant an increase in the maximum water entitlement was based on insufficient scientific understanding of the Mereenie Aquifer System in the Rocky Hill-Ooraminna management zone.

A comprehensive groundwater chemistry and isotope tracer assessment should be undertaken for the Mereenie Aquifer System as soon as practical.

The department informed the panel that it considered any risk was sufficiently mitigated by the 10-year life of the licence, conditions under which the licence was issued, and the evidence to hand at the time of the decision.³⁴ It should be noted however that water quality impacts from irrigated horticulture may take significantly longer than 10 years to manifest in the groundwater. Likewise, they can take similarly long timeframes to be ameliorated. Accordingly, in the panel's view, a comprehensive groundwater chemistry and isotope tracer assessment should be undertaken for the Mereenie Aquifer System in the Rocky Hill-Ooraminna management zone as soon as practical. Doing so will enable the review and refinement of the existing conceptual model for the resource, and thereby inform both future monitoring requirements and the development of a fit-for-purpose numerical groundwater model (as already committed to by the department in the SoD) to facilitate long-term water planning. It is likely that such an assessment will require the drilling and construction of a dedicated monitoring bore network.

4.6 ANNUAL ANNOUNCED ALLOCATIONS

For a large number of licence assessments analysed during this scientific review the granting of new licences has meant that extraction at full entitlement would lead to exceedance of flow thresholds for environmental water requirements and/or exceedance of the estimated sustainable yield. This potential over-allocation of the water resources is prevented through annual announced allocations (AAAs), which are applied to licences according to their security level (generally high, medium or low) and are made by 1 May each year and set for 12 months.

Documentation relating to the AAA procedures used and their alignment with the licensing decision procedures was not referred to or included on licence files as forming the basis for the recommendations made to the Controller. While the department advised³⁵ that such documentation could be produced, the panel determined this would not be necessary for the purposes of the review, the central point being that the way in which AAAs procedures had been taken into account by planners during the assessment process for each application, and presented to the Controller, was not documented on file nor included in the SoD.

While AAAs underpin all Top End licensing decisions made in the review period, there have only been two years of AAAs below 100%. These were made in the TLA Katherine, which is not the

³⁴ Departmental comments on an early draft of this chapter made on 15 June 2017.

³⁵ Department comments on an early draft of this chapter made on 15 June 2017.

subject aquifer for any licence decisions investigated in this review. Licences for the TLA Mataranka and Ooloo Aquifer have received 100% entitlement in all years since AAAs began.

The method for determining AAAs was explained by the department during interview and via subsequent correspondence.²² Two main methods are used, one relying on integrated groundwater and surface water models, the other on a proportion of annual recharge to groundwater. The method used depends on the availability of an appropriate surface/groundwater model.

The model-based method is employed in the Daly and Roper river catchments, as these areas have complex integrated models to simulate connected water resources (section 4.3). During the review, the department provided an internal document³⁶ outlining the workflows used to determine AAAs for groundwater and surface water extraction licences in the Daly River catchment. This sets out the order in which AAAs are determined, beginning with licences in the TLA Katherine as this aquifer has a WAP, then the Katherine River, Daly River and its tributaries, TLA–Other and Ooloo Dolostone Aquifer water extraction licences.

It was not clear whether similar documentation exists for the Roper River catchment, although one officer did refer to a standard procedure for assessing impacts to spring flows in Eusey National Park. Regardless, AAAs for the Ooloo Aquifer and TLA Mataranka licences are set by modelling predicted Daly River and Roper River natural and altered flows to determine how often environmental thresholds would have been met or exceeded at full allocation levels.

The basis for setting AAAs in the TLA Katherine is the modelled 1 November natural flows at the Low Level Gauging Station on the Katherine River, which is determined using BoM SILO data up to 1 April and assuming nil rain subsequently. A look-up table in the WAP³⁷ relates modelled 1 November natural flows to the extent of the reduction in allocation. Licences in different security classes are reduced at different rates.

The model-based approach used to set AAAs for the Ooloo Aquifer ensures the cumulative impacts of all surface water and groundwater extractions will not reduce dry season Daly River flows below the minimum thresholds specified in section 4.4.2. While the February 2012 draft WAP specifies that AAAs will be based on predicted 1 November flows at Dorisvale and Beeboom gauging stations, it was confirmed by the department during interview that the flow reductions are actually assessed at Dorisvale, Ooloo and Mount Nancar gauging stations, consistent with the licence assessment (section 4.4.2). As discussed previously, the panel was not provided with the May 2013 draft WAP in which these updates had been made and endorsed by DRMAC.

Model calibration and uncertainty issues aside, the scientific methodology used to determine Annual Announced Allocations for the Ooloo Aquifer appears to be robust and defensible and worthy of commendation.

Besides the issues identified in section 4.3 with the complex integrated modelling tools, this review finds the scientific methodology used to determine AAAs in the Daly River catchment to be sound and worthy of commendation.

A similar model-based method of determining AAAs has been suggested for the Koolpinyah Dolomite Formation Aquifer (K DFA). A SoD for a licence in respect of this resource stated:

³⁶ 'Annual Announced Allocations – Daly River catchment, 2017 procedure – updated each year to reflect staff workloads'

³⁷ see TLA Katherine WAP p 30

“extraction... should only exceed an amount equivalent to 20% of that year’s recharge into the aquifer if it can be demonstrated that discharge from the aquifer will not be reduced by more than 20%.”

Modelling undertaken for the licence assessment showed that the level of use of the aquifer would have exceeded 20% of annual recharge in five years of the 30-year model period, and that discharge from the aquifer was reduced by more than 20% for approximately one month during the 30-year period. Accordingly, AAAs are a condition on the granted licence to maintain water supply security ‘based on annual modelled predictions of change in discharge from the aquifer’. Whilst this seems to be a sound approach, the panel was unable to determine whether the department has documented the methodology internally, and whether the methodology has been implemented since the granting of the licence.

The annual recharge method for determining AAAs is employed in the Jinduckin Aquifer because this hydrogeological unit is not included in the integrated Daly River catchment model. The ESY has been calculated on an individual property scale for assessment of two licence applications during the review period (section 4.4.3). In these cases, ESY was based on 20% of the average annual recharge for the upper and lower units of the Jinduckin Formation, which was derived from historical baseflow assessment (Jolly, 1984). Hence it is what is commonly referred to as an ‘area-based’ or ‘pro-rata’ approach to groundwater allocation. On raising this specific matter with the department, the panel was unable to understand how AAAs have been calculated for these water extraction licences. It was suggested that the method was based on an empirical relationship between wet season rainfall and baseflow discharge. It was also unclear whether allocations of less than 100% had since been announced, albeit the quantity of water granted for the second licence application caused the maximum water entitlement to exceed the ESY by 1,400 ML/year.

The annual recharge method for determining AAAs has also been suggested for a new licence granted in the Wildman Siltstone Aquifer. The AAA is a condition on the licence because the total potential use from the aquifer (licensed and unlicensed) after granting the licence is more than double the extraction limit of 400 ML/y. The latter is based on 20% of average annual recharge that was estimated using expert knowledge, rather than any field measurement or model estimate, and is thus highly uncertain. Nevertheless, the SoD mentions that AAAs will be “set each year... based on annual recharge to the aquifer”, although it provides no explanation of how this will be determined. Furthermore, the panel was unable to determine whether the department has documented the methodology internally, and whether the methodology has been implemented since the granting of the licence.

In addition to the licences issued with AAAs in each of the aquifers outlined above, one other licence was issued with AAAs that had no mention of the methodology in the SoD or supporting documentation provided to the Controller. It was the only licence issued in the relevant water resource and, after granting the licence, the total potential use from this aquifer remained below the ESY. The department advised the panel³⁸ that an AAA was required for this licence because:

“additional extraction from this aquifer in the future – both licensed and unlicensed – must be anticipated.”

³⁸ Department comments on an early draft of this chapter made on 15 June 2017.

4.7 WATER QUALITY IMPACTS

In addition to the issues discussed previously with regards to potential mixing between potable and more saline groundwater resources (e.g. Ti Tree Basin Aquifer and Mereenie Aquifer System) there is a number of other licence decisions for which this review considers that further attention on water quality impacts may have been worthwhile. While the risk of measurable impacts over the 10-year term of a water extraction licence will generally be low, there is potential for long-term impacts to groundwater and connected surface water that can be difficult to mitigate without early management intervention.

None of the licence decisions reviewed for the Ooloo Aquifer and none bar one of the licence decisions reviewed for the TLA Mataranka contained information on ambient water quality and the potential risks of prolonged irrigation to either soil structure or salinisation of the underlying groundwater resource. The department advised the panel³⁹ that:

“Salinity Hazard Mapping (Tickell, 1994) indicates largely no potential threats of salinity in the Top End.”

The review notes that such evidence was not referred to or included on licence files as forming the basis for the recommendations made to the Controller.

Likewise, none of the assessments looked into the potential for water quality impacts to the rivers via deep drainage of pesticides or nutrients. The omission of water quality from Top End licence assessments may reflect the very high wet season recharge and flows, which act to dilute any contaminants. However, it is possible that nutrient fluxes (as an example) from groundwater discharge could impact river biology during low flow periods. The department advised the panel⁴⁰ that:

“DENR monitoring of groundwater and surface water in the Daly River catchment has shown little or no evidence of significant water quality impacts from development associated with water extraction.”

The review notes that such evidence was not provided to the panel, and that it was not referred to or included on licence files as forming the basis for the recommendations made to the Controller.

At the other extreme, any potential contaminants to groundwater in the Arid Zone are likely to persist in the absence of significant recharge events. As an example, one licence application from the Alice Springs region was for a small 37.5 ML/y water supply to a new housing estate development. According to the SoD:

“Individual on-site tertiary treatment devices will process waste water from each household prior to being released for infiltration or on-site irrigation. Based on consideration of the maximum water entitlement allowable for this new licence no adverse effects are expected on groundwater or the use of any other land in the Rocky Hill/Ooraminna Management Zone.”

However, there are many examples in Australia where on-site systems have polluted groundwater sources with faecal material, presenting a risk for drinking water quality. This review finds that other factors

To better understand water quality impacts, other factors, in addition to the volume of water, should have been considered, including depth to water table, chemistry of the receiving groundwater, and proximity to other existing or potential future users.

³⁹ Department comments on an early draft of this chapter made on 7 June 2017.

⁴⁰ Department comments on an early draft of this chapter made on 2 June 2017.

in addition to the volume of water should have been considered, including depth to water table, chemistry of the receiving groundwater, and proximity to other existing or potential future users. In response to this finding, the department advised the panel⁴¹ that:

“DENR takes into account the regulatory/guideline requirements specified by Department of Health in regard to septic waste disposal systems.”

The review notes that these requirements were not referred to or included on licence files as forming the basis for the recommendations made to the Controller.

4.8 SUMMARY OF KEY FINDINGS

The following points represent a summary of the key findings of this chapter:

The 80:20 policy provides a conservative and rational approach to holistic water and natural resource management in the Top End, in the absence of robust scientific research such as that which currently exists for the Daly River.

The scientific methodology used to assess licences for most of the water resources investigated in this review appears to be robust, defensible and in some cases, commendable in approach. However, a number of areas for improvement were noted including the need for further numerical model calibration and uncertainty analysis, and the length of historical climate data used to predict future water availability. These issues are summarised below.

Model uncertainty was not assessed as part of the water availability predictions and, therefore, was not considered as part of the licence decision-making process. At a minimum, model parameter uncertainty should be reflected in model-based decision making, at least in advice to water planners about the confidence with which the models can simulate natural flows and predict altered flows. The current approach of reporting modelled change in flow against measured flow helps to reduce some of the uncertainty, however there remains inherent errors in any modelling analysis that need to be properly communicated.

Water availability assessments may be compromised by:

- The department’s current approach of only using the past 30 years of historical climate data to determine future water availability and reliability of licences, rather than the full historical record. While this may be appropriate for the 10-year term of a granted licence, the Controller and licensees need to be better informed that the last 30 years of historical climate data is not a reliable indicator of long-term future water availability; the implication is that the likelihood of renewal of licences after each 10-year term is highly uncertain, and thus needs to be factored into business investment decisions.
- Lack of recent data incorporated into models, for example the need to recalibrate or at least validate the integrated Daly River catchment model using more recent observation data.
- Lack of local pumping rules for the Ooloo Aquifer to protect specific GDEs such as springs and groundwater-dependent terrestrial vegetation from intolerable seasonal drawdown.
- The need for further field-based investigations to assess recharge/discharge rates for the Jinduckin Aquifer, including specific environmental water requirements for Douglas River.

⁴¹ Department comments on an early draft of this chapter made on 2 June 2017.

- The need to continually refine the integrated Roper River catchment model to further constrain the relationships between rainfall, groundwater recharge, water levels, river flows and spring flows.

Documentation of the evidence base and detailed methods of modelling process and analysis of results was generally lacking for the determination of the ESY, assessment of licence reliability, and setting of AAAs. This lack of documentation obscured the ability of the panel to determine whether best practice evidence-based science was always provided to form the basis for the recommendations made to the Controller. As a result of this, the water scientist relied heavily upon the information provided through interviews with key department staff, to whom the panel is most appreciative for the openness and honesty displayed.

Impacts on water quality were often lacking and need to be better incorporated into licence assessments. For example, there is a long-term risk to high quality (TDS <500 mg/L) groundwater resources in the arid zone due to mixing with or entrainment of poorer quality groundwater. A comprehensive hydrochemistry and environmental isotope assessment of the Mereenie Aquifer Systems should be a priority to provide further confidence about the security of the future public water supply for Alice Springs. The SoD for the relevant licence decision in the review period commits to developing a numerical groundwater flow model, and one of the licence conditions provides for future assessment to be conducted and considered for the licence renewal.

Ongoing monitoring and investigations are critical to improve the science base for water allocation planning, including studies of groundwater recharge and flow, processes affecting water quality, and non-baseflow GDEs.

5 LICENCE REVIEW: ToR 1

This chapter contains an overview of the review panel's assessment of licence files in relation to ToR 1:

ToR 1: Whether the process adhered to the requirements outlined in the Act and Regulations, in particular sections 90, 71A–71E and 30 of the Act.

In reviewing the licences, the review panel applied the approach detailed in chapter 2.

The panel's assessment of licence files against each of the specific procedural requirements of the Act follows.

5.1 APPLICATIONS TO WHICH PART 6A APPLIED

5.1.1 Application for water licence

Clarity about the details of an application (including the date on which it is made) is essential in order for the Controller to meet requirements of the Water Act, to give effect to government policies such as FIFS, and to ensure that appropriate conditions are placed on the licence.

Lack of clarity was noted in areas including the following:

- Applications were frequently incomplete

While applications require certain supporting information, a Supporting Information Form (SIF) accompanied only about half of the applications reviewed.

- Dates on which applications were lodged were unclear

The date on which an application form was received by the department, the date of application referred to in the Memo to the Controller, and the date indicated in the Licence Summary Table as the 'date received' were frequently different. One licence file included a letter to the applicant after completion of an initial assessment, advising that an application had been 'received and accepted'.

- Applications were amended without formality

Changes generally related to the area under irrigation or crops to be planted, and therefore in the quantity of water sought. Changes generally were requested and agreed by email or telephone, and did not result in formal amendments to the Form 11 or 14, or the SIF. In some cases, changes arose when a new landowner assumed a former owner's application.

- There was lack of consistent distinction between applications for grant, renewal and amendment (increase) of licences

In spite of the legal and practical distinctions between applications for new licences, applications for increase, and applications for renewal with increase, licence application forms, the SIF, and templates for NoD and SoD did not distinguish adequately between these application types. Although there are separate NoI templates for new licences and amendments (increases), the correct template was often not used in the files reviewed.

LICENCE APPLICATIONS: KEY POINTS

- Applications were frequently incomplete.
- Dates on which applications were lodged were unclear.
- Applications were amended without formality.
- Lack of distinction between applications for grant, renewal and amendment (increase) of licences.

5.1.2 Notifying intention to make licence decision

Section 71B of the Water Act requires that, within 30 days of lodgement of an application for a water licence, the Controller must give notice of the Controller's intention (NoI) to make a water extraction licence decision. The NoI must include specific information, and must be published in the newspaper and given to landowners and occupiers adjacent to the land on which water will be taken and used.

While NoI were in most cases correctly made and published, the review panel noted a number of minor concerns including the following:

- Unable to confirm that NoI published within 30 days of application; long delays

Due to lack of clarity over the date of lodgement of the application, and absence of direct proof of NoI publication, in most cases it was not possible to confirm that the requirement had been met. In a number of cases there were delays of a year or more (in a small number of cases, delays of up to seven years) between the date applications were signed, and the likely date of NoI publication.

- New NoI not published for every application

In almost all cases reviewed, a NoI was duly published for each application. In one case a new NoI did not follow a new application. In another case, a significant change in an application (from groundwater to surface water) was not the subject of a new NoI.

- Minor departures from NoI content requirements

There were a number of instances of minor departures from the content requirements, usually apparently attributable to incomplete or incorrect use of the template.

- Lack of direct evidence of publication of NoI

On most files, there was no direct evidence of publication – that is, a photocopy of the relevant page of the newspaper. Some files included corroborating evidence, in the form of letters from responders referring to the newspaper advertisement.

- Lack of evidence of notification of adjacent landowners and occupiers

There was no evidence to support that adjacent landowners and occupiers had been correctly identified. Some licence files included letters to adjacent landowners, but many did not. Where there were no letters on file, responses from neighbours referring to the NoI sent to them corroborated the fact that letters had been sent. In a small number of cases, there was no direct or other evidence of the NoI being provided to adjacent landowners and occupiers.

NOI: KEY POINTS

NoI were in most cases correctly made and published.

Minor concerns included:

- Frequent long delays to point of NoI publication.
- Unable to confirm NoI published within 30 days of lodgement.
- New NoI not published for every application.
- Minor departures from NoI content requirements.
- Lack of direct evidence of publication of NoI.
- Lack of evidence of notification of adjacent landowners and occupiers.

More significant concern is that NoI not advertised until after bulk of application assessment completed. Although adopted to avoid unnecessary advertising costs, practice was inconsistent with s 71B.

A more significant concern was the practice of not accepting an application as having been 'lodged' for the purpose of commencing the timeframe for Nol publication until the bulk of assessment had been completed and it was clear that there would be water available in the system to allow the licence grant. While the practice was intended to avoid the need for advertising an application before it was clear that it might proceed, it is not consistent with the requirements of s 71B.

5.1.3 Assessing the application – s 90 matters

In making a water licence decision, the Controller must take into account any (and all) of certain specified factors that are relevant to the decision, as well as any other factors that are relevant and ought to be taken into account. The Controller must also take into account all comments received in response to the Nol. The panel's findings in relation to the various aspects of assessment are summarised below.

5.1.3.1 Assessment obligation

Section 90 of the Act requires that in making a water extraction licence decision, the Controller must take into account any (and all) of certain factors that are relevant to the decision. The 's 90 factors' are set out in Box 5-1.

SECTION 90 FACTORS
(a) the availability of water in the area in question;
(ab) any water allocation plan applying to the area in question;
(b) the existing and likely future demand for water for domestic purposes in the area in question;
(c) any adverse effects likely to be created as a result of activities under the permit, licence or consent on the supply of water to which any person other than the applicant is entitled under this Act;
(d) the quantity or quality of water to which the applicant is or may be entitled from other sources;
(e) the designated beneficial uses of the water and the quality criteria pertaining to the beneficial uses;
(f) the provisions of any agreement made by or on behalf of the Territory with a State of the Commonwealth concerning the sharing of water;
(g) existing or proposed facilities on, or in the area of, the land in question for the retention, recovery or release of drainage water, whether surface or sub-surface drainage water;
(h) the adverse effects, if any, likely to be created by such drainage water resulting from activities under the licence on the quality of any other water or on the use or potential use of any other land;
(j) the provisions under the <i>Planning Act</i> relating to the development or use of land in the area in question;
(k) other factors the Controller considers should be taken into account or that the Controller is required to take into account under any other law in force in the Territory.

Box 5-1. Section 90 factors against which licence applications are assessed.

Assessment to underpin findings on each of these factors forms a vital part of the process, as there must be adequate evidence on which the Controller can make a judgement about each of them. It is important therefore, that there is evidence on each licence file, drawn to the Controller's attention, of assessment undertaken in respect of each of them. Where a s 90 factor is determined to be irrelevant to the decision and therefore not taken into account, reasons supporting that determination should also be on file.

The panel notes that although licence files themselves generally contained little additional information to support findings made in the draft SoD, both Controllers who held that office during the review period advised the panel that they were regularly involved in discussions in relation to applications, particularly those that may have been more complex.

5.1.3.2 Matters relating to availability of water

SoDs generally contained strong evidence relating to outcomes of assessment of s 90 factors relating to the availability of water, and the regional impacts on that availability of granting the application. In particular, SoDs explained how the relevant WAP, or in the absence of a WAP the NT WAP Framework, had been applied in determining the sustainable yield. However, licence files did not include any information about how or when the assessment was carried out, or the data or model on which it was based.

Licence files generally did not indicate that there had been any consideration of the potential for local impacts of extraction and use.

Local impacts can be significant, particularly where large volumes of water are being taken in a concentrated area, by either a single licensee or a cluster of licensees. There was indirect evidence of assessment of groundwater dependent ecosystems (GDEs) at the local scale in only two of the files reviewed, and proximity of GDEs to a water extraction point was mentioned in only one SoD. More detail about this matter is contained in chapter 4.

ASSESSMENT RELATING TO WATER AVAILABILITY: KEY POINTS

- Generally strong evidence in SoDs of assessment of:
 - availability of water
 - regional impacts on availability that would arise from granting the licence
- Generally no evidence of consideration of local impacts of extraction and use on either GDEs or other users.

Neither licence files nor SoDs indicated that there had been consideration of potential impacts on other users at the local scale, even in regions where water extraction was concentrated in relatively small areas. The panel was informed that it was the department's practice to assess impact to other users dependent upon local density of users. There was no written procedure in relation to this; staff generally applied their knowledge of regional bore density associated with licence applications to exercise technical judgement about the likelihood of interference with other bores in the vicinity of a new licence application.

Section 6.1 includes further discussion specifically about the extent to which licence grants adhered to the relevant WAP, draft WAP or NT WAP Framework.

5.1.3.3 Matters relating to other specific s 90 factors, including water quality

Licence files commonly did not include any evidence of assessment of other s 90 factors, and this was reflected in the content of SoDs, which often used standard 'default style' text in relation to some of them. Most SoDs reviewed stated that at least three s 90 factors were not relevant, with no explanation of why that conclusion had been reached.

The most significant element of s 90 that was not generally mentioned in licence files and SoDs related to water quality – s 90(1)(g) and (h).

Activities that use water can result in point or diffuse source pollution or land degradation. For example, irrigation near a waterway can result in herbicides and pesticides reaching the waterway by surface or subsurface drainage; irrigation can also cause chemicals to leach into the underlying groundwater, and can result in land salinization and other effects. Use of water in industrial applications raises risks of wastewater pollution unless there are adequate measures in place for wastewater retention, treatment and disposal.

ASSESSMENT RELATING TO OTHER S 90 FACTORS: KEY POINTS

- Generally no evidence of assessment of other s 90 factors.
- The most significant element of s 90 that was not generally mentioned in licence files and SoDs related to potential impacts on water quality.

Evidence of consideration of water quality impacts was included in 4 licence files, with evidence of water quality assessment included on only one of those. Nine SoDs discussed potential water quality impacts of the licence grants, with licence conditions relating to protecting surface water quality, or monitoring groundwater quality, included on 7 licences.

In all other licence files, SoDs stated that paragraphs (g) and (h) were not relevant to the licence decision, with no further explanation.⁴² The review panel noted a number of instances where material on the licence file indicated that some degree of consideration may have been warranted, such as for applications involving use close to waterways, intensive centre pivot irrigation or industrial uses creating sewage (such as caravan parks to which 'industry' allocations were granted).

5.1.3.4 Matters relating to relevant 'other' factors – s 90(1)(k)

The Controller must also take other factors into account when making a water extraction licence decision, if the Controller thinks that they should be taken into account. Administrative law requires that the Controller exercise this discretion in a way that is consistent with the objects and purpose of the legislation.

Only three of the SoDs reviewed mentioned other factors explicitly for the purposes of paragraph (k). The panel was informed that the department does not generally undertake an assessment of, or recommend that the Controller take into account, any factors that are not set out in s 90(1)(a) – (j). Controllers have not asked for additional matters to be taken into account.

Although the Water Act contains no explicit guidance on what other factors would be appropriate to take into account, s 90 should be interpreted in a way that promotes the Act's purpose as legislation for the management of water resources, and therefore a range of matters not necessarily explicit in s 90 will be relevant. Amongst these matters will be government policies, provided they are consistent with the Water Act and the Controller still considers the merits of each application.

Policies and practices summarised in chapter 3 were generally taken into account and either referred to explicitly in the SoD (e.g. in the case of the NT WAP Framework and AAAs, where used), or were reflected in licence terms and conditions and therefore implicitly taken into account (e.g. UIOLI and ten-year licence terms).

Material on the licence files showed that other factors were also taken into account in granting water licences – for instance, the applicant's proposed crop and the water requirements of that crop, the existence of bores or the applicant's intention to construct bores capable of taking the quantity allocated, and the order of priority given to the application (that is, where it ranked in the FIFS 'queue'). There was considerable variation between files of evidence of the way in which or extent to which they had been assessed, and these additional factors were almost never mentioned in the advice provided to the Controller or in the SoD. As material facts which influenced the

ASSESSMENT RELATING TO S 90(1)(K) FACTORS: KEY POINTS

- Only 3 SoDs specifically mentioned 'other' factors for s 90(1)(k).
- 'Other' factors were routinely considered in licence assessment and grant (e.g. applicant's proposed use of water, priority given to the application, and policies and practices relating to water allocation).
- As material facts which influenced the Controller's decision, ideally they would have been explicitly referred to, at least in the memo to the Controller.

⁴² The panel notes that SoD templates provided by the department indicated that the factors in paragraphs (g) and (h) were not relevant to water extraction licences. The panel was later informed that the templates had not been in use during the review period. Nevertheless, it appeared that the approach had become standard.

Controller's decision, ideally they would have been explicitly referred to, at least in the memo to the Controller.

Chapter 6 contains more detail in relation to consideration of the NT WAP Framework, WAPs and other policies, as these relate specifically to ToR 2 and ToR 3.

Section 6.5 (ToR 6) contains more detail in respect of the way in which the applicant's intended use was taken into account.

5.1.4 Considering responses to the NoI

Section 71C of the Water Act requires the Controller to take into account all comments received in relation to an advertised NoI. The way in which comments have been taken into account must be set out in the SoD.

The requirement is central to the purposes of Part 6A, and deficiencies in meeting the requirement may, if serious enough, place an affected water extraction licence decision at risk of challenge through judicial review proceedings. Further discussion on this matter is contained in section 6.4, as it relates specifically to ToR 5.

5.1.5 Making, communicating and publishing the decision

5.1.5.1 Significance of evidence of assessment and grounds for decision

The Controller must make a water extraction licence decision as soon as practicable after the end of the period allowed for comments on the NoI (and if possible, within 30 days of the end of that period). In making the decision, the Controller must take into account the relevant factors set out in s 90, and all comments received in response to the NoI. The SoD must set out the way in which these requirements were met.⁴³

There are two main elements to the requirements:

- That evidence exists to show that the Controller has made the decision personally, and that in doing so he or she (and not just departmental officers in their advisory role) has taken into account the relevant matters
- That the SoD must meet statutory requirements about its contents.

Memos generally did not refer to the basis for the department's findings about the matters contained in the SoD.

In the absence of a formal and comprehensive brief to the Controller regarding the basis for the recommended decision, the department's advice to the Controller about the assessment was, implicitly, contained in the draft SoD.

In all files reviewed, the only advice to the Controller about an application was contained in a short Memo to the Controller, prepared by officers. Typically, and especially towards the end of the review period, the memo stated that mandatory procedural steps required by the Water Act had been satisfied, and referred to attachments evidencing this.

Memos generally did not refer to the basis for the department's findings about the matters contained in the SoD. In the absence of a formal and comprehensive brief to the Controller regarding the basis for the recommended decision, the department's advice to the Controller about the assessment was, implicitly, contained in the draft SoD. There was one case in which a licence amendment was granted with no SoD having been put before the Controller. A SoD was prepared some 18 months later. There was in that particular case no evidence that any of the required matters had in fact been assessed or taken into account in the making of the decision.

⁴³ Water Act s 71C

5.1.5.2 Documenting the reason for decision – the SoD

All SoDs generally included good explanations of the availability of water, and of the regional-scale impacts of granting the licence on other users and environmental water needs of the way in which the availability of water, and potential impacts of granting the licence on other users of the water (at a regional scale). There was clear improvement over the course of the review period in clarity of explanations provided. For example, SoDs for licences in the Ooloo aquifer granted towards the end of the review period (May 2016) clearly identify the evidence underpinning these key findings of fact.

The way in which the Controller took other relevant factors into account, or decided that some s 90 factors were not relevant, was in most cases not well explained in SoDs. In this, the SoDs reflect the extent of documented assessment of applications (see section 5.1.3 above).

The review panel was informed that there was no SoD template as such; rather, department's practice was to use recent past SoDs as a 'library' from which to draw appropriate SoD content, and encourage continual improvement in the preparation of SoDs.

Although the use of exemplar SoDs is an aid to continuous improvement, there are risks associated with the practice. There were a number of instances amongst the licences reviewed of errors in SoDs that were probably attributable to use of a previous SoD as a basis for the new SoD. Errors were generally not serious (for example, a SoD for a batch referred to 'four applications', when there were five applications in the batch).

DOCUMENTING THE REASON FOR DECISION: KEY POINTS

- SoDs generally included good explanations of the availability of water, and of regional-scale impacts of granting the licence.
- Clear improvement in documentation and clarity of the SoD over the course of the review period.
- The way in which the Controller took other relevant factors into account, or decided they were not relevant, was in most cases not well explained in SoDs.
- Some minor errors in SoDs found, possibly as a practice of using past SoDs as a basis for the current SoD.

5.1.5.3 Giving notice of the decision – the NoD

Within 30 days after making a water licence decision, the Controller must give notice of the decision (NoD) to the applicant, and publish it in the same newspapers in which the NoI was published. A NoD must include a brief statement of the reasons for the decision, advise where a person may see a full copy of the decision, and advise that a person aggrieved by the decision may apply for review under s 30.⁴⁴

A NoD was prepared for each licence file reviewed. Licence files also generally included a copy of the advertisement evidencing publication.

All NoDs appeared to have been published within 30 days of the decision being made; in fact publication often happened on the same day or within one or two days after the decision had been made.

A significant number of licence files indicated that authority to publish the NoD was given either before the package containing the SoD had been given to the Controller, or before the SoD was signed.

The review panel raised the apparent procedural anomalies with the department and former Controllers. The panel was advised that in advertising authorities for NoDs were generally approved at officer-level, prior to the Controller's sign-off of the SoD and NoD. In each case, the reasons for

⁴⁴ Water Act s 71D

decision would have been discussed with the Controller prior to the licence and NoD being signed. More than one version of a SoD would regularly have been seen by the Controller prior to the signing the final version. However, licence files contained no documentation to this effect.

GIVING NOTICE OF THE DECISION: KEY POINTS

- A NoD was prepared for each licence grant.
- Licence files generally contained evidence of publication of the NoD within the statutory timeframe.
- The practice of approving publication of the NoD before the SoD has been signed raises the risk of a decision being notified before it has been duly made, or at least risk of a perception that this has occurred.
- There should be evidence on each licence file that the licence decision was made by the Controller before public notice of it was endorsed for publication.

In the review panel’s opinion, and particularly in the absence of formal processes to ensure that a NoD did not proceed to press in the event that the Controller in fact declined to make it, the practice outlined raises the risk of a decision being notified before it has been duly made. Due to lack of on-file evidence of the Controller’s prior consideration of a matter, it also risks creating a perception that a decision was a foregone conclusion, with notice of the decision being sent for advertising before it had been considered or made.

Notification that a decision has been made can be issued only after the decision has in fact been duly made. As indicated by s 71D, signing and publication

of the NoD, and granting or amending the licence, are the final steps in the process. There should be evidence on each licence file that the licence decision was made by the Controller before public notice of it was endorsed for publication.

5.1.6 Granting the licence

Licences reviewed were generally consistent with the reasons for decision as expressed in the SoD. In all cases, licences expressed the quantity of entitlement and included appropriate conditions relating to the manner in which it was to be taken.

Licences were commonly issued with conditions reflecting the way in which assessments about water availability had been taken into account – for example for Top End licences, by including AAA conditions and limits on monthly extractions. The panel noted that in spite of the prominence given to proposed crops and crop water use during the assessment phase, crop use was not mentioned in the memo to the Controller or in the SoD, and conditions relating to proposed crop and use were not applied to licences.

Licences were generally correctly granted in the name of the applicant or company on whose behalf the application had been made. However, in a handful of cases, a licence was issued to a trading name rather than to a legal person. In a small number of cases, a licence was issued in joint names, without evidence that the requirements of regulation 18 in relation to joint applications had been met.

GRANTING THE LICENCE: KEY POINTS

- In all cases, licences expressed the quantity of entitlement and included appropriate conditions relating to the manner in which it was to be taken.
- In spite of the prominence give to crop water use during the assessment phase, conditions relating to proposed use were generally not applied.
- Licences generally correctly granted in name of applicant. In a small number of cases, a licence was issued to a trading name rather than to a legal entity.

All but one of the applications reviewed was granted with a 10-year term. However, there was also a practice of granting licence *amendments* with fresh 10-year terms. Section 6.2.4 contains further discussion in relation to this matter.

5.2 OWN MOTION GRANTS (TO WHICH PART 6A DID NOT APPLY)

5.2.1 Own motion grant processes

Sections 45 and 60 of the Water Act permit the Controller to grant a licence to take surface water or groundwater (respectively) without an application being made by the licensee. These are referred to as 'own motion' grants.

Own motion licence grants are not subject to the process requirements set out in Part 6A of the Act that apply to applications for new or increased licences. Although the factors set out in s 90 must still be taken into account by the Controller, no formal statement of decision is required. Own motion decisions can be the subject of a s 30 review, but the lack of public notice of the intention to make a decision, and of the decision and reasons for the decision, reduce the real opportunity for review.

Table 5-1 illustrates the differences between own motion grants, and grants following application.

Table 5-1. Essential differences between water extraction licence decisions and 'own motion' decisions under the Water Act.

ITEM	GWEL / SWEL ON APPLICATION	OWN MOTION GWEL / SWEL
Power to grant	ss 45 and 60 of the Water Act.	ss 45 and 60 of the Water Act.
Power to increase licensed amount	Yes	No
Part 6A process requirements including: <ul style="list-style-type: none"> • Nol • Formal SoD • Public notice of SoD (i.e., NoD) 	Yes	No
s 90 Factors	Yes	Yes

5.2.2 Own motion grant files reviewed

Five of the reviewed licences were own motion grants.

Of these, two were licence *increases*, while another two were grants of new licences. The third was in fact a grant upon application, which had partially complied with requirements of Part 6A. The reason for incomplete application of the Part 6A process and eventual grant of the licence as an own motion was not apparent from the licence file.

In all cases, the quantity of water involved was small or very small, with correspondingly low risk to the available quantity of water resources. However, two of the matters included potential water quality impacts, which were not mentioned in the memo to the Controller nor included in licence conditions.

As own motion licence grants are not subject to the process requirements set out in Part 6A, there is considerably lower requirement for transparency and openness of decision making than for ordinary licence grants. The five own motion grants revealed a lack of policy relating to the appropriateness of use of the own motion provisions, as well as inappropriate use of the provision to grant licence increases. The licence files did not contain sufficient information on file to demonstrate that the Controller had taken into account all relevant s 90 factors, and s 90 was not mentioned in the memos to the Controller.

5.3 REVIEWING A DECISION OF THE CONTROLLER

5.3.1 Overview of s 30

A person who is 'aggrieved' by a licence decision made by the Controller (whether this is made under Part 6A or of the Controller's own motion) may apply to the Minister for review of the decision, under s 30 of the Act.

Twenty-five out of the 57 licence decisions reviewed were subject to s 30 review. None of these were own motion grants.

The Minister's options upon a review are to:

- uphold the Controller's decision,
- substitute a decision that in the Minister's opinion should have been made by the Controller, or
- refer the matter back to the Controller for reconsideration.

When undertaking a s 30 review, the Minister needs to decide for him or herself whether the Controller's decision is incorrect, and what is the preferable decision. It is appropriate for departmental officers to prepare a briefing for the Minister, and each licence file subject to a s 30 review contained such a briefing.

5.3.2 Content of Ministerial briefing

In the files reviewed, the content of Ministerial briefings was appropriate: the attached relevant material that was before the Controller, and also included the department's summary to the Minister and response to the review grounds. Most files included the department's assessment of whether the person seeking review was 'aggrieved'.

However, briefings for two batches of licences contained a number of administrative errors including incorrect references to some attachments, and incorrect summaries of comments made by responders to the NoI. One briefing contained more serious errors in referring in some places to different and unrelated water resources. The errors appear to have arisen from use of an earlier Ministerial briefing as a template for the subsequent briefing, without carefully checking factual differences. While the cause of the errors is likely to have been oversight, nevertheless the result of serious deficiencies in a briefing is that there is a risk that the Minister made a decision on a misunderstanding of the relevant facts.

5.3.3 Roles of department, Controller and Minister in s 30 review

In one licence file, a Ministerial Briefing was signed by the Chief Executive, who also then occupied the position of Controller of Water Resources. Given the Minister's obligation to consider the Controller's decision and determine whether a different decision ought to be made, it was not appropriate for the briefing to be prepared by the Controller.

Following review of the Minister's decision by the Supreme Court in *The Environment Centre Northern Territory Inc v Minister for Land Resource Management* [2015] NTSC 30, briefings for s 30 reviews were prepared by the Executive Director Water Resources directly for the Minister, and not forwarded through the Controller. This is an appropriate separation of the roles of the Minister and Controller in the circumstances of a review of the Controller's decision, and a proper response to the Supreme Court decision.

The Minister is not obliged to give reasons for his or her decision, but reasons are increasingly expected by both stakeholders and some courts. Two of the licence files included copies of letters

from the Minister to the s 30 review, outlining the reasons for his decision. The review panel is not aware whether similar outcomes were provided on other licence files.

5.3.4 Section 30 review panel

One s 30 application was referred by the Minister to a Review Panel (the Panel had been established under s 24 of the Act some years previously; this review did not consider the appointment of that Panel). The position of Chair of the Panel was vacant at the time, and the Minister appointed a new Chair on departmental advice. The Chair duly nominated two members of the Review Panel to consider the application.

The deliberations and findings of the s 30 review panel, its advice to the Minister and the Minister's subsequent decision fall outside of the review period, and therefore outside of the scope of this review.

5.4 SUMMARY OF KEY FINDINGS

Overall, the processes applied to licence grants adhered to requirements of the Water Act and regulations in most material respects. Instances of departure from statutory requirements (including as to timeframes) were in the panel's view unlikely in most cases to have warranted a decision being set aside on the grounds that it had been improperly made.

As detailed in this chapter, the Water Act and regulations are prescriptive in their requirements for the assessment and grant of water extraction licences. It is essential that these requirements are met, and failure to do so can in some circumstances threaten the validity of the resulting decision. Prescription is greater for applications subject to Part 6A of the Act than it is for 'own motion' licence grants.

Processes that were applied to licence grants adhered to requirements of the Water Act and regulations in most material respects.

Various instances of departure from statutory requirements were mostly minor and in the panel's view it is generally unlikely that the deficiencies noted would have warranted a decision being set aside on the grounds that it had been improperly made.

Licence packages reviewed often included indirect (rather than direct) evidence that procedural requirements of Part 6A had been met. The panel also noted a range of instances of relatively minor departure from the precise terms of the statutory requirements, which in the panel's view were not material to the Controller's decision. These included matters such as lack of detail in public notices relating to licence applications and departure from statutory timeframes for the publication of those notices.

Licence packages generally contained strong evidence relating to assessment of the availability of water, and the regional impacts on that availability of granting the application. However, material provided to the Controller for the purposes of making a licence decision did not in all cases provide a clear basis for all elements of the licence decision. Factors that had implicitly been taken into account when preparing the licence and recommendation to the Controller (such as the appropriateness of an allocation for the applicant's intended use) were usually not explicit in the reasons for decision.

The panel considers it generally unlikely that the deficiencies noted would have warranted a licence decision being set aside. Notwithstanding this general view, the panel is concerned that decisions to

treat the grant of licence amendments (increases) as *new* licences, with a fresh 10-year term, may not have been consistent with the Water Act; legal advice will be required to clarify this.⁴⁵

The panel notes that once a licence has been granted, the Controller's decision can only be set aside either by the Minister in response to a s 30 review, or by the Supreme Court if, on an application for judicial review, the court found that the decision was not properly made. Whether to actually set aside a decision, even in the event of such a finding, is within the discretion of the court. The panel further notes that the time limit for applying for judicial review in the Northern Territory Supreme Court is 60 days from the date on which the decision was initially made. The limit may be extended by the court, but only in special circumstances.

Improved administrative practices, with more regular use of legal support, would address the bulk of concerns noted. Improved practices should include processes that ensure that comprehensive information is placed before the Controller, forming a strong evidentiary basis for the Controller's decision; and formalisation of administrative processes and guidelines for the receipt, processing and assessment of licence applications.

⁴⁵ Further discussion on the point is in section 6.2.4 in relation to 10-year licence terms.

6 LICENCE REVIEW: ToR 2 – ToR 8

This chapter contains an overview of the review panel’s assessment of licence files in relation to ToR 2 – ToR 8:

ToR 2: Whether the process adhered to the relevant WAP, or draft WAP, for a declared Water Control District, or the existing NT Water Allocation Planning Framework where there is no WAP.

ToR 3: Whether the grant was made in accordance with the relevant government policies.

ToR 4: Whether the approval of the water licence application and entitlement was consistent with advice provided by the former Department of Land Resource Management’s scientists and expert practitioners during the assessment and approval process.

ToR 5: The extent to which comments received from the community were considered during the assessment and approval process.

ToR 6: Whether the volume of water applied for and allocated was consistent with both the intended use set out in each licence application, and the sustainable yield of the relevant source of water.

ToR 7: Whether there was demonstrated separation of the decision making powers between the former Department of Land Resource Management, the Controller of Water Resources and the Minister in granting each new and increased licence entitlement.

ToR 8: Whether, having regard to the need for proper process, public accountability and responsible management of water resources, there is any evidence regarding the making of the grant which indicates that there should be further investigation of the grant process.

In reviewing the licences, the review panel applied the approach detailed in chapter 2.

6.1 TOR 2: WHETHER THE PROCESS ADHERED TO THE RELEVANT WAP, OR DRAFT WAP, FOR A DECLARED WATER CONTROL DISTRICT, OR THE EXISTING NT WATER ALLOCATION PLANNING FRAMEWORK WHERE THERE IS NO WAP

There was seldom evidence of assessment against a WAP, draft WAP or the NT WAP Framework included in a licence file. However, the contents of each SoD indicated that an assessment of the quantity of water available for allocation, and the impacts that grant of a licence application would have on water available, had been carried out.

Assessment against water quantity provisions of WAP, draft WAP or NT WAP Framework could be inferred from each SoD although evidence was seldom included on the licence file.

6.1.1 Requirements of WAPs

Not only is a WAP a matter to be taken into account under s 90, the Water Act also requires water management in a Water Control District to be ‘in accordance with’ a WAP for that district.⁴⁶ The extent to which the Controller’s decision on a particular application will be constrained by a WAP depends on the specificity of the WAP. Provisions in the WAP that are expressed as rules for water licence decisions, must be applied by the Controller.

During the review period, declared WAPs were in place in relation to only three licence files. In each case, the licence granted was within the ESY specified in the WAP. However, in one case, an entitlement was granted in excess of the total amount nominated by the WAP for that particular use

⁴⁶ Water Act s 22B

WAP ASSESSMENT: KEY POINTS

- Provisions in the WAP that are expressed as rules for water licence decisions, must be applied by the Controller.
- Where a declared WAP applied, each licence was granted within the ESY specified in that WAP.
- However, some other rules did not appear to have been applied, e.g.:
 - No evidence that the Water Advisory Committee review was sought.
 - A requirement for annual reporting of crops irrigated, and use of micro-irrigation, was not mentioned in SoD nor applied to licence conditions.

(although still within the overall ESY for the aquifer). The SoD in this case indicated the Controller's intention to amend the WAP to accommodate the increased allocation by reducing allocation to another sector by a corresponding amount. Although the grant was contrary to the WAP's nominated quantity for that sector, the WAP did not expressly stipulate that allocations to any sector must not exceed the WAP nomination. The decision is therefore unlikely to have constituted a departure from the requirements of s 22B.

Apart from ESY provisions, WAPs contain other rules relating to the granting of licences. In one case, the applicable WAP required that the application was to be provided to the Water Advisory Committee for review. There was no evidence on either file that

this was done, and the requirement was not mentioned in the SoD. The WAP also required annual reporting of crops irrigated, and use of micro-irrigation. These factors related to one of the applications, and were not reflected in the licence conditions nor mentioned in the SoD.

6.1.2 NT WAP Framework

The NT WAP Framework is a government policy that ought to be taken into account by the Controller when making a water licence decision, and is particularly relevant when there is no declared WAP.

The Framework was taken into account and applied in almost all cases in which there was no declared WAP, with SoDs explaining how the licence grant had taken into account the NT WAP Framework. The Framework was not applied in three of the 'own motion' grants (detailed in section 5.2), and in two other cases.

In one of the cases in which the NT WAP Framework was not applied, an expired WAP was mentioned in the SoD, but not the NT WAP Framework. The Framework was applicable, and should have been taken into account in conjunction with consideration of the expired WAP.

NT WAP FRAMEWORK ASSESSMENT: KEY POINTS

- Applicable policy to be taken into account by Controller where there is no declared WAP for a resource.
- Was taken into account and applied in almost all cases:
 - Not mentioned as being applied in 3 'own motion' grants.
 - One case where expired WAP was applied rather than Framework.
 - One unusual case noted where Framework was taken into account but not applied.

In the remaining relevant case, the NT WAP Framework was taken into account but not applied. A single licence was granted for nearly double the amount that would, applying the Framework, constitute the ESY of the resource (that is, 20% of estimated recharge). This was an unusual case, in which the Controller determined that a licence should be granted to a significant user in an area in which all users were at that time exempted from the need to hold a licence. The SoD indicated that improved management of the aquifer would be possible with the grant of the licence, as it included a AAA condition as well as conditions requiring the provision of records of annual extraction, which would 'contribute significantly' to the development of a proposed WAP for the area.

6.1.3 Draft WAPs

It is not mandatory for the Controller to take into account a draft WAP. However, draft WAPs may certainly be relevant to a decision, and to that extent are matters that should be taken into account for the purposes of s 90(1)(k).⁴⁷ Draft WAPs existed in relation to 33 of the licence files reviewed: for the TLA Mataranka (2011) and Ooloo (2012) aquifers.

Statements in the draft WAPs setting out the ESY were generally taken into account in licence decisions to which they were relevant. Over the course of the review period, SoDs improved in the extent to which they explained differences between the ESY stated in a draft WAP, and the department's current estimate of ESY and the way in which the AAA scheme would ensure that the ESY was not exceeded.

Draft WAPs also contained a range of other provisions relating to the grant of licences. If the draft WAPs had been declared, each of these rules would have had to be applied by the Controller. Draft provisions included, for example:

- For applications exceeding 1,000 ML, a granted licence would require the licensee to develop the first 1,000 ML before having access to an increase
- That priority would be given to applications for development that already existed at the date of declaration of the WAP over that which was only proposed at that date
- Applications for increases would be required to demonstrate full use of the previously granted entitlement has occurred or would be likely to occur within the next 12 months
- Restrictions relating to high-capacity bores in close proximity to rivers or other bores.

DRAFT WAP ASSESSMENT: KEY POINTS

- Not mandatory for the Controller to take into account a draft WAP.
- Draft WAPs may be relevant to a decision and to that extent should be taken into account for the purposes of s 90(1)(k).
- Proposed ESYs in draft WAPs were generally taken into account.
- Proposed rules contained in draft WAPs were not mentioned in licence files or in SoDs, and were generally not reflected in licence conditions.

Proposed rules contained in draft WAPs were not mentioned or alluded to in licence files or in SoDs, and were generally not reflected in licence conditions.

6.2 TOR 3: WHETHER THE GRANT WAS MADE IN ACCORDANCE WITH THE RELEVANT GOVERNMENT POLICIES

The following policies were considered by the review panel for the purposes of ToR 3:

- NT WAP Framework and declared WAPs (see above, ToR 2)
- First in first served (FIFS)
- Use it or lose it (UIOLI)
- AAAs
- 10-year licence terms
- No Strategic Indigenous Reserve (SIR).

⁴⁷ See *MacFarlane v Minister for Natural Resources* [2012] NTSC 98, at [32].

6.2.1 FIFS

As mentioned in chapter 3, operation of a FIFS approach to water licensing requires that decisions be made about the place that each application will occupy in a queue in terms of water availability. In Top End resources, the priority given to an application can mean the difference between receiving a high or medium security licence, versus a lower security licence. In resources where the AAA scheme does not apply, it can mean the difference between a licence for the amount sought and a lesser amount, or none at all.

The panel was informed that there is no documented explanation of the department's approach to implementation of FIFS, but that practices applied during the review period included:

- assessing crop water use requirements and, in some cases, bore capacity or proposed bore drilling before accepting an application as having been duly 'lodged' for the purposes of the Water Act
- in some cases, assessing the availability of water before accepting an application as having been duly lodged
- giving priority to existing licensees' applications for increased licence quantities over applications for new licences (although this practice was not applied to one group of eleven applications, a mix of application types, which were assessed and granted as a batch).

Licence files did not consistently indicate the above practices; evidence for the conduct of crop water use assessment was the most consistently included. In spite of the priority afforded to applications for increase in entitlement, and provisions contained in draft WAPs requiring assessment of existing use, there was little evidence that an applicant's use of their existing entitlement had been assessed, and the department confirmed that it was not its practice to do so.

As licence files contained no evidence of the date on which an application was deemed to have been 'lodged', and no evidence of the date on which an assessment as to availability of water had been carried out, it was not possible to verify the way in which FIFS had been applied to each application.

There were a number of instances in which the date stated on the licence summary table as the application date did not match the date on which the application form or SIF was signed. In most of these cases, there was no other material on the file to explain the application date entered on the 'licence summary table' provided to the panel by the department.

In one example, four applications were processed together (although not in a 'batch', the practice having by then ceased). The impact of granting the applications was modelled sequentially and cumulatively, to determine the additional impact of each subsequent licence grant. This much is appropriate in a FIFS policy setting. However, the way in which FIFS was applied to the applications in this group was unclear, due to lack of clarity in what had been treated as the *application date*. In particular, one of the applications had been made some

FIFS: KEY POINTS

- FIFS requires that decisions be made about the place that each application will occupy in a queue in terms of water availability.
- An applicant's priority can mean the difference between receiving a high or medium security licence vs a lower security licence, or not receiving a licence at all.
- It was not possible to determine how FIFS was applied to each application as:
 - licence files contained no evidence of the date on which an application was deemed to have been 'lodged'
 - licence files contained no evidence of the date on which an assessment as to availability of water had been carried out
 - there was no formalised explanation of how FIFS was applied.

years before the others, yet was the last to be granted. As for other licence files, the reason for the order of assessment of each application was not indicated in SoDs or memos to the Controller. One of the licences involved received a medium security licence; the others, low security.

6.2.2 UIOLI

The intended policy outcome for UIOLI is clear from an NT Government statement in 2014. Broadly, the statement was that a licence not used in full in the first three years may be reduced by 50%, and by a further 50% if the remaining balance is not used within the following three years.

All licences granted after April 2013 included two conditions referring to the expectation that the entitlement will be used, generally as follows:

Non-use or underutilisation of the water entitlement(s) conferred under this licence may result in full or partial revocation of the licence by the Controller of Water Resources.

In the event that the total extraction reported under this licence is less than 90% of the Extraction Limits determined for three consecutive 12 month periods by [a preceding condition], the licence holder must provide a written report to the Controller of Water Resources that explains why the Extraction Limits were not reached and provides a projection of water requirements under this licence for the next three years or remaining term of the licence, whichever is the lesser.

Neither of the conditions is a requirement that water under the licence be used. The first draws the applicant's attention to the fact that underutilisation might attract exercise of the Controller's power under the Water Act to vary the licence. The second is a requirement to provide a report to the Controller if water is not used.

Conditions currently included on licences may enable implementation of UIOLI, although not in precisely the terms of the policy statement.

6.2.3 AAAs

AAA conditions were applied to all Top End licences in the review period.

AAAs: KEY POINTS

- AAA conditions were applied to all Top End licences in the review period.
- In applying AAAs, reliability of existing licences was to be preserved when assessing and recommending subsequent applications – i.e. new licence grants should not impact existing licences.
- One set of licences was issued contrary to this policy and approach, explanation was not contained in the SoD.
- While licence files generally contained no information about the evidence base, methodology and process that would be used to calculate AAAs, the soundness of the department's approach was verified by review of an internal process document.

UIOLI: KEY POINTS

- Current policy (2014) is that a licence not used in full in the first three years may be reduced by 50%, and by a further 50% if the remaining balance is not used within the following three years.
- All licences granted after April 2013 included two conditions referring to the expectation that the entitlement will be used.
- Conditions currently included on licences may enable implementation of UIOLI, although not in precisely the terms of the policy statement.

A significant aspect of the AAA policy as it was applied by the department was that reliability of existing licences was to be preserved when assessing and recommending subsequent applications. The intention was that new licences would not be granted if the grant would cause a reduction in reliability of existing licences.

Licences in one batch set were granted contrary to this intent; the new licences were granted with explicit acknowledgement in the SoD that their grant would reduce the reliability of existing licences in the same security class (from 80% to 60%). The review panel was informed that the department had determined that 60% reliability for general security licences was not unreasonable, given that the draft

WAP at that time indicated that general security licences should have a minimum reliability of 55%. The explanation was not mentioned in the SoD.

In terms of the underpinning science and modelling of AAAs, licence files generally contained no information about the evidence base, methodology and process that would be used to calculate AAAs. However, the department provided to Dr Harrington an internal process document for the Daly River catchment (i.e., Oolloo aquifer, TLA Katherine, and all connected rivers), which provides sufficient evidence to generally demonstrate the soundness of approach for determining AAAs in those areas. Further commentary on this aspect is provided in chapter 4.

The review panel noted that no WAPs were in place in relation to the licences issued with AAA conditions and consequently in some cases, with medium or low reliability. Section 6.5 contains further detail in relation to the implications of low reliability licences in areas outside of WAPs.

6.2.4 10-year licence terms

All but one of the new licences granted during the review period were granted with 10-year terms. The single licence not so issued was granted for a period of weeks, due to the specific short-term nature of the use (repair of a railway embankment).

10-YEAR LICENCE TERMS: KEY POINTS
<ul style="list-style-type: none">• Only one licence was issued without a 10-year term – due to the short-term nature of the use.• Applications for an <i>amendment</i> to increase entitlement, were granted with fresh 10-year terms commencing from the date of grant – a practice possibly inconsistent with the Water Act.

The review panel noted that throughout the review period, applications for an *amendment* to an existing licence to increase the entitlement were granted, in effect, as if they were new licences (but without the existing licence having expired, or been revoked or surrendered) - with fresh 10-year terms commencing from the date of grant of the application for amendment. Licence files did not include any reason for this. It is possible that the practice is not consistent with the requirements of the Water Act.

One licence amendment was granted to formally extend the term of a licence beyond ten years, to a total of 25 years. In that case, the Minister had been consulted as required by s 60 of the Water Act, and had formed the view that ‘special circumstances’ existed to justify the extended term. The panel noted that the department’s briefing to the Minister did not indicate any circumstances particular to the applicant. Like most other applicants, the applicant in this case sought certainty for their irrigation enterprise, in order to secure investment in new infrastructure. Indeed the department noted the likelihood of increasing requests for extended terms, for similar reasons.

6.2.5 No SIR

In March 2013, the NT Government determined that WAPs would no longer set aside ‘strategic Indigenous reserves’ (SIR) for Indigenous economic development (the ‘no SIR’ policy). The only declared WAP for which a SIR had been included was the TLA Katherine (the provision has since been removed). An SIR had been included in draft WAPs for Oolloo (2012) and TLA Mataranka (2011), where it was described as ‘a portion of the consumptive pool set aside for future allocation to Indigenous People for indigenous economic development’. As the draft WAPs had not been

declared, the 'no SIR' policy meant that it was proper for the Controller not to apply or take into account that aspect of the draft WAPs.⁴⁸

However, SoDs for 25 of the licences reviewed indicated that the Controller might have applied the 'no SIR' policy as a response to all concerns raised by commenters about access to water for Indigenous economic development, as well as in relation to the issue of equity of access to water resources generally. Further comment on this matter is contained in section 6.4.

6.3 TOR 4: WHETHER THE APPROVAL OF THE WATER LICENCE APPLICATION AND ENTITLEMENT WAS CONSISTENT WITH ADVICE PROVIDED BY THE FORMER DEPARTMENT OF LAND RESOURCE MANAGEMENT'S SCIENTISTS AND EXPERT PRACTITIONERS DURING THE ASSESSMENT AND APPROVAL PROCESS

In each case, approval of the application and grant of the entitlement was consistent with the recommendation contained in the departmental memo to the Controller. However, as detailed in section 5.1.3, the evidence base for the department's advice was generally absent from the licence

file, apart from varying evidence of assessment of crop water use.

WHETHER APPROVALS WERE CONSISTENT WITH ADVICE: KEY POINTS

- In each case, approval of the application and grant of the entitlement was consistent with the recommendation contained in the departmental memo to the Controller.
- The evidence base for recommendations was seldom contained on the licence file, meaning that evidence of assessment was inferred from the contents of the SoD.
- SoDs generally indicated only that assessment relating to water availability on a regional scale had been carried out.

Information contained in the SoD indicated that assessment of water availability, and impacts of granting the licence on that availability, had been carried out. Information for example about the process of modelling of flows, quantifying uncertainty in predictions, calculations underpinning AAAs (see ToR 3), evidence of current and future proposed bores, and protection of or consideration of water quality impacts, was generally not included on licence files.

The panel was informed of the modelling and assessment processes applied by the department; further details about these are provided in chapter 4.

6.4 TOR 5: THE EXTENT TO WHICH COMMENTS RECEIVED FROM THE COMMUNITY WERE CONSIDERED DURING THE ASSESSMENT AND APPROVAL PROCESS

In the licence files reviewed, evidence that the Controller took into account comments received was contained in the SoD, by way of an itemisation of comments received, summary of their contents, and an indication of how they had been taken into account in the decision.

In most SoDs reviewed, comments were adequately summarised and the SoD explained how they had been taken into account. However, there were instances where this was not the case, including:

- Some 'batched' files included errors in itemisation of comments or summarisation of concerns, including some instances of incorrect assignation of comments to applications.

⁴⁸ The draft WAPs were not binding on the Controller and it was therefore open to him, in accordance with government policy, to disregard the SIR. In any case, the draft WAPs would not have directly implemented SIR; rules about allocation from the SIR pool were to be developed subsequently.

Generally in such cases, comments were similar enough in their substance and relevance to applications in the batch that the error was unlikely to be significant to the decision.

- In some files, concerns were either not mentioned in the summary, or the way in which they had been taken into account was not apparent in the SoD.

A more significant example of the latter observation was concerns raised by NOI respondents about the 'equity' of granting large proportions of the sustainable yield to a small number of licensees. These concerns were raised in response to a number of applications for licences for significant quantities of water (in one case, a single licence represented 36% of the (then) total ESY for the resource). SoDs typically either did not respond to the concerns, or responded only on the aspect of Indigenous access for economic development with a statement that *'account was taken of the decision made by Government in December 2012 that water allocation plans should not provide a SIR'*. The SoDs implied that the existence of the 'no SIR' policy meant that social and equity concerns relating to Indigenous access to water resources need not be considered by the Controller.

The Controller was not necessarily bound to give any particular weight to commenter concerns about Indigenous access to water resources, or issues about equity more generally. He was however obliged to take them into account, and not dismiss them by applying a policy that was not relevant.

In general, the process for recording and assessing comments would have benefitted from increased formality and documentation. One of the licence files showed commendable evidence of thorough and systematic recording of all commenters and their responses.

Further, it is noted that the assessment and approval process does not take into account certain limitations of current modelling of resources, including the model's inability to represent small scale processes, and the non-uniqueness of model calibration and thus uncertainty in predictions. Due to this, specific issues raised by commenters may not necessarily always have been able to be considered. For example, commenters in a small number of cases raised concerns relating to local, rather than regional-scale, impacts on spring-fed GDEs. Whilst the available models account for cumulative groundwater discharge to the connected rivers, they cannot be expected to accurately represent the flow regime of individual springs or complexes along the river. Therefore, the Controller did not have the scientific knowledge available to properly address these comments.

**CONSIDERING COMMENTS RECEIVED FROM THE COMMUNITY:
KEY POINTS**

- In most SoDs reviewed, comments were adequately summarised and the SoD explained how they had been taken into account.
- One file contained a commendable systematic recording of all commenters and summary of their responses.
- SoDs for some 'batched' files included errors in itemisation of comments or summarisation of concerns.
- In some SoDs, concerns were either not mentioned in the summary, or the way in which they had been taken into account was not apparent in the SoD.
- Some SoDs implied that the existence of the 'no SIR' policy meant that social and equity concerns relating to Indigenous access to water resources need not be considered by the Controller.
- Constraints on knowledge and modelling of local processes might have prevented some specific concerns from being assessed.

6.5 TOR 6: WHETHER THE VOLUME OF WATER APPLIED FOR AND ALLOCATED WAS CONSIDERED IN RELATION TO BOTH THE INTENDED USE SET OUT IN EACH LICENCE APPLICATION, AND THE SUSTAINABLE YIELD OF THE RELEVANT SOURCE OF WATER

6.5.1 Intended use

6.5.1.1 *Assessing applicant's intended use*

Most licences were granted for a quantity consistent with the intended use, as indicated by the crop water use estimates provided by applicants. Many licence files also contained evidence that crop water use estimates had been verified by the department and considered during the assessment process. Where such verification and consideration was documented, it was generally by way of email correspondence between the department and applicants.

There were some inconsistencies in the outcomes of assessments:

- In some cases, the eventual allocation granted did not equate to that requested, with no evidence on file for the difference. In a small number of these, the final allocation was for a larger quantity than that applied for.
- In one case there was significant inconsistency in the quantity granted for a particular crop. The panel was informed that the error appeared to be clerical, and not picked up prior to the licence grant.
- In a small number of cases, it appeared that the applicant had exceeded their previously licensed quantity; there was no evidence on file to indicate whether or how that fact had been taken into account.

ASSESSING INTENDED USE: KEY POINTS

- Most licences were granted for a quantity consistent with the intended use, as indicated by the crop water use estimates provided by applicants.
- For industry, public water supply or aquaculture applications, there was less evidence of assessment of the applicant's requirements.

Where an application was for industry, public water supply or aquaculture use rather than crop irrigation (16 licences in total), there was much less evidence of assessment of the applicant's requirements. Licence files for two aquaculture applications contained no indication of such assessment.

Licence files did not indicate that assessments were formally brought to the Controller's attention and they were sometimes not included in the package of documents provided to the Controller.

6.5.1.2 *Taking into account applicant's intended use*

As mentioned in section 3.2.3, the AAA system meant that Top End licences granted during the review period included a condition that varies the quantity received by the licensee on an annual basis, depending on water available in that year. Licences were usually granted with a designated 'security level', which dictates the reliability of the licence – that is, how frequently the licence will receive its full allocation. Low security licences receive full allocation less frequently than high security licences.

A system such as AAA works well in conjunction with a developed water market – low-reliability licensees with need for water during dry years (for example, to sustain permanent crops) can purchase additional water from licensees who do not intend to use their full allocation in that year.

Outside of WAP areas, there is limited ability to trade water allocations.⁴⁹ Holders of low-reliability licences in such areas would be vulnerable during dry periods (particularly where they grow permanent crops such as orchards or sandalwood), as there is no possibility of sourcing additional water through the water market.

Highly unreliable entitlements, with no ability to purchase additional allocation to maintain perennial crops or permanent tree crops or orchards, may place licensees in an invidious position, and one which significantly increases the likelihood of non-compliance during dry periods.

Licence files included no evidence that the potential effects of granting lower security licences to applicants for irrigation of permanent crops had been taken into account. In some cases, licence reliability was as low as 30% reliability.

There was similarly no indication that applicants were informed of the likely reliability of the licence, and how suitable that might be for their proposed use. Estimates of reliability were conveyed only through the SoD, once the licence had been granted.

Concern that farmers did not understand the reliability of their licences, and that unreliable licences would cause difficulties in future was explicitly raised by NT Farmers in response to a Nol:

Ultimately when full development of the available water occurs the extra unreliable water licences will result in hardship in dry years or pressure to allow greater impacts on the environment, that will create significant conflict in our communities.

There was no evidence on this file that the particular concern was taken into account by the Controller in making the decision, and it was not mentioned in the SoD.

If licensees breach their conditions, taking a greater quantity of water than permitted following a low-recharge season, risks to water dependent ecosystems are high, as evidenced from the modelling of reductions in dry season river flow in dry years. The risk is increased by the fact that demand for full water entitlement is likely to be higher when the soil profile has remained dry following a wet season of lower than average recharge.

The panel notes however that the concern has not been realised, as to date there have been no AAAs of less than 100% for any licence except in the TLA Katherine, where trading is available under the WAP.

TAKING INTO ACCOUNT APPLICANT'S USE (LOW-RELIABILITY LICENCES FOR PERMANENT CROPS): KEY POINTS

- No ability to trade water allocations leaves low-reliability licensees, with permanent crops, vulnerable during dry years.
- Lack of evidence that applicant's current or intended use for permanent crops was taken into account when granting low-reliability licence.
- No indication that applicants informed of suitability of low-reliability licence for permanent crop.
- No evidence that Nol response raising this concern was taken into account.

⁴⁹ The department's website states that water entitlements may only be traded where there is a declared WAP: <https://nt.gov.au/environment/water/about-water-extraction-licences/water-trading>. Licence files reviewed for areas outside WAPs were endorsed with the words 'trading not applicable'. Within an area covered by a declared WAP, the WAP must ensure that rights under licences can be traded in part or in full: Water Act s 22B(5)(c). While it is possible that a form of transfer of entitlements between two licensees may be available outside of WAP areas, through simultaneous increase of one entitlement (under Part 6A) and corresponding decrease of another licence entitlement, this would be cumbersome and costly. The Act envisages that trade will occur only under and in accordance with a WAP.

6.5.2 Sustainable yield

Estimated sustainable yield was considered in relation to each licence granted. Licences were generally granted accordingly, as outlined in section 6.1.

In one case for the Jinduckin Aquifer, there was insufficient evidence on file to establish whether the data and assumptions used to determine ESY were appropriate, and no apparent consideration of free-flowing bores on the applicant's property in estimating current levels of take. Further discussion in relation to this example is contained in chapter 4.

While AAAs underpin the successful preservation of sustainable yield in Top End resources, SoDs generally did not explain how AAAs would be calculated in order to maintain both sustainable yield and the specific environmental water requirements indicated in the SoD. Although this information was not contained in the licence files themselves, the department provided a copy of an internal working document that clearly sets out an appropriate workflow for determining AAAs for the Daly River catchment, including the Ooloo aquifer, TLA Katherine, and all connected rivers in the catchment. Further details are provided in section 4.6.

6.6 TOR 7: WHETHER THERE WAS DEMONSTRATED SEPARATION OF THE DECISION MAKING POWERS BETWEEN THE FORMER DEPARTMENT OF LAND RESOURCE MANAGEMENT, THE CONTROLLER OF WATER RESOURCES AND THE MINISTER IN GRANTING EACH NEW AND INCREASED LICENCE ENTITLEMENT

6.6.1 Understanding of separate roles

It appeared from the licence files that departmental officers played an appropriate role in the administration and provision of advice for both licence applications and s 30 reviews. The review panel was informed that all decisions are made by senior officers within the department; in particular, memos to the Controller are made through appropriate senior officers, each of whom formally signs off on the memo. This process was evident from the reviewed licence files.

There was no evidence or suggestion of inappropriate contact between the Minister and Department or Controller in any of the licence files reviewed. The absence of interference by a Minister in relation to the outcome of any licence file was confirmed by past Controllers during interview.

SEPARATION OF ROLES: KEY POINTS

- Departmental officers played an appropriate role in the administration and provision of advice for both licence applications and s 30 reviews.
- No evidence or suggestion of inappropriate contact between the Minister and Department or Controller in any of the licence files reviewed.
- No evidence on the licence documentation reviewed of any conflict of interest or bias on the part of the Controller.

The Controller should not act as the decision-maker in circumstances where there is bias, or reasonable risk of perceived bias, or a conflict of interest. The review panel found no evidence on the licence documentation reviewed of any conflict of interest or bias on the part of the Controller. As mentioned in section 5.3.3, following the Supreme Court decision in *Environment Centre Northern Territory v Minister for Land Resource Management*, Ministerial briefings for s 30 reviews were not signed through by the Controller, in an appropriate separation of the Controller from this part of the process.

6.6.2 Department's role in assessment

To make a sound decision, the Controller needs to be confident that all relevant facts are before him or her, and that the department's advice in relation to each aspect of the assessment has been prepared at an appropriate level and by an appropriate officer. As noted elsewhere in this report, formal procedures would assist in this respect.

6.7 TOR 8: WHETHER, HAVING REGARD TO THE NEED FOR PROPER PROCESS, PUBLIC ACCOUNTABILITY AND RESPONSIBLE MANAGEMENT OF WATER RESOURCES, THERE IS ANY EVIDENCE REGARDING THE MAKING OF THE GRANT WHICH INDICATES THAT THERE SHOULD BE A FURTHER INVESTIGATION OF THE GRANT PROCESS

As discussed throughout this chapter as well as chapters 3, 4 and 5, review of the licence files revealed a number of areas which, in the review panel's opinion, indicate opportunities for further investigation and improvement of the grant process overall. Particular areas in which improvements in processes for the assessment and grant of water licences are desirable, are identified in the Recommendations.

As stated in section 5.4, the panel notes that in spite of identified concerns, it is unlikely that the grant process would have caused any licence to be set aside.

APPENDIX A: REVIEW OF WATER EXTRACTION LICENCES - TERMS OF REFERENCE

SCOPE

The review will:

- review the application, assessment and approval processes for identified water extraction licences, including having contact with relevant employees, licence applicants, stakeholders and decision makers;
- assess whether grants of new or increased water entitlements were made in compliance with the *Water Act 1992 (NT)* (Act), the *Water Regulations* (Regulations) and relevant government policies;
- incorporate an assessment by an independent water science expert of whether best practice evidence-based scientific analysis was available to decision makers when assessing the relevant applications for water extraction licences;
- undertake a legal review to determine whether best practice evidence-based scientific analysis was sought and duly considered in relation to each application for a water extraction licence; and
- assess whether any matters extraneous to the Act or Regulations were considered during the assessment and approval process for each water licence.

The review will only consider the processes relevant to applications for, and the granting of, new or increased water extraction licences. In particular, the review will not consider Government resource management programs or policies which were not directly relevant to the granting of water extraction licences.

APPROACH

The review will assess all new and increased water extraction licences granted between 30 August 2012 and 30 August 2016 in the Northern Territory. In relation to each grant, the assessment will consider:

- whether the process adhered to the requirements outlined in the Act and Regulations, in particular sections 90, 71A-71E and 30 of the Act;
- whether the process adhered to the relevant Water Allocation Plan (WAP), or draft WAP, for a declared Water Control District, or the existing NT Water Allocation Planning Framework where there is no WAP;
- whether the grant was made in accordance with the relevant government policies;
- whether the approval of the water licence application and entitlement was consistent with advice provided by the former Department of Land Resource Management's scientists and expert practitioners during the assessment and approval process;
- the extent to which comments received from the community were considered during the assessment and approval process;
- whether the volume of water applied for and allocated was considered in relation to both the intended use set out in each licence application, and the sustainable yield of the relevant source of water;

- whether there was demonstrated separation of the decision making powers between the former Department of Land Resource Management, the Controller of Water Resources and the Minister in granting each new and increased licence entitlement; and
- whether, having regard to the need for proper process, public accountability and responsible management of water resources, there is any evidence regarding the making of the grant which indicates that there should be further investigation of the grant process.

In conducting its assessment, the review is to have regard to and incorporate an analysis by an independent water science expert of the best practice evidence-based science that was available to decision makers when assessing the relevant applications for water extraction licences.

APPENDIX B: WATER SCIENTIST SCOPE

PURPOSE

To independently assess whether best practice evidence-based science was available to decision makers when assessing the relevant applications for the Review of Water Extraction Licences.

SCOPE

The water scientist will:

- Evaluate the current science and accompanying assumptions in relation to water extraction licensing;
- Assess the scientific rigour, assumptions and conceptualisation underpinning the science supporting determination of environmental water requirements;
- Provide advice regarding the availability and relevance of any other science available, but not currently applied, that would strengthen the evidence base for decision making and alleviate or reduce the weaknesses identified, if any;
- Review the fit-for-purpose application of ecological and hydrological models, including surface water and groundwater connectivity;
- Evaluate whether the principles for determining environmental flow requirements are robust and scientifically sound; and
- Assess the validity of the determinations made by the Department of Natural Resources and Environment for licence reliabilities of those licences identified by the Panel.

APPENDIX C: NORTHERN TERRITORY WATER ALLOCATION PLANNING FRAMEWORK

All available scientific research directly related to environmental and other public benefit requirements for the water resource will be applied in setting water allocations for non-consumptive use as the first priority, with allocations for consumptive use made subsequently within the remaining available water resource.

In the absence of directly related research, contingent allocations are made for environmental and other public benefit water provisions and consumptive use. These are explained below.

Top End (northern one third of the Northern Territory)

Rivers

At least 80 per cent of flow at any time in any part of a river is allocated as water for environmental and other public benefit water provision, and extraction for consumptive uses will not exceed the threshold level equivalent to 20 per cent of flow at any time in any part of a river.

In the event that current and/ or projected consumptive use exceeds the 20 per cent threshold level, new surface water Licences will not be granted unless supported by directly related scientific research into environmental other public benefit requirements.

Aquifers

At least 80 per cent of annual recharge is allocated as water for environmental and other public benefit water provision, and extraction for consumptive uses will not exceed the threshold level equivalent to 20 per cent of annual recharge.

In the event that current and/ or projected consumptive use exceeds the 20 per cent threshold level, new groundwater Licences will not be granted unless supported by either directly related scientific research into groundwater dependent ecosystem/ cultural requirements, or in the absence of such research, hydrological modelling confirming that total groundwater discharge will not be reduced by more than 20 per cent.

Arid Zone (southern two thirds of the Northern Territory)

Rivers

At least 95 per cent of flow at any time in any part of a river is allocated as environmental and other public benefit water provision, and extraction for consumptive uses will not exceed the threshold level equivalent to five per cent of flow at any time in any part of a river.

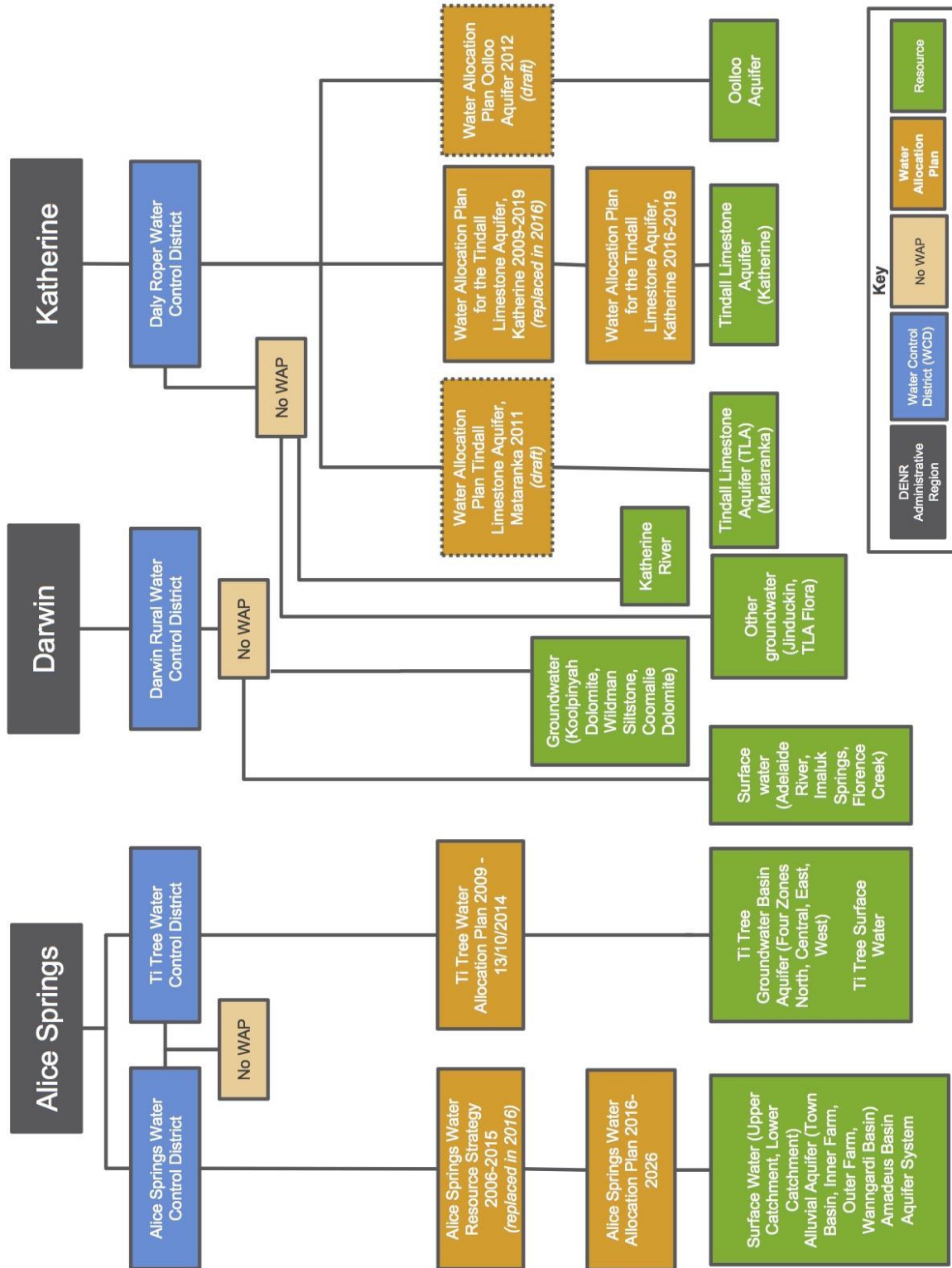
In the event that current and/ or projected consumptive use exceeds the threshold levels of five per cent for river flow, new surface water Licences will not be granted unless supported by directly related scientific research into environmental other public benefit requirements.

Aquifers

There will be no deleterious change in groundwater discharges to dependent ecosystems, and total extraction over a period of at least 100 years will not exceed 80 per cent of the total aquifer storage at start of extraction.

In the event that current and/ or projected consumptive use exceeds the threshold levels of 80 per cent of the consumptive pool for aquifers, or groundwater discharges to groundwater dependent ecosystems are impacted, new groundwater Licences will not be granted unless supported by directly related scientific research into groundwater dependent ecosystem/cultural requirements.

APPENDIX D: RESOURCES COMPRISING PART OF THE REVIEW



APPENDIX E: REVIEW PANEL’S APPROACH TO THE REVIEW

