EVALUATION OF NSW WATER SHARING PLANS

Evaluation of the major NSW Murray–Darling Basin groundwater sharing plans

2006 – 2016

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Foreword

This document is one of two evaluation reports examining NSW surface and groundwater sharing plans within the NSW Murray–Darling Basin. Report drafting commenced in 2012 with considerable revision prior to draft release in 2018. Minor corrections and layout changes have been made to the final report versions. The material contained within these reports is current to 2014 for regulated river plans (2016 for the NSW Border Rivers) and to 2016 for groundwater plans.

Since this report was written considerable effort has been applied to the development of replacement water sharing plans and associated water resource plans made under the *Basin Plan 2012*. Many of the findings and recommendations contained within these evaluation reports have been addressed during this process.

There are references in this document to the NSW Department of Primary Industries - Water (DPI Water). This is the former name of the NSW Department of Planning, Industry and Environment (DPIE).

Summary of recommendations

Recommendations for all groundwater water sharing plans	
Plan appropriateness	1. adopt a program logic approach to establish and review plan objectives. The objectives and success criteria should be developed using the SMART principle. 2. review plan internal logic to ensure the vision, objectives, strategies and performance indicators are clearly structured, relate to each other, and apply to the plan rules 3. review plan objectives and scope to improve the recognition of connections to adjacent surface and groundwater sources. 4. consider including analysis of climate variability and change, as well as potential changes in industry base to assess implications for water availability, groundwater recharge and water demands 5. improve public availability of evidence sources supporting plan development, implementation and monitoring, in order to support plan implementation and communication to stakeholders and the water market
Plan efficiency	6. complete groundwater–dependent ecosystem identification across NSW and update plans and rules accordingly 7. continue to resolve the issues identified in plan implementation audits.
Plan effectiveness – Economic	8. revise the economic objectives, related strategies and performance indicators using the program logic approach to allow evaluation of economic objectives. 9. establish a fit for purpose monitoring, evaluation and reporting program based on the revised performance indicators.
Plan effectiveness – Social /Cultural	10. revise the social and cultural objectives, related strategies and performance indicators using the program logic approach to allow evaluation of social and cultural objectives. This should include recognition of spiritual, social and customary values of water to Aboriginal people. 11. consider developing appropriate performance indicators for values of groundwater for Aboriginal people.
Plan effectiveness – Environmental	12. complete groundwater–dependent ecosystem identification across NSW and update plans and rules accordingly. 13. publish information on groundwater level trends using modelled and recorded data.

Recommendations to strengthen future water sharing plan evaluation
14. develop a “fit for purpose” performance monitoring program, aligned with NSW’s monitoring requirements under the *Basin Plan 2012*.
15. identify and collect contextual data to inform effectiveness evaluations. This includes information on climate and economic factors which influence WSP outcomes but are not managed by the WSP.
16. build plan performance monitoring into the business planning model within the department.
17. improve groundwater system knowledge by identifying and investigating key gaps, for example surface and groundwater interactions.
18. improve public availability of evidence sources supporting plan development, implementation and monitoring.

Glossary

BLR	Basic landholder rights
Basin Plan	*Basin Plan 2012* for the Murray–Darling Basin under the Commonwealth *Water Act 2007*.
Broad objectives	Statements of desired outcomes to which the plan will contribute. At least one broad objective is required for each of the economic, social / cultural and environmental aspects of the vision statement.
Drawdowns	The difference between groundwater level/pressure before take and that during take.
PIs	Performance Indicators
Plan implementation reviews	The reports previously known as the plan implementation audits. These reports examine whether the rules of a plan were implemented correctly and within the required timeframes. The frequency of reporting is determined by related legislation and agreements, for example the WMA 2000 specifies no more than five–year intervals for WSPs and the Basin Plan 2012 requires annual reporting.
Plan internal logic	Internal plan structure referring to clear links from objectives to rules. The structure of a WSP is directed by the *Water Management Act 2000* to include a vision, objectives, strategies and PIs. Rules should link to strategies, which then link to targeted objectives, which link to broad objectives, which should all link to the plan vision.
Plan internal logic relationship diagram	Flow charts showing the relationships between broad and targeted objectives, strategies and rules for economic, social / cultural and environmental outcomes.
Plan rules	Legal mechanisms by which the plan implements water management strategies. At least one plan rule or rule set is required to implement each strategy. The term may refer to an individual plan clause, sub clause or multiple clauses depending on how the plan has been written.
Plan strategies	Statements of water management activities or levers a plan uses to deliver targeted objectives.
Program logic	Established framework for evaluation, a linear series of steps that set out what needs to occur for a project to meet its desired outcomes – in this instance for a plan to achieve its objectives.
Relationship	For the purposes of this document ‘relationship’ refers to the linkages between broad and targeted objectives, targeted objectives and strategies, and strategies and rules. These relationships should be based on a conceptual model underpinned by evidence such as response models or other rationale. The strength of relationships should drive the selection of the most appropriate broad or targeted

	objective, strategy or rule because without strong relationship foundations any evaluation of plan success will be limited.
SMART	*Specific* – define a specific area or item for improvement. *Measurable* – quantify or provide an indicator of progress. *Achievable* – state what results can realistically be achieved given available resources and who will do the work. *Relevant* – choose goals that matter and are relevant to water resource planning including stakeholders. *Time–bound* – specify when the result(s) can be achieved and delivered.
Targeted objectives	Statements of the desired outcomes a plan will achieve. At least one targeted objective is required for each broad objective. All targeted objectives must be linked to at least one plan strategy.
Triple bottom line reporting	Evaluation of economic, social / cultural, and environmental outcomes guided by the legislation.
Water sharing and water resource plans (WSP and WRP)	Water sharing plans are established under the WMA 2000 and are prepared for all water sources in NSW. Water resource plans are a requirement of the Basin Plan 2012 and cover water sources in the Murray–Darling Basin. WSPs will be a component of WRPs for water sources in the MDB area.
Water year	1st July to 30th June.
WMA 2000, the Act	NSW *Water Management Act 2000.*

Contents

Introduction

This summary presents an overview of the first evaluation results of the development and implementation of the water sharing plans (WSP) for the major inland groundwater areas of the Murray–Darling Basin in NSW. Full details are available in the report cards for each WSP contained in the appendices to this report. The evaluation aims to determine plan appropriateness, efficiency of implementation and effectiveness in meeting plan objectives consistent with the requirements of the *Water Management Act 2000* (the Act). The evaluation period covered is from plan commencement to June 2016 with data to 2015 for some sections.

Table 1: Groundwater sharing plans evaluated

Water sharing plan	Commencement date	Original WSP cease date[1]
Lower Gwydir	1 October 2006	30 June 2017
Upper and Lower Namoi	1 October 2006	30 June 2017
Lower Macquarie	1 October 2006	30 June 2017
Lower Murrumbidgee	1 October 2006	30 June 2017
Lower Murray	1 November 2006	30 June 2017
Lower Lachlan	1 February 2008	30 June 2018

The evaluation of WSPs brings together evidence from planning, implementation and monitoring activities using a multiple lines of evidence approach. This information is often variable in scale, coverage and duration. A program logic is used to structure the evidence. Plan elements are separated for evaluation purposes. This allows high level outcomes and the steps taken to achieve them to be identified.

The evaluations focus on three key elements; appropriateness, efficiency and effectiveness.

- appropriateness – looks at whether the scale, scope, prioritisation and internal logic of a WSP were and are still suitable for the circumstances.
- efficiency – assesses the level of implementation of WSP rules; whether their implementation was optimised and whether implementation issues should be considered in reviewing and amending the WSP.
- effectiveness – gauges the extent to which the objective outcomes were achieved, and the contribution of the WSP strategies to this objective achievement.

Each set of report cards details the findings and the evidence base used for each assessment. The evaluations will inform the ongoing improvement of the WSPs, their implementation and monitoring. Specifically, the evaluations will assist the development of water resource plans which are required for implementation of the Murray–Darling Basin Plan (MDBP).

[1] These dates reflect the original cease dates of the relevant water sharing plans at plan commencement.

Background to the plans

The first round of WSPs in NSW were developed from the late 1990s to 2008, for rivers and groundwater areas identified as having high economic, social and environmental risk due to the level of development and competition for water resources. The WSPs were the outcome of a series of reforms to water policy and management, including nationally agreed reforms, through the Council of Australian Governments (COAG) in 1994, followed by the modernisation of water legislation in NSW through the *Water Management Act 2000.* The National Water Initiative was introduced in 2004 and built on the COAG reforms.

Key elements relevant to groundwater of these reforms, implemented by the WSPs, included:

- separation of water access licences from land title.
- creation of tradeable water licences (through 'permanent' trade of licences and shares or 'temporary' trade of allocations) and associated trading or "dealing" rules.
- clarification of existing water licences and allocations as "shares" in the water resource, subject to available water determinations (AWDs – often called allocations) which vary with climate and groundwater recharge.
- defined water accounting rules, priority of access, and level of reliability.
- the establishment of an overall limit to diversions from the water source, to protect both environmental values and water users' security and reliability.
- establishment of planned environmental water and associated rules.
- clarification of basic rights for native title, domestic and stock needs.

The current water sharing plan rules evolved from the rules, embargoes and other arrangements established in the 1980s and 1990s. Water management processes for the inland alluvial groundwater systems commenced in the 1990s when it was identified that there would be ongoing declines in groundwater levels if full development of existing entitlements occurred. In August 1997, the second stage of the NSW water reforms was announced. A new NSW Groundwater Policy Framework provided direction towards achievement of resource sustainability for NSW groundwater sources.

Groundwater management committees (GMCs) were established in 1998, representing water users, local government, indigenous, community and environmental interests, as well as key government agencies. The GMCs were initially involved in the development of groundwater management plans. Following commencement of the WMA 2000, they were then charged with developing recommendations to the Minister for water sharing arrangements in each water source. The draft WSPs developed were made available for public consultation. The Minister for Water Resources made the WSPs in 2006 and 2008, with concurrence from the Minister for the Environment.

Prior to plan development, these resources had been classified as high–risk due to high levels of entitlement and associated extraction. To manage take to the new sustainable WSP long–term average annual extraction limits, levels of take needed to be reduced. This was achieved through:

- reducing the level of licensed entitlements in groundwater systems; and
- assisting communities located in the groundwater system's catchments by funding projects to improve local infrastructure and strengthen the local community.

Supplementary water access licences were made available to affected licence holders whose historical usage was greater than their new entitlement. Allocations for supplementary licences were progressively reduced during the terms of the WSPs, until fully extinguished at the conclusion of the plan terms. This gradual reduction was designed to allow a period of adjustment for affected licence holders and was accompanied by a structural adjustment package, which provided financial support.

Key externalities and context during the evaluation period

During the WSP evaluation period these six groundwater areas experienced severe and extended drought, beyond the most severe drought previously on record. Many of the regulated river WSPs in the south of the NSW Murray–Darling Basin had to be suspended during the drought[2], as the conditions exceeded the assumptions on which the WSPs were based. The net effect across all the inland groundwater plan areas was to increase demand on groundwater resources.

In many of the six WSP areas, complaints were received about difficulties accessing the groundwater. In some cases, this was found to be purely due to reduced recharge from the drought conditions, while in other cases, it was found to also be due to the increased competition to access the groundwater resources. These issues are discussed in the individual report cards.

In some areas, the drought was also associated with a large increase in water allocation assignments within the groundwater sources and in the construction of new bores, through which, allocations could be extracted. These developments were associated with the diminished availability of surface water, and in the southern areas there were rice industry subsidies to establish groundwater access.

Environmental, social and economic outcomes are driven by climate, as well as many other factors external to water management, including significant broader reforms and investment across the Murray–Darling Basin. The broader economic circumstances during the evaluation period were influenced, among other factors, by commodity prices, technology change, the global financial crisis and the exchange rate. Social outcomes were affected by economic factors, as well broader demographic changes and educational factors. Environmental outcomes were also affected by climate (including the extreme drought), land use and introduced species.

In addition, during the evaluation period, water management in the Murray–Darling Basin (including groundwater) was the subject of significant reform and investment that was not envisaged when these WSPs were developed. This included the Commonwealth *Water Act 2007* and *Basin Plan 2012*, the introduction of “sustainable diversion limits”, development of large portfolios of surface water licences for environmental purposes by Commonwealth and state government agencies, and significant investment in water efficiency projects to generate water savings. These were associated with changes in the governance of water management and environmental water.

Evaluation methodology

Best practice evaluation is based on a program logic approach. This is a linear step by step process that outlines the steps that need to occur for a project to deliver its desired outcomes. It also identifies any assumptions that may underpin step linkages and identifies the elements that need to be delivered to achieve those outcomes. The evaluation of a plan involves bringing together evidence from planning and implementation to provide a total picture, using a multiple lines of evidence approach. However, this information is often variable in scale, coverage and duration. Program logic separates the elements of a program for evaluation purposes and identifies high level outcomes and the steps to achieve them. It was developed for the World Bank in the late 1960s (Bamberger and Hewitt 1986) and has been widely used in Australian natural resource management (Australian Government 2009, Roughley 2009, DECCW 2010). It has also been

[2] Plans suspended were:

- the Lachlan Regulated River suspended immediately on commencement on 1st of July 2004;
- the Murrumbidgee Regulated River suspended on the 10th of November 2006;
- the Murray Lower–Darling Regulated River suspended in October 2006; and
- the Macquarie–Cudgegong Regulated River suspended in July 2007.

All plans were reinstated on the 16th of September 2011.

identified as a viable method to assist evaluation for the NSW Government Evaluation Framework (DPC 2013).

Applying program logic to the planning cycle allows evaluation to be completed in stages (Figure 1) which can be progressively evaluated as more information becomes available during a plan's term. This flexible approach allows some form of review to occur, even though outcomes may not yet be directly attributable to a plan.

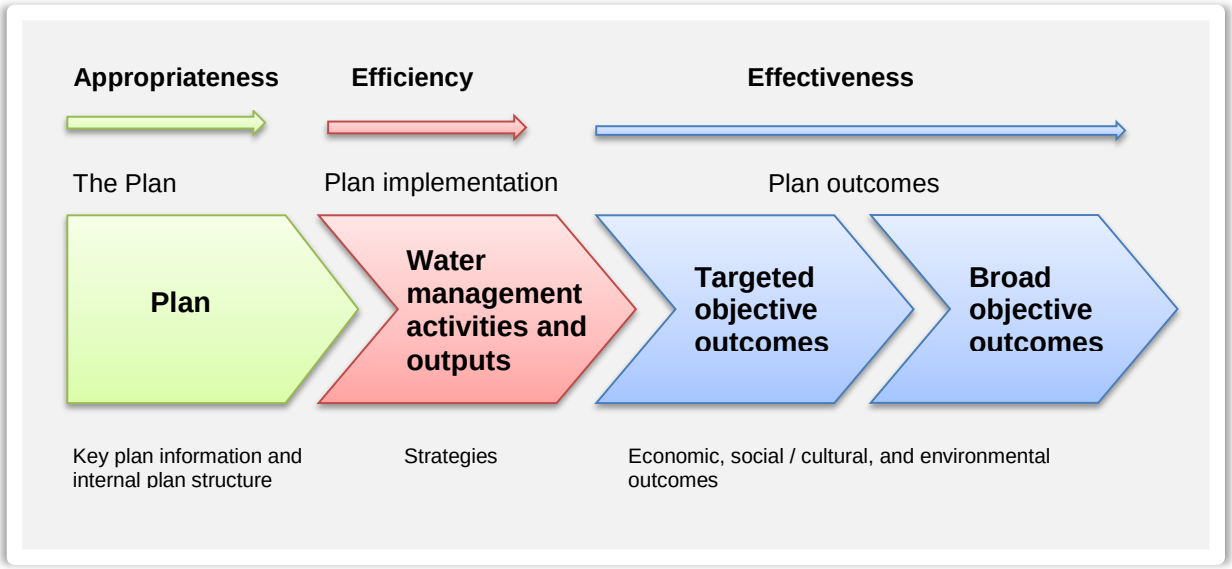

Figure 1 Plan operation elements following program logic and their related evaluation stage

Plan evaluation considers the following elements:

- **Appropriateness** – whether the scale, scope, prioritisation and internal logic of a plan were and are still suitable for the circumstances. This relies on information including geographical scale, types of water sources covered, the level of risk assigned to each water source and the plan's internal logic. This also involves an assessment of the original intent of the plan, and whether this intent is still relevant.
- **Efficiency** – the level of implementation of plan rules, and whether their implementation was optimised. This element focusses on the water management activities required to implement a plan's rules and the resulting outputs (e.g. volumes of water delivered, flows provided, water trading statistics). This evaluation involves mapping the implementation process, identifying if there are better ways of achieving the same outcomes, and benchmarking against best practice. This relies on analysis of information including plan implementation performance reviews and audits conducted during the plan term. This part of the evaluation forms the basis for continual plan improvement. The outputs feed directly into the targeted outcomes.
- **Effectiveness** – extent to which the objective outcomes were met, that is the level of success in achieving plan strategies which inform targeted and broad objectives. Effectiveness evaluation of a plan is strongly influenced by the two previous evaluation stages (see Figure 2). The Plan objectives detail what the Plan aims to achieve. They are grouped into economic, social and cultural, and environmental outcomes. This triple bottom line approach is guided by the Act (Section 3).

The outcomes were quantified by monitoring change from baseline conditions where available (i.e. the starting point for comparison) using predetermined performance indicators. Additionally, specific economic, social and cultural, and environmental investigations and modelling were used to improve result certainty. The achieved outcomes were then assessed against the

desired outcomes as specified in the Plan objectives. Under program logic, objective outcomes are split into targeted and broad outcomes:

- **Targeted objective outcomes** are clearly defined, measurable and directly attributable to a plan's operation and outputs. They typically relate to specific water management activities for example controlling river flows, setting water levels, maintaining water supply and controlling the extraction of water.
- **Broad objective outcomes** are less clearly defined and there are many factors external to a plan that influence the success of a broad objective for example land use, management of externally controlled environmental water, commodity prices, climatic conditions and other natural resource programs.

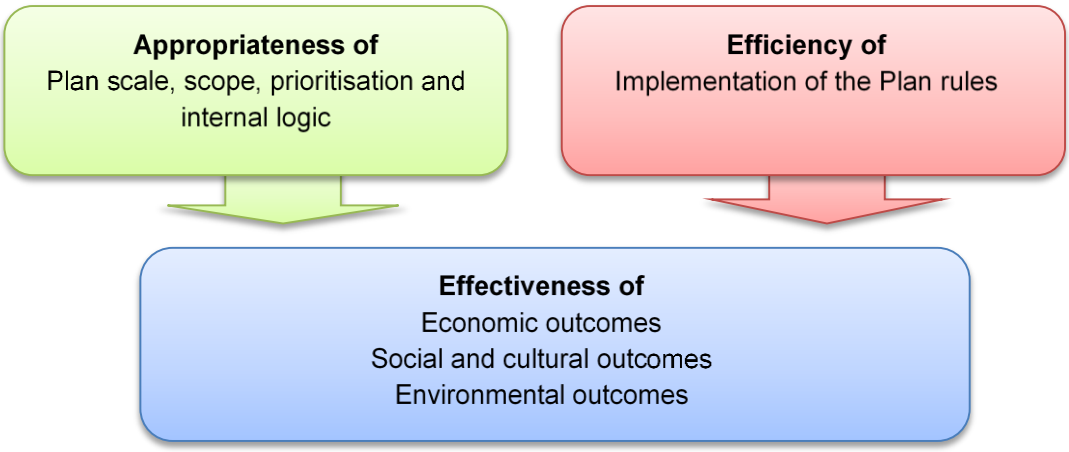

Figure 2 Interaction of evaluation elements

The following **key principles** underpin the evaluation approach

- plan objectives can only be evaluated if they relate to water management activities the plan controls through strategies and rules, and they have a clear linkage. Similarly, any rules that do not link clearly to an objective cannot contribute to the plan's evaluation.
- if the plan has not been operational during the evaluation period (e.g. if the plan was suspended) but the plan rules were still being implemented to achieve the same outcomes, then their implementation can be assessed.
- if plan strategies or rules have not been implemented or delivered, any effectiveness evaluation will be diminished or may not be possible.
- evaluation of broad objectives is reliant on the achievement of targeted objectives and plan strategies. The program logic approach assumes if targeted objectives and related strategies indicate progress, then progress is also being made towards the related broad objectives, such progress is detailed in the report cards.
- baseline is assumed to be WSP commencement. However, evaluation of some outcomes may use a varied baseline if rules were in place prior to commencement.
- evaluation is based on existing available evidence only. Raw datasets have not been analysed.

The evaluation is based on existing available evidence only. No additional data analysis has been undertaken to contribute to this evaluation.

General findings and recommendations

This section lists the general findings arising from the evaluation that are common across all of the relevant WSPs. More specific findings for each individual plan are listed in Chapter 6. The report cards for each individual WSP provide further detail on the reason for the finding, the supporting evidence and detailed recommendations.

Appropriateness

The Act requires a WSP to include:

(a) A vision statement,

(b) Objectives consistent with the vision statement,

(c) Strategies for reaching those objectives, and

(d) Performance indicators to measure the success of those strategies.

The application of this clear and logical framework is part of the appropriateness evaluation.

All WSPs were found to be mostly appropriate, but there is room for significant improvement. Appropriateness can be improved by applying a program logic approach to the revision of the WSP objectives, strategies and performance indicators using the SMART (specific, measurable, achievable, relevant and time–bound) principle. This will provide clearer direction for WSP rules, as well as a more robust framework to monitor and evaluate whether WSPs are effective.

Some of the WSP objectives contain multiple outcomes, for instance “establish and manage groundwater resource security for communities and industries”. In these cases, the objective was evaluated more than once, for each of the potential outcomes identified.

The objectives established by the WSPs are a mixture of high and medium level. The high–level objectives may be impacted by many factors outside the WSP’s control and as a result, they fall into the category of broad objectives under the above classification. The WSPs would benefit from an objective review which follows an improved objective setting process so that objectives better align with strategies and plan rules and can be clearly assessed.

All WSPs need to have clearer strategies. Currently all strategies link with WSP rules but do not provide adequate direction for WSP rules. The strategies outline the WSP structure only and do not clearly align with the objectives. As stated above the alignment between strategies and objectives would benefit from review.

The assessment found that the performance indicators specified were often not targeted enough to enable a measurement of success. In many cases, the WSP specified the same set of indicators to measure success for a number of objectives. This clearly indicated the objectives overlapped, making assessment difficult. During the evaluation, some additional performance indicators or measurements were identified and used to inform the process, these should be considered when setting performance indicators for new or reviewed WSPs.

The scale of the WSPs was found to be satisfactory as they cover the full extent of alluvial areas within the WSP areas. However, while the WSPs recognise that Groundwater–dependent Ecosystems (GDEs) may occur in the WSP areas, and provide setback distances to these GDEs, rivers, creeks and significant wetlands, overall the WSPs do not adequately address interactions with surface water, with limited rules to address connection. Although the contribution of rivers to the groundwater storage is acknowledged through the calculation of the extraction limit, which addresses long–term impacts on connected systems.

These groundwater sources had been classified as high–risk due to the high level of entitlement, and generally usage, within the systems at plan commencement. A key feature of these WSPs was

a reduction pathway via which extractions would be brought back to sustainable levels over the life of the plans. Many entitlements were reduced at the commencement of these WSPs. Supplementary water access licences were made available to affected licence holders whose historical usage was greater than their new entitlement. Allocations for supplementary licences have been progressively reduced during the term of the WSPs, until fully extinguished at the conclusion of each plan's term. This gradual reduction was designed to allow a period of adjustment for affected licence holders. This was accompanied by a structural adjustment package, which provided financial support.

Future issues such as the impacts of climate change are not generally considered within the WSPs, with recharge estimates based on past rainfall and run off patterns. As a result, reductions in recharge due to expected reductions in rainfall may result in drawdown of water levels within the aquifers to levels which are no longer acceptable and unable to maintain the environmental values at the current extraction limits. It is however noted that some of the WSPs provide for revised recharge estimates and amendments to the recharge figures and extraction limits. Ensuring that WSPs are flexible to respond to climate change is an issue which will need to be considered as the WSPs are integrated into Water Resource Plans (WRPs) under the Basin Plan 2012.

The evaluation looked at the extent to which documentation is made available to the public. These WSPs originally had a Part A document that was publicly available during the initial exhibition of the plans that is no longer available on the DPIE website. Consideration should be given to making these documents available and to publication of status reports for each WSP. In the future such documentation and that associated with implementation and monitoring of the plans should also be made available.

The **recommendations** arising out of the appropriateness evaluation common to all six of the groundwater WSPs, include the need to consider:

1. adopt a program logic approach to establish and review plan objectives. The objectives and success criteria should be developed using the SMART principle.
2. review plan internal logic to ensure the vision, objectives, strategies and performance indicators are clearly structured, relate to each other, and apply to the plan rules
3. review plan objectives and scope to improve the recognition of connections to adjacent surface and groundwater sources.
4. consider including analysis of climate variability and change, as well as potential changes in industry base to assess implications for water availability, groundwater recharge and water demands
5. improve public availability of evidence sources supporting plan development, implementation and monitoring, in order to support plan implementation and communication to stakeholders and the water market

Efficiency

Overall the WSPs have been implemented efficiently, especially when considering the challenging context of the extreme Millennium Drought. However, there is room for improvement in all the WSPs, including some issues common to all plans (excluding the Lower Murrumbidgee – see Section 6.5).

Common issues identified in the efficiency evaluation include:

- Minor problems associated with access licences, water supply approvals and account management remain to be overcome. These minor issues have been identified during WSP audits, and processes are underway to resolve them.
- In most of the WSPs, no GDEs are identified. DPIE is working on a state–wide assessment of GDEs and provisions for WSPs to include any GDEs identified.

The **recommendations** arising out of the efficiency evaluation common across all plans include the need to consider:

1. Complete groundwater–dependent ecosystem identification across NSW and update plans and rules accordingly
2. Continue to resolve the issues identified in plan implementation audits.

Effectiveness – economic

The WSPs were developed with an understanding that extraction at the pre–WSP entitlement levels was unsustainable. As a result, the WSP rules established an extraction limit for the groundwater sources which reduced during the term of the plan. In addition, licences in place before the commencement of the WSPs were converted to Aquifer Access Licences under the Act with many having reduced entitlements compared to pre–WSP conditions.

It was recognised prior to WSP commencement that this reduction in entitlements, to achieve a sustainable level of extraction, would have an economic impact. The level of impact on an individual would depend on the scale of investment and the level of reduction. To minimise impact, the history of extraction was considered in determining how entitlements were reduced. To help licence holders adjust to reduced entitlements financial assistance and Supplementary Water Access Licences were made available to affected licence holders. Access to this supplementary entitlement was reduced during the term of the WSP via reduced available water determinations. This allowed licence holders time to adjust through trade or changes to business operations and risk management.

Significant funds (approximately $121 million in total across the six WSP areas) were made available in financial assistance to affected licence holders. The funding could be used to improve efficiency, change business practices, purchase more groundwater or develop alternative water supplies. It was at the licence holder's discretion how they used this financial assistance. Unfortunately, no direct data is available on the effect of this package.

The introduction of the Act and WSPs addressed numerous barriers to trade. When the WSPs commenced, *Water Act 1912* licences were converted to access licences and approvals under the Act, which resulted in:

- Licenses which were granted in perpetuity.
- A separation of the water title from the land title.
- Clearly specified saleable water entitlements, with defined accounting rules, priorities of access, and levels of reliability.
- An increased range of dealing options for transfer of water allocations and entitlements.

This contributes positively to economic outcomes through the increased ease with which clearly defined water products provides options for industry to manage the business risk associated with climatic variability and surface water availability, together with business opportunity associated with commodity markets. The increased potential to transfer water provides opportunities due to differential water availability between licence categories, including differentials between groundwater WSPs and their overlying surface water WSPs, and changing demand levels within a water year.

In addition, water licences can be used as loan security. In 2009 an irrigator survey showed that over 50% of all groundwater licence holders across the six major inland alluvial systems were using this option. This had decreased to about 21% by 2013, although the reasons for this decrease are not clear.

As discussed in appropriateness, a common theme across all WSPs was the difficulty in evaluating the success of the WSPs in contributing to economic objectives. This was partly due to poorly defined objectives and strategies, poor performance indicators and a lack of relevant monitoring

data. In addition, the economic data could not be used to differentiate the impact of the externalities discussed in Section 3.

Key drivers of annual changes in farm incomes include changing commodity prices, costs of farm inputs, and varying seasonal conditions and irrigation water availability (ABARES 2015). The WSPs have almost no effect on most of these, except for being one factor in irrigation water availability.

While it may be reasonably assumed that the WSPs contributed to economic benefits for regional communities, it is recommended that review of the WSPs consider clearer identification of SMART objectives and performance indicators, related to WSP rules.

Overall the economic effectiveness was difficult to assess. Some of the stated performance indicator measures could not be directly attributed to the introduction of the WSP or water management activities.

The **recommendations** arising out of the effectiveness evaluation for economic outcomes common across all plans, includes the need to consider:

1. Revise the economic objectives, related strategies and performance indicators using the program logic approach to allow evaluation of economic objectives.
2. Establish a fit for purpose monitoring, evaluation and reporting program based on the revised performance indicators.

Effectiveness – social/cultural

The WSPs and their implementation contributed to some social values and benefits. The WSPs provide for Basic Landholder Rights (BLR) for domestic and stock water purposes. All WSPs have provided full access to water for BLR, Domestic and Stock Access License holders, and town water supply requirements.

There is little information available on the social impacts of the WSPs on communities within the WSP areas, beyond anecdotal information.

No native title rights have been granted within the water sources and no licences have been issued for Aboriginal cultural purposes.

The WSPs have not provided cultural outcomes for Aboriginal communities. No licences have been activated for cultural purposes, and a gap remains in the WSPs in terms of their ability to influence Aboriginal social outcomes. At the time the WSPs were developed, the capacity of government to report outcomes for Aboriginal people in water management was extremely limited. However, the Indigenous community was represented on the Groundwater Management Committees used to develop the water sharing plans. Plan objectives, and strategies to achieve these objectives, should be developed for the provision of water for native title rights, and recognition of spiritual, social and customary values of water to Aboriginal people.

The **recommendations** arising out of the effectiveness evaluation for social/cultural outcomes common across all plans, includes the need to consider:

1. Revise the social and cultural objectives, related strategies and performance indicators using the program logic approach to allow evaluation of social and cultural objectives. This should include recognition of spiritual, social and customary values of water to Aboriginal people.
2. Consider developing appropriate performance indicators for values of groundwater for Aboriginal people.

Effectiveness – environmental

The major environmental outcome of the WSPs has been to reduce and/or stabilise the rate of drawdown of the water levels within these groundwater sources. This has occurred as a result of

reducing the level of licence entitlements in groundwater systems, while allowing a period of adjustment through the creation of the supplementary category of access licences, which had their allocations successively reduced by available water determinations over the life of the plans.

Across the six WSPs, groundwater extraction generally remained within the respective extraction limit compliance criteria during the term of the WSPs. These results show the water reserved for the environment by the WSP was protected during the WSP term and WSP rules were effective in managing extraction to extraction limits. The exceptions are the Lower Gwydir and the Upper Namoi Zones 2, 3 and 5, where small exceedances occurred in 2014–15.

There is limited information available to assess change in water quality for beneficial uses, however, no reductions have been reported.

At the time the WSPs commenced, little consolidated information was available on the location or importance of GDEs. High priority GDEs that had been identified were included in plans and additional GDEs could be included if identified during the plan term., DPIE continues to work to identify GDEs across NSW. Until this work is completed,, evaluation of groundwater WSP environmental effectiveness will be limited. In addition, the nature of the relationship between groundwater sources, surface water sources and GDEs will require quantification.

The **recommendations** arising out of the effectiveness evaluation for environmental outcomes common across all plans, includes the need to consider:

1. Completion of the GDE identification across the State and place identified GDEs in the relevant WSP schedules, as appropriate.
2. Publishing information on groundwater level trends, using modelled and recorded data.

Key findings for individual plans

This section lists the key specific findings from evaluation of each relevant WSP. These are additional to the general findings for all WSPs described above. The individual record cards which can be found in the appendices provide further detail on the reason for the finding, the supporting evidence and detailed recommendations, including the lower priority recommendations.

Lower Gwydir

The evaluation found that the Lower Gwydir groundwater WSP:

- Scale and scope are largely **appropriate** for intended purpose, but improvements could be made to strengthen the WSP internal program logic and address interactions with connected water sources.
- Has been implemented **efficiently** in general, with some detailed issues that can be followed up.
- Has been **effective** in achieving some of its objectives, although there is insufficient information to assess others.

Further detail of the Lower Gwydir Groundwater WSP evaluation is provided in Appendix 1 and 2.

Appropriateness

The appropriateness findings of the evaluation of the Lower Gwydir were the same as the general findings and recommendations presented in section 5.

Further detail of the Lower Gwydir Groundwater WSP appropriateness evaluation is provided in Table 2 of Appendix 1.

Efficiency

The efficiency findings of the evaluation of the Lower Gwydir were the same as the general findings and recommendations presented in section 5, with one exception.

Extraction for the 2014/2015 water year resulted in average extraction for the period 2012/13 to 2014/15 exceeding compliance with the extraction limit conditions.

It was assessed that an AWD reduction was not necessary to return subsequent extractions to the extraction limit based on the small exceedance and the reduced amount of account water available for the 2015/2016 water year.

It is recommended that future usage in the Lower Gwydir groundwater source continues to be monitored to ensure compliance with the extraction limit.

Further detail of the Lower Gwydir Groundwater WSP efficiency evaluation is provided in Table 3 of Appendix 1.

Effectiveness – economic

The economic effectiveness findings for the Lower Gwydir are the same as the general findings and recommendations in section 5.

Approximately 14,200 ML of supplementary water access entitlement was granted at WSP commencement. This was subsequently reduced to achieve sustainable extraction levels, during the term of the WSP. As discussed in section 5, it was recognised prior to the WSP commencement that a reduction in entitlements would result in economic impact. To minimise the impact approximately $16 million was made available in financial assistance to affected licence holders to facilitate adjustment to this reduction.

Further detail of the Lower Gwydir Groundwater WSP effectiveness – economic evaluation is provided in Table 4 of Appendix 1.

Effectiveness – social/cultural

The effectiveness – social/cultural findings of the evaluation of the Lower Gwydir were the same as the general findings and recommendations presented in section 5.

Further detail of the Lower Gwydir Groundwater WSP effectiveness – social/cultural evaluation is provided in Table 4 of Appendix 1.

Effectiveness – environmental

The environmental effectiveness findings for the Lower Gwydir were the same as the general findings and recommendations presented in section 5. A brief exceedance of the extraction limit in the 2014/15 water year is discussed above in the efficiency evaluation.

Following community meetings in 2008 about groundwater status, trading was restricted in an area between Moree and Ashely that showed long–term water level decline and significant drawdowns. These restrictions took effect from 21 August 2008 and were implemented to limit further impacts from additional water being traded into these areas of greater impact. Trading restrictions have not been removed.

Further detail of the Lower Gwydir Groundwater WSP effectiveness – environmental evaluation is provided in Table 4 of Appendix 1.

Upper and Lower Namoi

The evaluation found that the Upper and Lower Namoi groundwater WSP:

- Is **appropriate** for its intended purpose, but improvements could be made to strengthen the internal program logic and address interactions with connected water sources.
- Has been implemented **efficiently** in general, with some detailed issues that can be followed up.
- Has been **effective** in achieving some of its objectives, although there is insufficient information to assess others.

Further detail of the Upper and Lower Namoi Groundwater WSP evaluation is provided in Appendix 3 and 4.

Appropriateness

The appropriateness findings of the evaluation of the Upper and Lower Namoi were the same as the general findings and recommendations presented in section 5.

Further detail of the Upper and Lower Namoi Groundwater WSP appropriateness evaluation is provided in Table 6 of Appendix 3.

Efficiency

The efficiency findings of the evaluation of the Upper and Lower Namoi were the same as the general findings and recommendations presented in section 5.

Extraction for the 2014/2015 water year resulted in average extraction for the period 2012/13 to 2014/15 exceeding compliance with the extraction limit conditions in the following groundwater source: Upper Namoi Zone 2, Upper Namoi Zone 3 and Upper Namoi Zone 5.

It was assessed that an AWD reduction was not necessary to return subsequent extractions to the extraction limit based on the small exceedance and the reduced amount of account water available for the 2015/2016 water year. It is recommended that current and future usage in the groundwater source be closely monitored for future compliance.

Further detail of the Upper and Lower Namoi Groundwater WSP efficiency evaluation is provided in Table 7 of Appendix 3.

Effectiveness – economic

The economic effectiveness findings for the Upper and Lower Namoi are the same as the general findings and recommendations in section 5.

Approximately 59,094 ML of supplementary water access entitlement was granted at WSP commencement in all groundwater sources (except Upper Namoi Zone 6, Upper Namoi Zone 9 and Upper Namoi Zone 10) and access to this entitlement was reduced during the term of the WSP using reduced available water determinations.

As discussed in section 5, it was recognised prior to the WSP commencement that a reduction in entitlements to achieve sustainable extraction levels, would result in economic impact. To minimise the impact approximately $75 million was made available in financial assistance to affected licence holders in all affected groundwater sources.

Further detail of the Upper and Lower Namoi Groundwater WSP effectiveness – economic evaluation is provided in Table 8 of Appendix 3.

Effectiveness – social/cultural

The effectiveness – social/cultural findings of the evaluation of the Upper and Lower Namoi were the same as the general findings and recommendations presented in section 5.

Further detail of the Upper and Lower Namoi Groundwater WSP effectiveness – social / cultural evaluation is provided in Table 8 of Appendix 3.

Effectiveness – environmental

The environmental effectiveness findings for the Upper and Lower Namoi were the same as the general findings and recommendations presented in section 5.

There was no change in beneficial use category during 2009–11, although there was some decline recorded for some water quality parameters at a limited number of sites.

Following community meetings in 2008 about groundwater status in the Lower Namoi, trading was restricted in areas showing long–term water level decline and significant drawdowns. These restrictions took effect from 10 November 2008 and were implemented to limit further impacts from additional water being traded into these areas of greater impact. Trading restrictions have not been removed.

Further detail of the Upper and Lower Namoi Groundwater WSP effectiveness – environment evaluation is provided in Table 8 of Appendix 3.

Lower Macquarie

The evaluation found that the Lower Macquarie groundwater WSP:

- Is **appropriate** for its intended purpose, but improvements could be made to strengthen the internal program logic and address interactions with connected water sources.
- Has been implemented **efficiently** in general, with some detailed issues that can be followed up.
- Has been **effective** in achieving some of its objectives, although there is insufficient information to assess others.

Further detail of the Lower Macquarie Groundwater WSP evaluation is provided in Appendix 5 and 6.

Appropriateness

The appropriateness findings of the evaluation of the Lower Macquarie were the same as the general findings and recommendations presented in section 5.

Further detail of the Lower Macquarie Groundwater WSP appropriateness evaluation is provided in Table 10 of Appendix 5.

Efficiency

The efficiency findings of the evaluation of the Lower Macquarie were the same as the general findings and recommendations presented in section 5.

Further detail of the Lower Macquarie Groundwater WSP efficiency evaluation is provided in Table 11 of Appendix 5.

Effectiveness – economic

The economic effectiveness findings for the Lower Macquarie are the same as the general findings and recommendations in section 5.

To help licence holders adjust to reduced entitlements financial assistance and temporary Supplementary Water Access Licences were made available to affected licence holders in Zones 1, 3 and 4 groundwater sources.

Approximately 2,399 ML of supplementary water access entitlement was granted at WSP commencement, and access to this entitlement was reduced during the term of the plan via AWD reductions.

As discussed in section 5, it was recognised prior to the WSP commencement that a reduction in entitlements to achieve sustainable extraction levels, would result in economic impact. To minimise the impact approximately $11 million was made available in financial assistance to affected licence holders.

Further detail of the Lower Macquarie Groundwater WSP effectiveness – economic evaluation is provided in Table 11 of Appendix 5.

Effectiveness – social/cultural

The effectiveness – social/cultural findings of the evaluation of the Lower Macquarie were the same as the general findings and recommendations presented in section 5.

Further detail of the Lower Macquarie Groundwater WSP effectiveness – social/cultural evaluation is provided in Table 11 of Appendix 5.

Effectiveness – environmental

The environmental effectiveness findings for the Lower Macquarie were the same as the general findings and recommendations presented in section 5.

Alternate management strategies in Zone 4 groundwater source have halted the water level declines and worsening seasonal fluctuations. These alternate management strategies were introduced in 1998 prior to the commencement of the WSP and continued via conditions included on work approvals for production bores, to restrict extraction when triggers in the DPIE monitoring bores are reached.

Further detail of the Lower Macquarie Groundwater WSP effectiveness – environmental evaluation is provided in Table 11 of Appendix 5.

Lower Lachlan

The evaluation found that the Lower Lachlan groundwater WSP:

- Is **appropriate** for its intended purpose, but improvements could be made to strengthen the internal program logic and address interactions with connected water sources.
- Has been implemented **efficiently** in general, with some detailed issues that can be followed up.
- Has been **effective** in achieving some of its objectives, although there is insufficient information to assess others.

Further detail of the Lower Lachlan Groundwater WSP evaluation is provided in Appendix 7 and 8.

Appropriateness

The appropriateness findings of the evaluation of the Lower Lachlan were the same as the general findings and recommendations presented in section 5.

Further detail of the Lower Lachlan Groundwater WSP appropriateness evaluation is provided in Table 14 of Appendix 7.

Efficiency

The efficiency findings of the evaluation of the Lower Lachlan were the same as the general findings and recommendations presented in section 5.

Further detail of the Lower Lachlan Groundwater WSP efficiency evaluation is provided in Table 15 of Appendix 7.

Effectiveness – economic

The economic effectiveness findings for the Lower Lachlan are the same as the general findings and recommendations in section 5.

Approximately 21,252 shares of supplementary water access entitlement were granted at WSP commencement, and access to this entitlement was reduced during the term of the plan via AWD reductions. This allowed licence holders time to adjust through trade or changes to business operations and risk management.

As discussed in section 5, it was recognised prior to the WSP commencement that a reduction in entitlements to achieve sustainable extraction levels, would result in economic impact. To minimise the impact approximately $3.5 million was made available in financial assistance to affected licence holders.

Further detail of the Lower Lachlan Groundwater WSP effectiveness –economic evaluation is provided in Table 16 of Appendix 7.

Effectiveness – social/cultural

The effectiveness – social/cultural findings of the evaluation of the Lower Lachlan were the same as the general findings and recommendations presented in section 5.

Further detail of the Lower Lachlan Groundwater WSP effectiveness –social/cultural evaluation is provided in Table 16 of Appendix 7.

Effectiveness – environmental

The environmental effectiveness findings for the Lower Lachlan were the same as the general findings and recommendations presented in section 5.

Further detail of the Lower Lachlan Groundwater WSP effectiveness –environmental evaluation is provided in Table 16 of Appendix 7.

Lower Murrumbidgee

The evaluation found that the Lower Murrumbidgee groundwater WSP:

- Is **appropriate** for its intended purpose, but improvements could be made to strengthen the internal program logic and address interactions with connected water sources.
- Has **been** implemented **efficiently** in general, with some detailed issues that can be followed up.

- Has **been effective** in achieving some of its objectives, although there is insufficient information to assess others.

Further detail of the Lower Murrumbidgee Groundwater WSP evaluation is provided in Appendix 9 and 10.

Appropriateness

The appropriateness findings of the evaluation of the Lower Murrumbidgee were the same as the general findings and recommendations presented in section 5.

Further detail of the Lower Murrumbidgee Groundwater WSP appropriateness evaluation is provided in Table 18 of Appendix 9.

Efficiency

The Lower Murrumbidgee identifies the “prior streams” as GDEs. Implementation of rules around the placement of bores close to “prior streams” has been complicated by mapping availability. Although all production bores accessing the deep groundwater source have conditions restricting access to overlying aquifers, with flow on protection to “prior streams’, bores used for BLR do not have these requirements. Similarly, all bores in the shallow aquifer do not have these conditions.

It is recommended considering reassessing the inclusion of “prior streams” in Schedule 4 of the WSP due to unavailability of mapping.

The remaining efficiency evaluation findings of the Lower Murrumbidgee were the same as the general findings and recommendations presented in section 5.

Further detail of the Lower Murrumbidgee Groundwater WSP efficiency evaluation is provided in Table 17 of Appendix 9.

Effectiveness – economic

The economic effectiveness findings for the Lower Murrumbidgee are the same as the general findings and recommendations in section 5.

To help licence holders adjust to reduced entitlements and to minimise the economic impact; financial assistance and temporary Supplementary Water Access Licences were made available to affected licence holders in the deep groundwater source.

Approximately 39,800 ML of supplementary water access entitlement was granted at WSP commencement and access to this entitlement was reduced during the term of the plan via AWD reductions.

Approximately $6 million was made available in financial assistance to affected licence holders.

Further detail of the Lower Murrumbidgee Groundwater WSP effectiveness – economic evaluation is provided in Table 18 of Appendix 9.

Effectiveness – social/cultural

The effectiveness – social/cultural findings of the evaluation of the Lower Murrumbidgee were the same as the general findings and recommendations presented in section 5.

Further detail of the Lower Murrumbidgee Groundwater WSP effectiveness – social/cultural evaluation is provided in Table 18 of Appendix 9.

Effectiveness – environmental

The environmental effectiveness findings for the Lower Murrumbidgee were the same as the general findings and recommendations presented in section 5.

Two local management areas were formally gazetted in August 2007 and restrictions on dealings (or trades) put in place for these areas to manage the increasing drawdowns. These restrictions remain in place and have halted the worsening seasonal fluctuations (drawdowns).

Further detail of the Lower Murrumbidgee Groundwater WSP effectiveness – environmental evaluation is provided in Table 18 of Appendix 9.

Lower Murray

The evaluation found that the Lower Murray groundwater WSP:

- Is **appropriate** for its intended purpose, but improvements could be made to strengthen the internal program logic and address interactions with connected water sources.
- Has been implemented **efficiently** in general, with some detailed issues that can be followed up.
- Has been **effective** to some degree in achieving some of its objectives, although there is insufficient information to assess others.

Further detail of the Lower Murray Groundwater WSP evaluation is provided in Appendix 11 and 12.

Appropriateness

The appropriateness findings of the evaluation of the Lower Murray were the same as the general findings and recommendations presented in section 5.

Further detail of the Lower Murray Groundwater WSP appropriateness evaluation is provided in Table 22 of Appendix 11.

Efficiency

The efficiency findings of the evaluation of the Lower Murray were the same as the general findings and recommendations presented in section 5.

Further detail of the Lower Murray Groundwater WSP efficiency evaluation is provided in Table 23 of Appendix 11.

Effectiveness – economic

The economic effectiveness findings for the Lower Murray are the same as the general findings and recommendations in section 5.

To help licence holders adjust to reduced entitlements and to minimise the economic impact; financial assistance and Supplementary Water Access Licences were made available to affected licence holders. Approximately 48,480 ML of supplementary water access entitlement was granted at WSP commencement and access to this entitlement was reduced during the term of the plan via available water determinations.

Approximately $3.6 million was made available in financial assistance to affected licence holders.

Further detail of the Lower Murray Groundwater WSP effectiveness – economic evaluation is provided in Table 23 of Appendix 11.

Effectiveness – social/cultural

The effectiveness – social/cultural findings of the evaluation of the Lower Murray were the same as the general findings and recommendations presented in section 5.

Further detail of the Lower Murray Groundwater WSP effectiveness – social/cultural evaluation is provided in Table 23 of Appendix 11.

Effectiveness – environmental

The environmental effectiveness findings for the Lower Murray were the same as the general findings and recommendations presented in section 5.

Further detail of the Lower Murray Groundwater WSP effectiveness – environmental evaluation is provided in Table 23 of Appendix 11.

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Appendix 1: Lower Gwydir – evaluation report cards and performance indicator summary

Table 2: Lower Gwydir Groundwater WSP Appropriateness Evaluation Report Card

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
Plan scale	Is the scale of the Plan appropriate for water management?	Extent to which scale is appropriate for water sharing management	**The geographic scale of the water source in the Plan is considered appropriate for water sharing management**.			
Plan scope	Is the scope of the Plan appropriate for water management?	Extent to which interactions with other water sources are addressed appropriately within the Plan or other water sharing plans	**The Plan does not adequately recognise the interactions with other groundwater or surface water sources (**other than the provision of setback distances to rivers and creeks).		Consider reviewing the WSP scope to achieve greater recognition of surface water and aquifer interactions with other identified connected water sources.	High
Prioritisation	Is the level of management required under the Plan appropriate for the risk to environmental, economic, or social and cultural values?	Extent of risk to groundwater–dependent ecosystems, economic, and social and cultural values	**The prioritisation of the Plan as high risk is considered appropriate.** The level of management applied is considered appropriate based on high levels of pre plan groundwater allocation.			
		Extent to which risk is addressed	**The Plan provides for extraction to be limited to the long–term average extraction limit.**			

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
			The plan sets rules for compliance against the extraction limit that includes reducing the AWD in a groundwater source if assessed necessary to bring average usage back to the extraction limit.			
		Extent to which risk is addressed	**Plan rules allow local impact areas to be declared in critical areas.** The Act also allows for temporary water restrictions to be imposed via section 324 orders.		Consider reviewing the use of plan based local impact area rules and the use of 324 Orders under the Act to minimise confusion and improve transparency.	High
		Identified future risks, including climate change, interception, change in industry base, etc.	**Climate change is not adequately addressed in the Plan as the extraction limit is based on historic climate rather than expected future climate predictions. The plan does provide for revised recharge estimates and amendments to the recharge figures and extraction limits.**		Consider reviewing extraction limits due to long–term climatic changes. Consider greater interaction between surface and groundwater plans.	High
Internal logic	Is the vision appropriate for water management?	Whether the vision reflects what is intended for water sharing plans in the Act	**The vision is considered appropriate** as it is consistent with the Act's intent for water sharing plans to achieve economic, social and environmental outcomes.			

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
	Are the objectives suitable for water management?	Whether the objectives align with the vision	**The objectives align with the plan vision.** Although one objective '(b) manage and share the groundwater resources of the Gwydir Valley in a sustainable and equitable manner, while minimising negative local and regional impacts" is more a vision statement.		Review objectives against the vision.	Medium
		Whether the objectives align with the principles and objects of the Act	**The objectives mostly align with the principles and objects of the Act.** Although one objective '(b) manage and share the groundwater resources of the Gwydir Valley in a sustainable and equitable manner, while minimising negative local and regional impacts" is more a vision statement and relates to all three outcomes.		Review objectives against the principles and objects of the Act.	Medium
		Extent to which the objectives are clear and comprehensive enough to reflect what the Plan intended to achieve	**The objectives do not represent a full list of the Plan's intended outcomes**. The objectives are mostly a mixture of broad and targeted objectives and do not clearly link		Consider whether additional objectives should be developed to allow an effective evaluation of the Plan. Both clear broad and targeted objectives	High

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
			together. One objective relates to a combination of economic, social and environmental outcomes and is more a vision statement.		should be established to achieve specific economic, social and environmental outcomes.	
		Extent to which the plan logic establishes SMART (Specific,Measurable,Attainable, Realistic, Time–bound) objectives	**The plan logic fails to set objectives which can be evaluated using SMART criteria.**		Consider whether plan logic should be reconsidered to improve measurement of success.	High
	Are the strategies suitable for water management?	Whether all plan rules are linked to a strategy	**All plan rules can be linked to a strategy.**		Consider whether more appropriate strategies should be developed. Current strategies relate to plan structure only and do not adequately show how the objectives will be achieved. This is important as the Act requires performance indicators to be used to assess plan strategies.	High
		Whether the strategies provide clear direction for the plan rules	**Strategies could be more specific** to guide the intent of the plan rules and to highlight the links with their intended outcomes.			
		Whether the strategies align with the objectives	**Not all strategies align with the objectives.** Most strategies point to the establishment of rule sets, but not to the intent or outcome of the rule sets.			
	Are the performance indicators suitable for	Whether the performance indicators align with the objectives and strategies	**Most performance indicators align to the objectives.** However, in some cases performance indicators specified for an objective do not reflect the		Review alignment and relevance of performance indicators and measures against	High

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
	water management?		objective and in other cases additional performance indicators are required, for example in relation to GDEs.		each objective and strategy.	
		Extent to which performance indicators are clear and comprehensive enough to measure what the Plan intended to achieve	**Most performance indicators are clear.** Additional measures are available for many performance indicators and have been included in this evaluation where possible.		Ensure any further performance indicators which are developed are clear and comprehensive.	Medium
Quality of supporting documentation	Is documentation explaining the decisions underpinning the Plan available?	Adequacy of documentation supporting the Plan	**The Plan has a comprehensive "Part A" document supporting plan development available internally.** A range of documents are available that support plan implementation.			
		Extent to which documentation is made available to the public	**The "Part A" document was publicly available during the plan's initial exhibition period but is no longer publicly available.** Status and summary reports are available on the DPIE website.		Consider making the "Part A" document available on the website.	Low
Communication	Is the process for communication	Extent of communication and	**Extensive consultation was carried out during plan development**, with the Lower			

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
	with stakeholders adequate?	processes supporting plan development	Gwydir Groundwater Management Committee meeting to explore issues and develop management strategies. The Plan was placed on public exhibition.			
		Communication arrangements in place during plan operation	**Communication on operational matters has been appropriate, based on the management decisions being made.** During drought periods, frequent discussions were held with water users. When conditions were good, communication has been on an as needs basis. Status and summary reports are available on the DPIE website.			
		Arrangements for consideration at term review of Plan	**Sufficient opportunity will be provided for communication during the water resource plan development process**. Consultation will involve opportunities to make submissions, and face to face meetings will be held with stakeholders.			
Alignment with state priorities for natural resource management plans (S43A)	Is the Plan aligned with state priorities for natural	Extent of alignment of Plan with state priorities	**While the State priorities align clearly with the vision of the Plan. The alignment between the**		Consider reviewing the alignment of Plan objectives with state priorities for natural resource management	High

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
	resource management?		**other internal logic elements could be clearer.** The 2016 NRC review of this Plan identified three key State Priorities for Water Sharing Plans: • Productive and resilient water–dependant industries, • Secure long–term water supplies for urban and rural communities, and • Healthy and reesilient water–dependant ecosystems. Note: the Plan was in place prior to the development of the state priorities for natural resource management and so full alignment is not expected.		during the development of the Water Resource Plan (WRP).	

Table 2: Lower Gwydir Groundwater WSP Efficiency evaluation Report Card

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
Basis for water sharing	Recharge	Were any changes made to annual average recharge estimates after 30 June 2010?	**No changes to average annual recharge estimates were made.** A model review has been undertaken, but not to change recharge estimates.		Consider results of any new or updated groundwater models at term review.	Medium
Environmental water provisions	Planned environmental water	Was all water contained in the storage component of these water sources reserved for the environment?	**The water reserved each year for the environment was in acordance with the planned environmental water requirements and account management provisions.**			
		Was supplementary access to the storage component phased out to ensure all water in the storage was reserved for the environment?	**Supplementary water acccess was reduced annually so that it was phased out by the end of the plan term in accordance with the Plan rules.**			
		Was all the water above the long–term average extraction limit reserved for the environment?	**Extraction limits were not complied with in all years.** **The 3 year average usage eceeded the compliance with the extraction limit trigger in 2014/2015.** **Over the period (2006/07 to 2014/15) 91% of the plans extraction limt was used.** At the time of this evaluation DPI water is currently reviewing the method for assessing compliance with the extraction limit.		Continue to monitor future usage in the groundwater source to ensure compliance with the extraction limit.	High

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		Were the extraction limits amended based on further recharge models and studies?	**No changes to extraction limits based on further average annual recharge estimates was made.**			
	Adaptive environmental water	Is there a process for licences to be committed for adaptive environmental purposes?	**All necessary systems are in place to apply and manage conditions should they be requested.** *Note: No licences have been committed as AEW in the plan area.*			
Basic landholder rights	Domestic and stock	Are domestic and stock BLR provided for within the Plan?	**Domestic and stock BLR access is provided for in the Plan**.			
		Is domestic and stock BLR growth provided for within the Plan?	**Procedures are in place to allow for growth in domestic and stock BLR whilst maintaining extraction limit compliance.**			
		Have interference management strategies been required?	**No interference management strategies have been required in this plan area.** A small number of complaints by groundwater users in the plan area were received about changes in reliability of water. These were investigated by DPIE; it was assessed that changes in reliability to be due to the prevailing climate and limited bore depth issues. One case of interference was identified in the plan area and resolved by permitting a replacement bore.			
		Are domestic and stock BLR consistent with reasonable use guidelines?	**Reasonable use guidelines (made under s.52 of the Act and provided for in the Plan) have not been made by the Minister.**		Endeavour to finalise and publish the reasonable use	High

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
					guidelines as a matter of priority.	
	Native title	Are native title BLR provided for within the Plan?	**Procedures are in place to provide access if native title rights for water are granted in the water source covered by this Plan.** *Note: No native title rights for water have been established in this plan area.*			
		Is growth in native title BLR protected within the Plan?	**Procedures are in place to allow for growth in native title BLR whilst maintaining extraction limit compliance.**			
Requirements for water for extraction under access licences	Conversion of access licences from *Water Act 1912* to *Water Management Act 2000*	Were licences established with share components calculated according to plan rules?	**All licences were established with share components calculated in line with Plan specifications**.			
	Changes to share components	Were the share components for supplementary licences reduced to 0 on 1st July 2015?	**Yes – share components were reduced to 0 and relevant licences have now been cancelled.**			
Rules for granting access licences	Granting new access licences	Were plan rules followed for the granting of access licences?	**All access licences granted were in line with the plan provisions.** The Water Management (General) Regulations 2004 and 2011 set out the specific purpose access licences for which applications can be accepted in line with the Plan. Amendments were made to allow new domestic and stock access licences to be approved up to a			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			total of 200ML/year to support the implementation of the Gingham Pipeline. This is a water saving and efficiency scheme funded through the NSW Wetlands Recovery Program.			
Limits to the availability of water	Extraction limits	Was an extraction limit established?	**An extraction limit was established for the water source.**			
	Variation of extraction limits	Were extraction limits varied?	**No changes to extraction limits have been required.**			
	Extraction Limit compliance	Were rules regarding compliance with the extraction limit implemented?	**The 3 year average usage eceeded the compliance with the extraction limit trigger in 2014/2015.** **A decision was made to not reduce entitlement in the following water year in accordance with discretion provided by the Plan.**		Review the appropriateness of the Plan rules for assessing compliance with the extraction limit. Note, this review is currently underway through the water resource planning process	
	AWDs	Were the rules for the making of AWDs for domestic and stock and local water utility aquifer access licences implemented?	All AWDs were announced in accordance with the requirements of the plan.			
		Were the rules for the making of AWDs for aquifer access licences implemented?	**All AWDs were announced when required in accordance with the plan rules.** The 3 year average usage eceeded the compliance with the extraction limit trigger in 2014/2015. A decision was made to not reduce entitlement in the following water		Review the appropriateness of the Plan rules for assessing compliance with the extraction limit. Note, this review is currently underway through the water	

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			year in accordance with discretion provided by the Plan.		resource planning process.	
		Were the rules for the making of AWDs for supplementary water aquifer access licences implemented?	**All AWDs were announced when required in accordance with the plan rules and had the correct annual reductions applied.**			
Rules for managing access licences	Water allocation and account management	Were water allocation accounts established?	**Water allocation accounts were established for all licence holders.**			
		Were water allocations accrued annually?	**All accounts were credited annually following available water determinations.**			
		Was water extraction accounted for at least annually?	**All accounts were debited and credited in line with plan provisions.** Note: A small number of individual accounts fell below zero.		Review account management practices to ensure all functions are undertaken in line with plan provisions.	Medium
	Management of local impacts	Were local impact areas established?	**No local impact areas have been required to be established.** Upon review of the groundwater status in 2008, trading was restricted in an area between Moree and Ashley due to long–term groundwater level decline and significant drawdown. These restrictions were implemented to limit further impacts from additional water being traded into these areas of greater impact. Trading restrictions have not been removed to date. *Note: Amendments to the Act in 2009 provided an alternative*		Review the local impact management mechanisms available in the Plan and in the Act to ensure consistency and transparency.	High

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			procedure for dealing with short term localised impacts.			
		Was extraction interference between neighbouring bores managed?	**Most approvals for new and replacement bores have been issued in line with the rules for minimum distance between neighbouring bores.** **The WSP allows exceptions to minimum distances in specific circumstances. These exceptions have been utilised during the WSP term.** *Note: Distance requirements are included as a condition on new and replacement bore works approvals. Licence holders and licensed drillers are required to comply with these conditions.* *In some cases new or replacement works were within specified distances, however, in each case a DPIE hydrogeologist assessed the impacts, as allowed for under the Plan and recommended additional conditions where appropriate.*		Continue to ensure work approvals for non BLR bores within minimum distances are conditioned appropriately.	Medium
		Were water levels monitored and managed if required?	**Water levels have been monitored during the plan term.** Upon review of the groundwater status in 2008, trading was restricted in an area between Moree and Ashley due to long–term groundwater level decline and significant drawdown. These restrictions were implemented to limit further impacts from additional water being traded into these areas		Continue to monitor and where necessary manage groundwater level impacts of extraction.	

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			of greater impact. Trading restrictions have not been removed to date. *Note: Amendments to the Act in 2009 provided an alternative procedure for dealing with short term localised impacts.*			
		Was water quality monitored and managed if required?	**Some water quality monitoring has been undertaken**. There is currently no water source scale groundwater quality monitoring program. **No impact areas for water quality management have been required**.		Consider options for further water quality monitoring to improve water quality management outcomes.	Medium
		Were groundwater–dependent ecosystems (GDEs) protected?	**No scheduled GDEs are listed.** Setback rules for new bores with respect to GDEs could not be implemented because there were no GDEs in the Schedule. **No additional GDEs were identified and included in the relevant schedule during the plan term.**		Ensure the addition of relevant GDEs to the relevant WSP schedule if/when they are identified.	High
		Were rivers and creeks protected?	**Rivers and creeks were protected through the application of setback distances for new bores.** Setback distances in some instances may not have been applied to the work approval. Setback rules are applied to new bores during the work approval assessment process. Full implementation of setback clauses		Ensure accurate bore location information is provided to ensure setback distance rules are applied correctly. Consider options to ensure compliance with bore construction conditions.	Medium Medium

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			may be influenced by the accuracy of bore location information provided. The Plan sets out additional bore construction requirements which must be complied with when bores are permitted within stream set back distances. It is possible that construction conditions have not been complied with as post construction inspections have not been undertaken. *Note: These rules are established in the GDE protection clause of the Plan.*			
		Was aquifer integrity protected?	**Aquifer integrity was protected.** This assessment is based on groundwater level monitoring (including the stabilisation and/or recovery of groundwater levels). There is currently no information available regarding land subsidence or reduction in bore yields. **No local impact areas for aquifer integrity management have been required.**		Continue groundwater level monitoring and investigate if reports of subsidence, aquifer compaction or reduced bore yield are received.	Medium
		Were extraction restrictions required?	**No local impact areas have been required to be established.** **These provisions have not been required.**		Review the local impact management mechanisms available in the Plan and in the Act to ensure consistency and transparency.	High

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		Was group registration required?	**No local impact areas have been required to be established. These provisions have not been required.**			
		Were there any failures of monitoring bores that are relied on to manage local impact restrictions?	**No local impact areas have been required to be established. These provisions have not been required.**			
Dealings	Minister's dealing principles	Were dealings in line with the Minister's dealing principles, the Act and the WSP?	**All dealings have been made in line with Minister's dealing principles**. *Note: Prohibited dealings in this plan area include change of water source, water allocation assignment between water sources, conversions of access licence categories and interstate (transfer and assignment of allocation).*			
	Constraints within water source	Were dealings in line with rules relating to constraints within the water source?	**All dealings were undertaken in line with plan rules relating to constraints within the water source**. *Note: Also refer to 'Were water levels monitored and managed if required?' for additional information on local management area and dealing constraints.*			
Mandatory conditions	Access licence conditions	Were mandatory conditions for access licences placed on licences?	**Mandatory conditions have been applied to access licences.** DPIE undertook a conditions reform project and developed guidelines for drafting conditions. As water sharing plans are remade DPIE is progressively reviewing conditions and, where relevant will apply conditions with improved wording		Endeavour to ensure all conditions meet DPIE's new SMART conditions criteria in the next planning cycle.	Medium

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			and confirm appropriate application of the conditions.			
	Water supply works approvals	Were mandatory conditions for works approvals placed on the works approvals?	**Mandatory conditions have been applied to work approvals.** DPIE undertook a conditions reform project and developed guidelines for drafting conditions. As water sharing plans are remade DPIE is progressively reviewing conditions and, where relevant will apply conditions with improved wording and confirm appropriate application of the conditions.		Endeavour to ensure all conditions meet DPIE's new SMART conditions criteria in the next planning cycle.	Medium
Plan Amendments	Annual average recharge	Were any amendments to annual average recharge made?	**No amendments to the average annual recharge have been made**.			
	Planned environmental water	Were any amendments made to planned environmental water?	**There have been no amendments to planned environmental water**.			
	Extraction Limit	Were any amendments made to the extraction limit?	**The Plan was amended following gazettal but prior to commencement to include BLR in the extraction limit calculations. There have been no further amendments.**			
	High priority GDEs	Was it necessary to amend GDE schedules in plans?	**There have been no amendments to the relevant schedule to include additional GDEs**		See recommendations under 'Were GDEs protected?'	
	Planned environmental water (Water	Were any amendments made to planned environmental water as	**No changes allowed for in the Plan have been made to environmental water provisions.**			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
	recovery programs)	a result of water recovery programs?				
	Amendments made under s.45 of the Act but not identified in the Plan	Were any further amendments made to the Plan?	**Subsequent to the making of the Plan some drafting errors were identified and have been corrected by amendment.** **Amendments to the Plan have also been made resulting from the water efficiency projects including rules for granting access licences.** **The water allocation and account management rules have been amended.** **Amendments relating to distance rules for BLRs have also been made.**			

Table 3: Lower Gwydir Groundwater WSP Effectiveness Evaluation Report Card

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
Protect and maintain groundwater–dependent ecosystems (GDEs) by minimising the impacts of extraction	• Change in groundwater extraction relative to the extraction limits. • Change in climate adjusted groundwater levels. • Change in water levels adjacent to identified groundwater–dependent ecosystems/ • Extent of recognition of spiritual, social, and customary values of groundwater to Aboriginal people.	**There are no high priority dependent ecosystems listed in the relevant plan schedule.** The Plan allow for the inclusion of GDEs as they are identified. DPIE continues to work to identify GDEs across the state, more work is still required, and this remains a shortfall, preventing the measurement of the effectiveness of the WSP in contributing to environmental outcomes for GDEs. The Plan does not directly protect or maintain cultural or spiritual values other than providing mechanisms to access water for cultural purposes under Native Title rights and Aboriginal Cultural access licences. Long–term annual average extraction limits were established for all groundwater sources which provided benefits to the environment and potentially cultural and spiritual values by limiting extraction to environmentally sustainable levels. Over the period (2006/07 to 2014/15) 91% of the plans extraction limt was used.		Moderate	Review performance indicators for this objective. Complete GDE identification and place identified GDEs in the relevant WSP schedule as appropriate.	Medium

Manage and share the groundwater resources of the Gwydir Valley in a sustainable and equitable manner, while minimising negative local and regional impacts	• Change in groundwater extraction relative to the extraction limits. • Change in climate adjusted groundwater levels. • Change in groundwater quality • Change in economic benefits derived from groundwater extraction and use. • Change in structural integrity of the aquifer. • Extent to which local water utility requirements have been met. • Extent of recognition of spiritual, social, and customary values of groundwater to Aboriginal people.	**This WSP was developed with an understanding that the pre plan entitlement and extraction levels in the groundwater source were unsustainable. As a result, the plan rules established a long–term average extraction limit which reduced annually from year 4 of the plan in line with reductions in available water for supplementary access licences. It was recognised prior to plan commencement that achieving sustainability for the environment would result in significant economic impact.** **This impact was partially offset by a structural adjustment package, which provided approximately $16 million to licence holders and communities to allow for adjustment to the entitlement reductions.** **Throughout the plan period (2006/07 to 2014/15), water allocations were at 100% for all classes of water users, except for the supplementary class, which had available water determinations reduced annually in line with plan rules. There is no evidence that groundwater sharing has been inequitable.** Over the period (2006/07 to 2014/15) 91% of the plans extraction limt was used. There is limited available information to assess trends in water quality parameters during the evaluation		Moderate	

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
		period. There have been no reports of change in WQ. No subsidence has been reported. A few cases of BLR users with reduced assess were reported, these were assessed as a result of bore construction and drought conditions. Average usage (2006/07 – 2014/15) from LWU is approximately 2100 ML compared to 3572 ML of entitlement. No interference impacts have been reported by high yield or local water utility extractors and water levels are monitored across the groundwater source.				
Protect the structural integrity of the aquifer by ensuring extraction does not cause any aquifer compaction, aquitard compaction or land subsidence,	• Change in groundwater extraction relative to the extraction limits. • Change in climate adjusted groundwater levels. • Change in structural integrity of the aquifer. • Extent of recognition of spiritual, social, and customary values of groundwater to Aboriginal people.	Over the period (2006/07 to 2014/15) 91% of the plans extraction limt was used. The risk of compaction in the Lower Gwydir alluvium is low due to the nature of the system Critical areas have not been defined. However, no subsidence has been reported. A few cases of BLR users with reduced assess were reported, these were assessed as a result of bore construction and drought conditions.		Moderate		

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
Protect and maintain groundwater quality by ensuring extraction does not result in a change in the beneficial use of the aquifer,	• Change in groundwater extraction relative to the extraction limits. • Change in climate adjusted groundwater levels. • Change in groundwater quality • Extent of recognition of spiritual, social, and customary values of groundwater to Aboriginal people.	**The establishment of an environmentally sustainable long–term average annual extraction limit has reduced extraction overall and linked extraction to long–term recharge volumes. Long–term protection of storage volumes and a part of the recharge volume reduces the risk of a change in beneficial use of the aquifer.** Over the period (2006/07 to 2014/15) 91% of the plans extraction limt was used. There is limited information to assess frequency and duration of drawdowns. There has been no change in beneficial use reports. However, limited information is available to assess.		Poor	Consider options for further water quality monitoring to improve water quality management outcomes.	Medium

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
Provide opportunities for market–based trading of groundwater rights within the extraction limit and interference constraints	• Change in economic benefits derived from groundwater extraction and use. • Extent to which local water utility requirements have been met.	**The introduction of fully tradeable groundwater access licences with a wide range of allowed dealings has resulted in greater account management and trading flexibility. This has been a significant change to groundwater management.** **Throughout the plan period (2006/07 to 2014/15), water allocations were at 100% for all classes of water users, except for the supplementary class, which had available water determinations reduced annually in line with plan rules. There is no evidence that groundwater sharing has been inequitable.** Upon review of the groundwater status in 2008, trading was restricted in an area between Moree and Ashley due to long–term groundwater level decline and significant drawdown. These restrictions were implemented to limit further impacts from additional water being traded into these areas of greater impact. Trading restrictions have not been removed to date.				

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
Preserve basic landholder rights to this groundwater source	• Change in groundwater extraction relative to the extraction limits. • Change in climate adjusted groundwater levels. • Change in groundwater quality. • Extent to which local water utility requirements have been met. • Extent to which native title rights requirements have been met. • Extent of recognition of spiritual, social, and customary values of groundwater to Aboriginal people. *Additional performance indicator identified* • Extent to which domestic and stock rights requirements have been met.	**Basic landholder rights were provided at all times with full access to water during the plan term. Priorities of access were maintained as per the requirements of the Act.** A few cases of BLR users with reduced assess were reported, these were assessed as a result of bore construction and drought conditions.		Moderate		

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
Ensure there are no long–term declines in water levels by managing allocations and extractions within the extraction limit	• Change in groundwater extraction relative to the extraction limits. • Change in climate adjusted groundwater levels. • Change in water levels adjacent to identified groundwater–dependent ecosystems. • Extent to which local water utility requirements have been met. • Extent to which native title rights requirements have been met. • Extent of recognition of spiritual, social, and customary values of groundwater to Aboriginal people.	**This WSP was developed with an understanding that the pre plan entitlement and extraction levels in the groundwater source were unsustainable. As a result, the plan rules established a long–term average annual extraction limit which reduced annually from year 4 of the plan in line with reductions in available water for supplementary access licences.** **From 2006/07 to 2014/15, water allocations were at 100% for all classes of water users, except for the supplementary class, which had available water determinations reduced annually in line with plan rules.** Over the period (2006/07 to 2014/15) 91% of the plans extraction limt was used. Water levels are monitored across the groundwater source. However, the value of this information as an indicator of long–term decline is limited as drawdown is seasonal. It is suggested that more appropriate performance indicators should be developed to assess this objective. A few cases of BLR users with reduced assess were reported, these were assessed as a result of bore construction and drought conditions.		Moderate	Consider developing more appropriate performance indicators to assess this objective.	Medium

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
Protect and maintain cultural and heritage values through the management of this groundwater source.	• Change in groundwater quality. • Change in economic benefits derived from groundwater extraction and use. • Extent to which local water utility requirements have been met. • Extent of recognition of spiritual, social and customary values of groundwater to Aboriginal people • Extent to which native title rights requirements have been met.	**The Plan does not directly protect or maintain cultural heritage values other than providing mechanisms to access water for cultural purposes under Native Title rights and Aboriginal Cultural access licences.** No change in beneficial use has been reported however, there is limited available information to assess this. Average usage (2006/07 – 2014/15) from LWU is approximately 2100 ML compared to 3572 ML of entitlement. A few cases of BLR users with reduced assess were reported, these were assessed as a result of bore construction and drought conditions.		Poor	Consider reviewing the Plan internal logic to ensure there is a clear link between the Plan objectives, strategies and rules.	High

Table 4: Lower Gwydir Groundwater WSP Performance Indicator Results Summary

Performance Indicator	Related Plan Objectives	Results	Strength of Information
Change in groundwater extraction relative to the extraction limits.	Protect and maintain groundwater–dependent ecosystems by minimising the impacts of extraction Manage and share the groundwater resources of the Gwydir Valley in a sustainable and equitable manner, while minimising negative local and regional impacts Protect the structural integrity of the aquifer by ensuring extraction does not cause any aquifer compaction, aquitard compaction or land subsidence, Protect and maintain groundwater quality by ensuring extraction does not result in a change in the beneficial use of the aquifer, Preserve basic landholder rights to this groundwater source	Total entitlement was reduced under the water sharing plan to the long–term average extraction limit. Access to groundwater was progressively reduced over the ten–year life of the plan via supplementary licences which were cancelled at the end of the 2014/2015 water year. The 3 year average usage exceeded the compliance with the extraction limit trigger in 2014/2015. A decision was made not to reduce entitlement in the following year in these groundwater sources in accordance with discretion provided by the plan. Each year from 2006/07 to 2014/15 an AWD of 1 ML/unit share was announced in accordance with the requirements of the plan. Over the period (2006/07 to 2014/15) 91% of the plans extraction limt was used. An analysis of the groundwater levels is provided in the Gwydir Alluvium Water Resource Plan Resource Description report. This analysis shows some areas where the groundwater levels have declined over the plan period. This decline in groundwater level over time is not unexpected as the water sharing plan for the Lower Gwydir Alluvium allowed extraction to be in excess of the estimated average annual recharge to enable users to adjust to the reduction in entitlements that occurred at the beginning of the plan. These results show that during the plan term water was accessible for extractive uses up to the plan determined portion and that the water reserved by the plan for the environment was protected in most years. *References:* NSW Office of Water (2011) *Audit of implementation –Inland alluvial aquifer water sharing plan audit report cards – Prepared for the period between 1 October 2006 and 30 June 2010 covering Lower Murrumbidgee, Lower Murray, Lower Macquarie, Lower Gwydir, Upper and Lower Namoi.* NSW Office of Water, Sydney	Good

Performance Indicator	Related Plan Objectives	Results	Strength of Information
	Ensure there are no long–term declines in water levels by managing allocations and extractions within the extraction limit	Available at: http://www.water.nsw.gov.au/water–management/water–sharing/auditing–and–reporting NSW Office of Water (in prep) *Audit of implementation – Inland alluvial aquifer water sharing plan audit report cards – Prepared for the period 1 July 2010 to 30 June 2014 covering Lower Murrumbidgee, Lower Murray, Lower Macquarie, Lower Gwydir, Upper and Lower Namoi,* NSW Office of Water, Sydney The following references are available at: http://www.water.nsw.gov.au DPI Water (2017) *Gwydir Alluvial Water Resource Plan Resource Description*. DPI Water, Sydney. DPI Water (In prep) *Gwydir Alluvial Risk Assessment.* DPI Water, Sydney. DPI Water (2017) *Gwydir Alluvium Water Resource Plan (GW15),* Status and Issues Paper. DPI Water Sydney. Barrett, C (2009) *Lower Gwydir Groundwater Source; Groundwater Management Area 004 – Groundwater Resource Status – 2008.* NSW Department of Water and Energy, Sydney.	
Change in climate adjusted groundwater levels.	Protect and maintain groundwater–dependent ecosystems by minimising the impacts of extraction Manage and share the groundwater resources of the Gwydir Valley in a sustainable and equitable manner, while minimising negative local and regional impacts Protect the structural integrity of the aquifer by	Groundwater levels are monitored at 120 bores at 58 sites across the Lower Gwydir Alluvium. This monitoring network includes 18 bores equipped with data loggers that record water levels continuously. An analysis of the groundwater levels is provided in the Gwydir Alluvium Water Resource Plan Resource Description report. This analysis shows some areas where the groundwater levels have declined over the plan period. This decline in groundwater level over time is not unexpected as the water sharing plan for the Lower Gwydir Alluvium allowed extraction to be in excess of the estimated average annual recharge to enable users to adjust to the reduction in entitlements that occurred at the beginning of the plan.	Good

Performance Indicator	Related Plan Objectives	Results	Strength of Information
	ensuring extraction does not cause any aquifer compaction, aquitard compaction or land subsidence, Protect and maintain groundwater quality by ensuring extraction does not result in a change in the beneficial use of the aquifer, Preserve basic landholder rights to this groundwater source Ensure there are no long–term declines in water levels by managing allocations and extractions within the extraction limit	Access to groundwater has been progressively reduced over the ten–year life of the plan via supplementary licences which were cancelled at the end of the 2014/2015 water year. *References:* Barrett, C (2009) *Lower Gwydir Groundwater Source; Groundwater Management Area 004 – Groundwater Resource Status – 2008.* NSW Department of Water and Energy, Sydney. DPI Water (2017) *Gwydir Alluvial Water Resource Plan Resource Description*. DPI Water, Sydney. DPI Water (2017) *Gwydir Alluvium Water Resource Plan (GW15),* Status and Issues Paper. DPI Water Sydney.	
Change in water levels adjacent to identified groundwater–dependent ecosystems	Protect and maintain groundwater–dependent ecosystems by minimising the impacts of extraction Ensure there are no long–term declines in water levels by managing allocations and	The Plan does not identify any ecosystems dependent on the groundwater source and no GDEs have been scheduled during the plan term although an identification process has commenced. As a result, this performance indicator cannot be assessed. DPIE is conducting a State–wide project to identify GDEs, which is currently focussing on the northern Murray–Darling Basin.	N/A

Performance Indicator	Related Plan Objectives	Results	Strength of Information
	extractions within the extraction limit.		
Change in groundwater quality	Manage and share the groundwater resources of the Gwydir Valley in a sustainable and equitable manner, while minimising negative local and regional impacts Protect and maintain groundwater quality by ensuring extraction does not result in a change in the beneficial use of the aquifer, Preserve basic landholder rights to this groundwater source Protect and maintain cultural and heritage values through the management of this groundwater source.	Groundwater quality is naturally variable across the Lower Gwydir Alluvium. There have been no reports of change in beneficial use category. Across the Lower Gwydir Alluvium, salinity from groundwater samples from groundwater monitoring bores at the time of construction (up to 43 years ago) range from 200 µS/cm close to the rivers to >3,000 µS/cm in the far west and on the outer limits of the alluvium. From November 2009 and September 2010, the former NSW Office of Water undertook a groundwater quality and isotope sampling program across the Lower Gwydir Alluvium. The main findings of this study relating to salinity is that groundwater in the deeper aquifer system is fresh (1,500 µS/cm). *References:* DPI Water (2017) *Gwydir Alluvium Water Resource Plan (GW15),* Status and Issues Paper. DPI Water Sydney.	Moderate
Change in economic benefits derived from groundwater extraction and use.	Manage and share the groundwater resources of the Gwydir Valley in a sustainable and equitable manner, while minimising negative local and regional impacts	The introduction of fully tradeable groundwater access licences with a wide range of allowed dealings has resulted in greater account management and trading flexibility. This has been a significant change to groundwater management. There is limited information available to measure the change in economic benefits to groundwater users directly as a result of the water sharing plan.	Poor

Performance Indicator	Related Plan Objectives	Results	Strength of Information
	Provide opportunities for market–based trading of groundwater rights within the extraction limit and interference constraints Protect and maintain cultural and heritage values through the management of this groundwater source.	The facilitation of an active trading market in Lower Gwydir Groundwater source allows for a market–based demand solution to deliver the available water resource to the most productive and economical operations while protecting overall growth in usage with the long–term average annual extraction limit for each respective water source. Through the temporary trade market, 37,243 megalitres of water was transferred over the evaluation period for commercial purposes with a total consideration of $3,337,442. Additionally, 1,127 shares were permanently assigned for commercial consideration at a total value of $3,125,996. Note: these figures are representative of 71T and 71Q trades respectively. Transfer of licences under Section 71M of the Act were not included for the purpose of this report. *References:* Aither 2016, Water markets in New South Wales: market outcomes, trends and drivers, Aither Pty Ltd.	
Change in structural integrity of the aquifer.	Manage and share the groundwater resources of the Gwydir Valley in a sustainable and equitable manner, while minimising negative local and regional impacts Protect the structural integrity of the aquifer by ensuring extraction does not cause any aquifer compaction, aquitard compaction or land subsidence,	The risk of compaction in the Lower Gwydir alluvium is low due to the nature of the system (Gwydir Alluvial Risk Assessment, DPI Water, in prep). Upon review of the groundwater status in 2008, trading was restricted in an area between Moree and Ashley due to long–term groundwater level decline and significant drawdown. These restrictions were implemented to limit further impacts from additional water being traded into these areas of greater impact. Trading restrictions have not been removed to date. The risk to structural integrity was managed by the establishment of trade areas to restrict trade from areas of low pumping stress to areas of higher pumping stress. There have been no reports of subsidence or reduced bore yields indicating compromised structural integrity. *References:*	Moderate

Performance Indicator	Related Plan Objectives	Results	Strength of Information
		Barrett, C (2009) *Lower Gwydir Groundwater Source; Groundwater Management Area 004 – Groundwater Resource Status – 2008.* NSW Department of Water and Energy, Sydney. DPI Water (In prep) *Gwydir Alluvial Risk Assessment.* DPI Water, Sydney. DPI Water (2017) *Gwydir Alluvium Water Resource Plan (GW15),* Status and Issues Paper. DPI Water Sydney.	
Extent to which domestic and stock rights (BLR) requirements, domestic and stock access licence requirements and local water utility requirements have been met.	Preserve basic landholder rights to this groundwater source. Ensure there are no long–term declines in water levels by managing allocations and extractions within the extraction limit. Manage and share the groundwater resources of the Gwydir Valley in a sustainable and equitable manner, while minimising negative local and regional impacts. Provide opportunities for market–based trading of groundwater rights within the extraction limit and interference constraints. Protect and maintain cultural and heritage values through the	BLRs have not been restricted. One case of interference was identified in the plan area and resolved by permitting a replacement bore. A small number of complaints by groundwater users in the Plan area were received about changes in reliability of water. These were investigated by DPIE, who assessed changes in reliability to be due to the prevailing climate and limited bore depth issues. Full entitlement was available at all times for licenced domestic and stock use via annual available water determinations of 100%. No domestic and stock licences have been issued in this water source. Full entitlement was available at all times for local water utility use via annual available water determinations of 100%. There have been no verified reports of interference impacts on bores accessing water for local water utility use. *References* *DPIE, Water Register at: http://www.water.nsw.gov.au/water–licensing/registers*	Good

Performance Indicator	Related Plan Objectives	Results	Strength of Information
	management of this groundwater source.		
Extent to which native title rights requirements have been met, (and water has been made available and used for Aboriginal purposes)	Preserve basic landholder rights to this groundwater source. Ensure there are no long–term declines in water levels by managing allocations and extractions within the extraction limit. Protect and maintain cultural and heritage values through the management of this groundwater source.	No native title rights for water were established in the plan area prior to or during the plan term. Native title rights for water, where established under the Commonwealth Native Title Act 2003, are recognised, protected and prioritised by the plan under basic landholder rights provisions. No Aboriginal Cultural access licences have been issued in this plan area. Aboriginal cultural use of water is recognised by the plan. Licences for Aboriginal cultural use may be granted within specified limits. *References* *Native title determinations at:* http://www.nntt.gov.au/searchRegApps/Pages/default.aspx *DPIE, Water Register at:* http://www.water.nsw.gov.au/water–licensing/registers	Good
Extent of recognition of spiritual, social and customary values of groundwater to Aboriginal people	Protect and maintain groundwater–dependent ecosystems by minimising the impacts of extraction. Manage and share the groundwater resources of the Gwydir Valley in a sustainable and equitable manner, while minimising negative local and regional impacts. Protect the structural integrity of the aquifer by	Native title rights for water and Aboriginal cultural licences are addressed above. The plan does not directly address or manage the recognition of spiritual, social and customary values beyond providing mechanisms to access water for cultural purposes. Some groundwater plans provide protection to cultural heritage sites through bore set back distances and associated extraction limits DPIE will continue to work with Aboriginal communities to identify opportunities to better address the needs and aspirations of the Aboriginal communities in terms of equitable access to water for social, cultural, spiritual and economic use of water.	Poor

Performance Indicator	Related Plan Objectives	Results	Strength of Information
	ensuring extraction does not cause any aquifer compaction, aquitard compaction or land subsidence. Protect and maintain groundwater quality by ensuring extraction does not result in a change in the beneficial use of the aquifer. Preserve basic landholder rights to this groundwater source. Ensure there are no long–term declines in water levels by managing allocations and extractions within the extraction limit. Protect and maintain cultural and heritage values through the management of this groundwater source.		

Appendix 2: Lower Gwydir– internal logic relationship diagrams

Relationship diagrams show the internal Plan logic supporting the delivery of each of the Plan's outcomes. One diagram has been created for each of the economic, social / cultural and environmental outcomes. The diagrams show linkages from the broad objectives (navy boxes) to the targeted objectives (blue boxes) and the rules (grey boxes). Where gaps in the program logic have been identified, these are shown as 'not specified' in the appropriate coloured box.

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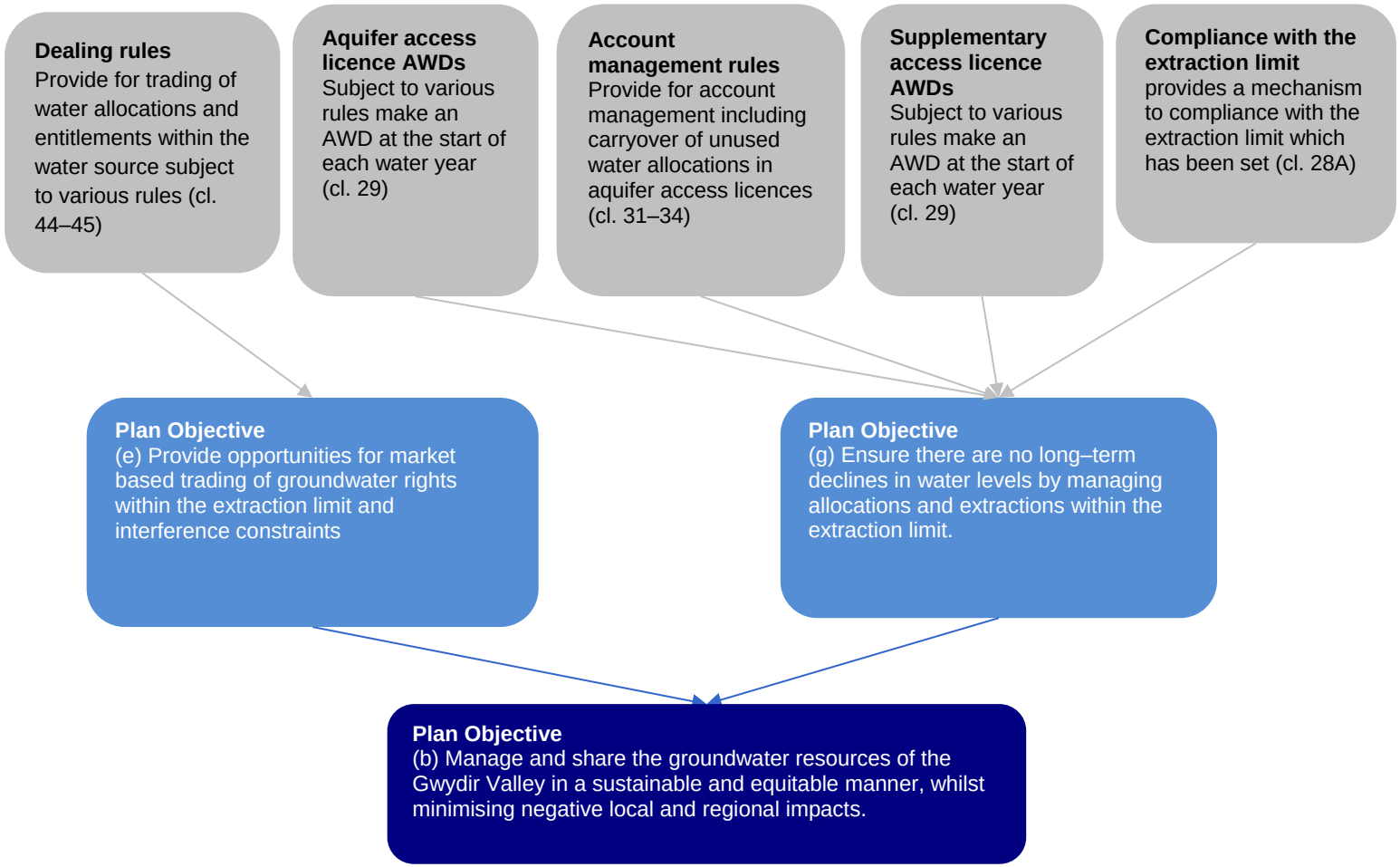

Figure 3: Lower Gwydir Groundwater WSP – Economic internal logic relationship diagram

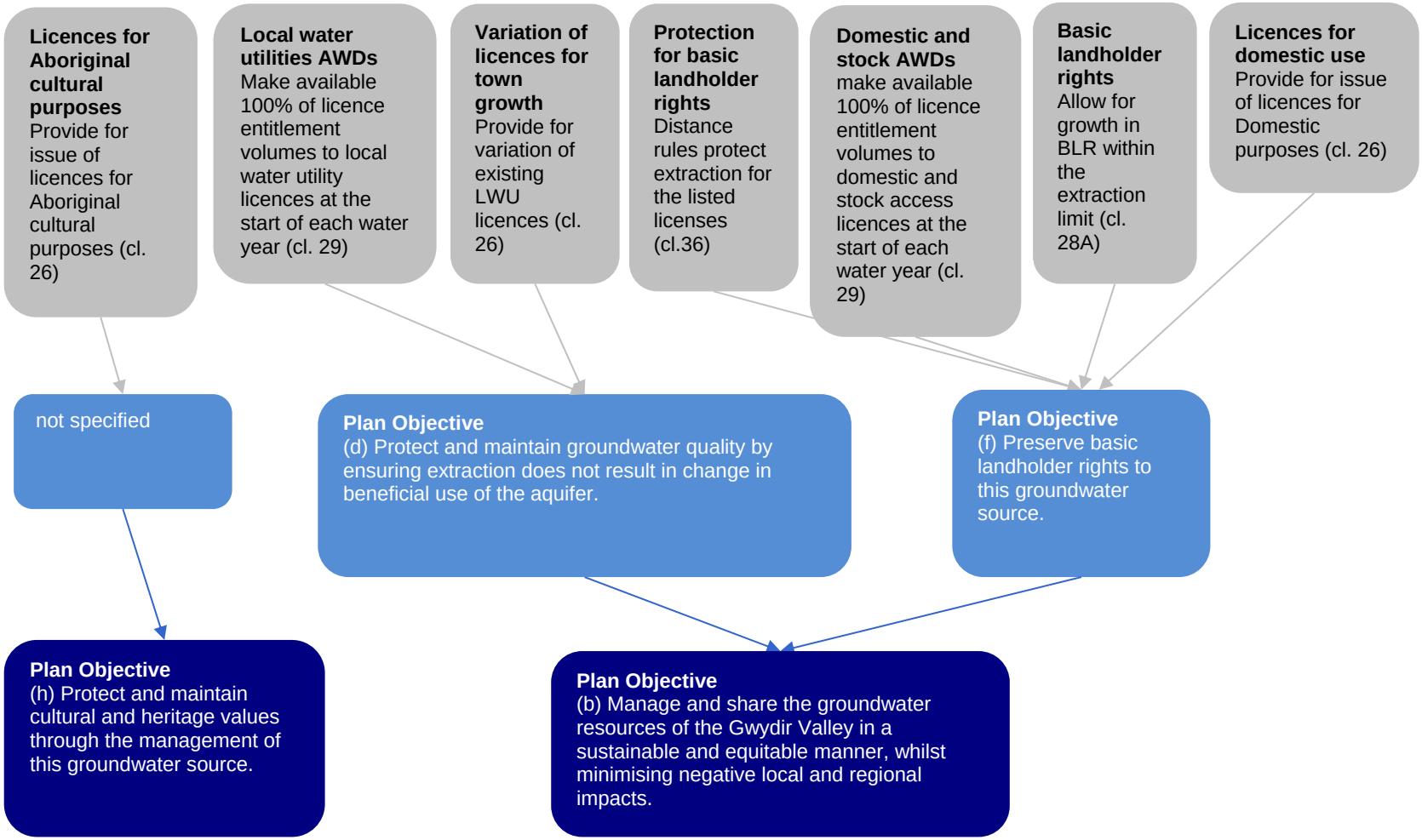

Figure 4: Lower Gwydir Groundwater WSP – Social/Cultural internal logic relationship diagram

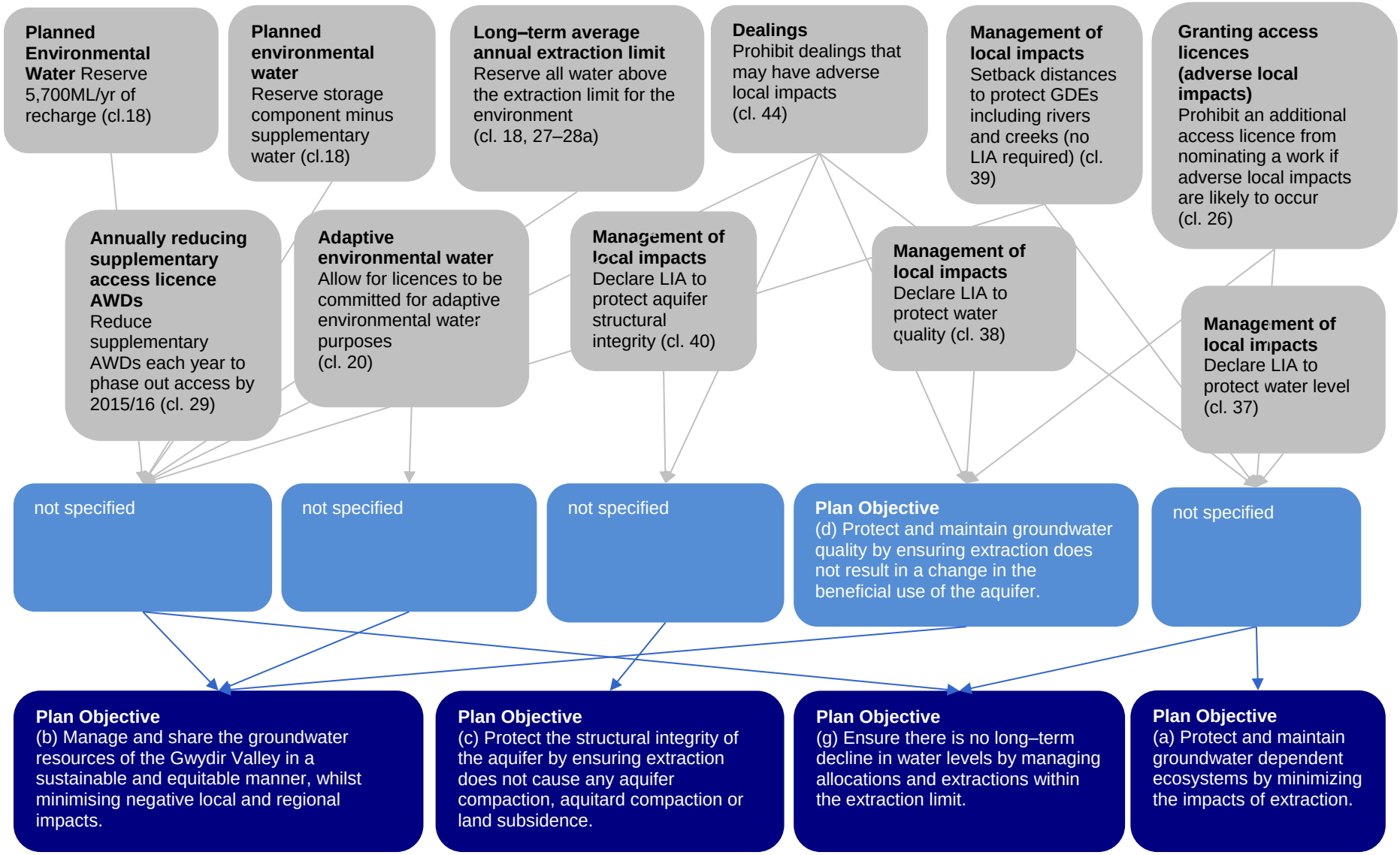

Figure 5: Lower Gwydir Groundwater WSP – Economic internal logic relationship diagram

Appendix 3: Upper and Lower Namoi – evaluation report cards and performance indicator summary

Table 5: Upper and Lower Namoi Groundwater WSP Appropriateness Evaluation Report Card

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
Plan scale	Is the scale of the Plan appropriate for water management?	Extent to which scale is appropriate for water sharing management	**The geographic scale of the water sources in the Plan is considered appropriate for water sharing management**.			
Plan scope	Is the scope of the Plan appropriate for water management?	Extent to which interactions with other water sources are addressed appropriately within the Plan or other water sharing plans	**The Plan does not adequately recognise the interactions with other aquifers or surface water** (other than the provision of setback distances to rivers and creeks).		Consider reviewing the WSP scope to achieve greater recognition of surface water and aquifer interactions with other identified connected water sources.	High
Prioritisation	Is the level of management required under the Plan appropriate for the risk to environmental, economic, or social and cultural values?	Extent of risk to groundwater–dependent ecosystems, economic, and social and cultural values	**The prioritisation of the Plan as high risk is considered appropriate.** The level of management applied is considered appropriate based on high levels of pre plan groundwater allocation.			

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
		Extent to which risk is addressed	**The Plan provides for extraction to be managed to the extraction limit.** The plan sets rules for compliance against the extraction limit that includes reducing the AWD for a groundwater source if assessed necessary to bring average usage back to the extraction limit.			
			Plan rules allow that local impact areas can be declared in critical areas. The Act also allows for temporary water restrictions to be imposed via section 324 orders.		Consider reviewing the use of plan based local impact area rules and the use of 324 Orders under the Act to minimise confusion and improve transparency.	High
		Identified future risks, including climate change, interception, change in industry base, etc.	**Climate change is not adequately addressed in the Plan as the extraction limit is based on historic climate rather than expected future climate predictions. The plan does provide for revised recharge estimates and amendments to the recharge figures and extraction limits.**		Consider reviewing recharge for climatic changes.	High
Internal logic	Is the vision appropriate for water management?	Whether the vision reflects what is intended for water sharing plans in the Act	**The vision is considered appropriate** as it is consistent with the Act's intent for water sharing plans to achieve economic, social and environmental outcomes.			
	Are the objectives suitable for water management?	Whether the objectives align with the vision	**The objectives mostly align with the plan vision** although one objective relates to both social and environmental outcomes.		Review objectives against the vision.	Medium

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
		Whether the objectives align with the principles and objects of the Act	**The objectives align with the principles and objects of the Act.**			
		Extent to which the objectives are clear and comprehensive enough to reflect what the Plan intended to achieve	**The objectives do not represent a full list of the Plan's intended outcomes**. The plan contains a mixture of broad and targeted objectives, and do not clearly link to plan strategies or rules through targeted objectives. One objective relates to both social and environmental outcomes.		Consider whether additional objectives should be developed to allow an effective evaluation of the plan. Both clear broad and targeted objectives should be established to achieve specific economic, social and environmental outcomes.	High
		Extent to which the plan logic establishes SMART (Specific,Measurable,Attainable, Realistic, Time–bound) objectives	**The plan logic fails to set objectives which can be evaluated using SMART criteria.**		Consider whether plan logic should be reconsidered to improve measurement of success.	High
	Are the strategies suitable for water management?	Whether all plan rules are linked to a strategy	**All plan rules can be linked to a strategy.**		Consider whether more appropriate strategies should be developed. Current strategies relate to the Plan structure headings only and do not adequately show how the objectives will be achieved (targeted objectives). This is important as the performance indicators should be used to assess the strategies under the Act.	High
		Whether the strategies provide clear direction for the plan rules	**Strategies could be more specific** to guide the intent of the plan rules and to highlight the links with their intended outcomes.			
		Whether the strategies align with the objectives	**Not all strategies align with the objectives.** Most strategies point to the establishment of rule sets, but not to the intent or outcome of the rule sets.			

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
	Are the performance indicators suitable for water management?	Whether the performance indicators align with the objectives and strategies	**Most performance indicators align to the objectives.** However, in some cases performance indicators specified for an objective do not reflect the objective and in other cases additional performance indicators are required, for example in relation to GDEs.		Review the alignment and relevance of performance indicators and measures against each objective and strategy.	High
		Extent to which performance indicators are clear and comprehensive enough to measure what the Plan intended to achieve	**Most performance indicators are clear.** Additional measures are available for many performance indicators and have been included in this evaluation.			
Quality of Supporting Documentation	Is documentation explaining the decisions underpinning the Plan available	Adequacy of documentation supporting Plan	**The Plan has a comprehensive "Part A" document supporting plan development available internally.** A range of documents are available that support plan implementation.			
		Extent to which documentation is made available to the public	**The "Part A" document was publicly available during the plan's initial exhibition period but is no longer publicly available.** Status reports, summary reports and/or resource condition reports are available on the DPIE website.		Consider making the "Part A" document publicly available.	Low

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
Communication	Is the process for communication with stakeholders adequate	Extent of communication and processes supporting plan development	**Extensive consultation was carried out during plan development**, with the Upper and Lower Namoi Groundwater Management Committee meeting to explore issues and develop management strategies. Plans were placed on public exhibition.			
		Communication arrangements in place during plan operation	**Communication on operational matters has been appropriate, based on the management decisions being made.** During drought periods, frequent discussions were held with water users. When conditions were good, communication has been on an as needs basis. A series of status, summary and resource condition reports are available on the DPIE website.			
		Arrangements for consideration at term review of Plan	**Sufficient opportunity will be provided for communication during the water resource plan development process**. Consultation will involve opportunities to make submissions, and face to face meetings will be held with stakeholders.			

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
Alignment with state priorities for natural resource management plans (S43A)	Is the Plan aligned with state priorities for natural resource management?	Extent of alignment of Plan with state priorities	**While the State priorities align clearly with the vision of the Plan. The alignment between the other internal logic elements could be clearer.** The 2016 NRC review of this Plan identified three key State Priorities for Water Sharing Plans: • Productive and resilient water–dependant industries, • Secure long–term water supplies for urban and rural communities, and • Healthy and reesilient water–dependant ecosystems. Note: the Plan was in place prior to the development of the state priorities for natural resource management and so full alignment is not expected.		Consider reviewing the alignment of Plan objectives with state priorities for natural resource management during the development of the Water Resource Plan (WRP).	High

Table 6: Upper and Lower Namoi Groundwater WSP Efficiency Evaluation Report Card

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
Basis for water sharing	Recharge	Were any changes made to annual average recharge estimates?	**No changes to average annual recharge estimates were required.**		Consider results of any new or updated groundwater models when available.	Medium
Environmental water provisions	Planned environmental water	Was all water contained in the storage component of these water sources reserved for the environment?	**The water reserved each year for the environment was in acordance with the planned environmental water requirements and account management provisions.**			
		Was supplementary access to the storage component phased out to ensure all water in the storage was reserved for the environment?	**Supplementary water acccess was reduced annually so that it was phased out by the end of the plan term in accordance with the Plan rules.**			
		Was all water above the recharge extraction limit reserved?	**The 3 year average usage exceeded the compliance with the extraction limit trigger in 2014/2015 in Upper Namoi Zone 2, Upper Namoi Zone 3 and Upper Namoi Zone 5.** **A decision was made to not reduce entitlement in the following water year in accordance with discretion provided by the Plan.** **Over the period 2006/07 to 2014/15 the percentage of the total plans extraction limit that was used was; 58% total for the**			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			Upper Namoi and 81% for the Lower Namoi. *Note: Planned environmental water provisions are implemented via limits to extraction.*			
		Were the extraction limits amended based on further recharge models and studies?	**No changes to extraction limits based on further average annual recharge estimates were made.**			
	Adaptive environmental water	Is there a process for licences to be committed for adaptive environmental purposes?	**All necessary systems are in place to apply and manage conditions should they be requested.** *Note: No licences have been committed as AEW in the plan area.*			
Basic Landholder Rights	Domestic and Stock	Are domestic and stock BLR provided for within the Plan?	**Domestic and stock BLR access is provided for in the Plan**.			
		Is domestic and stock BLR growth provided for within the Plan?	**Procedures are in place to allow for growth in domestic and stock BLR whilst maintaining extraction limit compliance.**			
		Have interference management strategies been required?	**An interference management strategy has been required in this plan area.** A small number of complaints by groundwater users in the Upper and Lower Namoi areas about changes in reliability of water were investigated by DPIE, it was assessed that changes in reliability to be due to the prevailing climate and limited bore depth issues. Pumping restrictions were introduced in 2007 for the Upper			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			Namoi Zone 11 water source under s323 and s324 Orders of the Water Management Act (2000) to alleviate pumping impacts on the shallow aquifer during the drought. The last order ceased on 30 June 2010 and was not reinstated due to the more favourable climatic conditions at the beginning of the 2010–2011 water year.			
		Are domestic and stock BLR consistent with reasonable use guidelines?	**Reasonable use guidelines (made under s.52 of the Act and provided for in the Plan) have not been made by the Minister.**		Endeavour to finalise and publish the reasonable use guidelines as a matter of priority.	High
	Native title	Are native title BLR provided for within the Plan?	**Procedures are in place to provide access if native title rights for water are granted in any of the water sources covered by this Plan.** *Note: No native title rights for water have been established in this plan area.*			
		Is growth in native title BLR protected within the Plan?	**Procedures are in place to allow for growth in native title BLR whilst maintaining extraction limit compliance.**			
Requirements for water for extraction under access licences	Conversion of access licences from *Water Act 1912* to *Water Management Act 2000*	Were licences established with share components calculated according to plan rules?	**All licences were established with share components calculated in line with plan specifications**.			
	Changes to share components	Were the share components for supplementary licences reduced to	**Supplementary access has been reduced each year as part of a staged phase out of this licence category. Supplementary access**			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		0 at the date specified?	**licenes in this water source have now been cancelled.**			
Rules for granting access licences	Granting new access licences	Were plan rules followed for the granting of access licences?	**All access licences granted were in line with the plan provisions.** The Water Management (General) Regulations 2004 and 2011 set out the specific purpose access licences for which applications can be accepted in line with the Plan.			
Limits to the availability of water	Extraction limits	Was an extraction limit established?	**Extraction limits were established for all water sources**.			
	Variation of extraction limits	Were extraction limits varied?	**No changes to extraction limits have been made.**			
	Extraction limit compliance	Were rules regarding compliance with the extraction limit implemented?	**Extraction was within the extraction limit 2006/07 to 2014/15 for Upper Namoi Zones 1, 4, 6–12 and the Lower Namoi Groundwater Sources.** **The 3 year average usage exceeded the extraction limit in 2014/2015 in Upper Namoi Zone 2, Upper Namoi Zone 3 and Upper Namoi Zone 5.** A decision was made not to reduce entitlement in the following year in these groundwater sources in accordance with discretion provided by the plan. All AWDs were announced in accordance with the requirements of the plan.		Continue to monitor current and future usage in relevant water sources and to assess extraction against the LTAAEL	High

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
	AWDs	Were the rules for the making of AWDs for domestic and stock and local water utility aquifer access licences implemented?	**All AWDs were announced when required in accordance with the plan rules.**			
		Were the rules for the making of AWDs for aquifer access licences implemented?	**All AWDs were announced when required in accordance with the plan rules.**			
		Were the rules for the making of AWDs for supplementary water aquifer access licences implemented?	**All AWDs were announced when required in accordance with the plan rules and had the correct annual reductions applied.**			
Rules for managing access licences	Water allocation and account management	Were water allocation accounts established?	**Water allocation accounts were established for all licence holders.**			
		Were water allocations accrued annually?	**All accounts were credited annually following AWD determinations.**			
		Was water extraction accounted for at least annually?	**All accounts were debited and credited in line with plan provisions.**			
	Management of local impacts	Were local impact areas established?	**No local impact areas have been required to be established.** Following community meetings in 2008 about groundwater status in the Lower Namoi, trading was restricted in areas showing long–term water level decline and significant drawdowns. These restrictions took effect from 10 November 2008 and were implemented to limit further impacts		Review the local impact management mechanisms available in the Plan and in the Act to ensure consistency and transparency.	High

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			from additional water being traded into these areas of greater impact. Trading restrictions have not been removed to date. A few cases of BLR users with reduced access were report across the Upper and Lower Namoi groundwater sources. These were assessed as a result of bore construction and drought conditions. In 2007 a Temporary Water Restriction Order under Section 323 of the Water Management Act 2000 was introduced to restrict groundwater extraction in the upstream portion of Upper Namoi Zone 11 Water Source. These restrictions were introduced because of the water shortage identified in Maules Creek and in the alluvial aquifer associated with the Creek upstream of Elfin Crossing. This was in response to concerns raised by landholders in the Maules Creek catchment on the impact of pumping groundwater for irrigation on stock and domestic groundwater wells and pools in Maules Creek. These restrictions were put in place from December 2007 until August 2009 when they were replaced by a Temporary Water Restriction Order under Section 324 of the Act. This order ceased on 30 June 2010 and was not reinstated due to the more			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			favourable climatic conditions at the beginning of the 2010–2011 water year. *Note: Amendments to the Act in 2009 provided an alternative procedure for dealing with short term localised impacts.*			
		Was extraction interference between neighbouring bores managed, including exceptions to minimum distance requirements?	**Most approvals for new and replacement bores have been issued in line with the rules for minimum distance between neighbouring bores.** **The WSP allows exceptions to minimum distances in specific circumstances. These exceptions have been utilised during the WSP term.** *Note: Distance requirements are included as a condition on new and replacement bore works approvals. Licence holders and licensed drillers are required to comply with these conditions.* *In some cases new or replacement works were within specified distances, however, in each case a DPIE hydrogeologist assessed the impacts, as allowed for under the Plan and recommended additional conditions where appropriate.* *Note: It is important to note that the large numbers of licences within the distance restrictions are mainly in areas where BLR works are built on residential blocks. In high density*		Continue to ensure work approvals for non BLR bores within minimum distances are conditioned appropriately.	Medium

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			residential areas there is not the space to allow for 200 m between each work approval location. Extractions for BLR are generally smaller therefore there would be less impact from extractions compared to production bores. As a result of this, the Plan was amended in 2013 to exempt BLR bores from distance restrictions, whilst retaining rules to resolve extraction interference disputes between neighbours.			
		Were water levels monitored and managed if required?	**Water levels have been monitored during the plan term.** Following community meetings in 2008 about groundwater status in the Lower Namoi, trading was restricted in areas showing long–term water level decline and significant drawdowns. These restrictions took effect from 10 November 2008 and were implemented to limit further impacts from additional water being traded into these areas of greater impact. Trading restrictions have not been removed to date. *Note: Amendments to the Act in 2009 provided an alternative procedure for dealing with short term localised impacts.*		Continue to monitor and where necessary manage groundwater level impacts of extraction. Consider amending the Plan at term review to include the alternative management strategies as permanent trading rules. *Also see recommendations for 'Were local impact areas established?'*	High
		Was water quality monitored and managed if required?	**Some water quality monitoring has been undertaken**.		Consider options for further water quality monitoring to improve water quality	Medium

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			There is currently no water source scale groundwater quality monitoring program. **No impact areas for water quality management have been required**.		management outcomes.	
		Were groundwater dependant ecosystems (GDEs) protected?	**No scheduled GDEs are listed.** Setback rules for new bores with respect to GDEs could not be implemented because there were no GDEs in the Schedule. **No additional GDEs were identified and included in the relevant schedule during the plan term.**		Ensure the addition of relevant GDEs to the relevant WSP schedule if/when they are identified.	High
		Were Aboriginal cultural heritage values protected?	**There are no results available specific to setback rules for Aboriginal cultural heritage values.** DPIE aims to improve Aboriginal involvement and representation in water planning and management within NSW. This includes identifying key water–related environmental, social, cultural and economic opportunities and priorities for Aboriginal communities (including GDEs and cultural values). *Note: There is no requirement for Aboriginal cultural heritage values to be scheduled.* *Note: These rules are established in the GDE protection clause of the Plan.*		Establish process for the identification and assessment of setback distances for Aboriginal cultural heritage values.	High

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		Were rivers and creeks protected?	**Rivers and creeks were protected through the application of setback distances for new bores.** Setback distances in some instances may not have been applied to the work approval. Setback rules are applied to new bores during the work approval assessment process. Full implementation of setback clauses may be influenced by the accuracy of bore location information provided. The Plan sets out additional bore construction requirements which must be complied with when bores are permitted within stream set back distances. It is possible that construction conditions have not been complied with as post construction inspections have not been undertaken. *Note: These rules are established in the GDE protection clause of the Plan.* In 2007 a Temporary Water Restriction Order under Section 323 of the Water Management Act 2000 was introduced to restrict groundwater extraction in the upstream portion of Upper Namoi Zone 11 Water Source. These restrictions were introduced because of the water shortage		Ensure accurate bore location information is provided to ensure setback distance rules are applied correctly. Consider options to ensure compliance with bore construction conditions.	Medium

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			identified in Maules Creek and in the alluvial aquifer associated with the Creek upstream of Elfin Crossing. This was in response to concerns raised by landholders in the Maules Creek catchment on the impact of pumping groundwater for irrigation on stock and domestic groundwater wells and pools in Maules Creek. These restrictions were put in place from December 2007 until August 2009 when they were replaced by a Temporary Water Restriction Order under Section 324 of the Act. This order ceased on 30 June 2010 and was not reinstated due to the more favourable climatic conditions at the beginning of the 2010–2011 water year.			
		Was aquifer integrity protected?	**Aquifer integrity was protected.** This assessment is based on groundwater level monitoring (including the stabilisation and/or recovery of groundwater levels). There is currently no information available regarding land subsidence or reduction in bore yields. **No local impact areas for aquifer integrity management have been required.**		Continue groundwater level monitoring and investigate if reports of subsidence, aquifer compaction or reduced bore yield are received.	Medium
		Were extraction restrictions required?	**No local impact areas have been required to be established. These provisions have not been required.**		Review the local impact management mechanisms available in the plan and in the Act to ensure consistency and transparency.	High

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		Was group registration required?	**No local impact areas have been required to be established. These provisions have not been required.**			
		Were there any failures of monitoring bores that are relied on to manage local impact restrictions?	**No local impact areas have been required to be established. These provisions have not been required.**			
Dealings	Minister's dealing principles	Were dealings in line with the Minister's dealing principles, the Act and the WSP?	**All dealings have been made in line with Minister's dealing principles**. *Note: Prohibited dealings in this plan area include conversions of access licence categories and interstate (transfer and assignment of allocation).*			
	Constraints within water source	Were dealings in line with rules relating to constraints within the water source?	**All dealings were undertaken in line with plan rules relating to constraints within the water source**. This plan has a constraint rule specifying dealings are prohibited if the dealing would result in the total access licence share components or credited water allocations authorised to be extracted through nominated works at a location exceeding 600 ML/year per square kilometre. DPIE Licensing uses the property area for this assessment. This is the only plan with this provision. *Note: Also refer to 'Were water levels monitored and managed if required?' for additional information*		Evaluate the continued appropriateness of the Upper and Lower Namoi 600ML/year rule at plan term review.	Low

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			on alternate management strategies and dealing constraints.			
	Change of water source	Were dealings in line with rules relating to change of water source?	**All dealings were in line with rules permitting change of water source trade between groundwater sources of the plan.**			
	Water allocation assignment between water sources	Were dealings in line with rules relating to water allocations between water sources?	**All dealings were in line with rules permitting water allocation trade between groundwater sources of the plan.**			
Mandatory conditions	Access licence conditions	Were mandatory conditions for access licences placed on licences?	**Mandatory conditions have been applied to access licences.** DPIE undertook a conditions reform project and developed guidelines for drafting conditions. As water sharing plans are remade DPIE is progressively reviewing conditions and, where relevant will apply conditions with improved wording and confirm appropriate application of the conditions.		Endeavour to ensure all conditions meet DPIE's new SMART conditions criteria in the next planning cycle.	Medium
	Water supply works approvals	Were mandatory conditions for works approvals placed on the works approvals?	**Mandatory conditions have been applied to work approvals.** DPIE undertook a conditions reform project and developed guidelines for drafting conditions. As water sharing plans are remade DPIE is progressively reviewing conditions and, where relevant will apply conditions with improved wording		Endeavour to ensure all conditions meet DPIE's new SMART conditions criteria in the next planning cycle.	Medium

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			and confirm appropriate application of the conditions.			
Plan Amendments	Annual average recharge	Were any amendments to annual average recharge made?	**No amendments to the average annual recharge have been made**.			
	Planned environmental water	Were any amendments made to planned environmental water?	**There have been no amendments to planned environmental water**.			
	Extraction limits	Were any amendments made to the extraction limits?	**No amendments to the extraction limits have been made**.			
	High priority GDEs	Was it necessary to amend GDE schedules in plans?	**There have been no amendments to the relevant schedule to include additional GDEs.**		See recommendations under ‘Were GDEs protected?’	
	Planned environmental water (Water recovery programs)	Were any amendments made to planned environmental water as a result of water recovery programs?	**No changes allowed for in the plan have been made to environmental water provisions.**			
	Amendments made under s.45 (a) of the Act but not identified in the Plans.	Were any further amendments made to the plans?	**Subsequent to the making of the plans some drafting errors were identified and have been corrected by amendment.** **Amendments to the plan have also been made resulting from the water efficiency projects including rules for granting access licences.**			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			The water allocation and account management rules have been amended. **Amendments relating to distance rules for BLRs under Management of local impacts have also been made.**			

Table 7: Upper and Lower Namoi Groundwater WSP Effectiveness Evaluation Report Card

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
Protect, maintain and, where practicable, enhance ecosystems dependent on groundwater, and the cultural and spiritual values of groundwater, by minimising the impacts on these of groundwater extraction,	• Change in groundwater extraction relative to the extraction limit. • Change in climate adjusted groundwater levels. • Change in structural integrity of the aquifer. • Extent of recognition of spiritual, social and customary values of groundwater to Aboriginal people. • Change in groundwater quality. • Change in water levels adjacent to identified groundwater–dependent ecosystems.	**There are no high priority dependent ecosystems listed in the relevant plan schedule.** **The Plan does not directly protect or maintain cultural or spiritual values other than providing mechanisms to access water for cultural purposes under Native Title rights and Aboriginal Cultural access licences.** **Long–term annual average extraction limits were established for all groundwater sources which provided benefits to the environment and potentially cultural and spiritual values by limiting extraction to environmentally sustainable levels.** Over the period 2006/07 to 2014/15 the percentage of the total plans extraction limit that was used was; 58% total for the Upper Namoi and 81% for the Lower Namoi.		**Poor**	Ensure the addition of relevant GDEs to the relevant WSP schedule if/when they are identified.	High
Protect the structural integrity of the aquifers and groundwater quality, by ensuring groundwater extraction does not result in any aquifer compaction,	• Change in groundwater extraction relative to the extraction limit. • Change in climate adjusted groundwater levels. • Change in groundwater quality. • Change in structural integrity of the aquifer.	Over the period 2006/07 to 2014/15 the percentage of the total plans extraction limit that was used was; 58% total for the Upper Namoi and 81% for the Lower Namoi. Water level drawdowns are monitored across the groundwater source. However, the value of this information as an indicator of long–term decline is limited as drawdown is seasonal. It is suggested that more appropriate		**Moderate**	Consider developing more appropriate performance indicators to assess this objective.	Medium

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
aquitard compaction, land subsidence or change in the beneficial use of the aquifer.		performance indicators should be developed to assess this objective. There have been no reported cases of subsidence as an issue There is limited information available to assess trends in groundwater quality parameters however there have been no reported changes in water quality.				
Manage access to the extraction limits to ensure there are no long–term declines in water levels.	• Change in groundwater extraction relative to the extraction limit. • Change in climate adjusted groundwater levels. • Change in groundwater quality. • Change in economic benefits derived from groundwater extraction and use. • Change in structural integrity of the aquifer. • Extent to which domestic and stock rights requirements have been met. • Extent to which local water utility requirements have been met. • Extent to which native title rights requirements have been met. • Extent of recognition of spiritual, social and customary values of	Over the period 2006/07 to 2014/15 the percentage of the total plans extraction limit that was used was; 58% total for the Upper Namoi and 81% for the Lower Namoi. A few cases of BLR users with reduced assess were reported, these were assessed as a result of bore construction and drought conditions. An area has been identified in Lower Namoi showing long–term water level decline and significant drawdowns. Trade restrictions were introduced from 10 November 2008 and were implemented to limit further impacts from additional water being traded into these areas of greater impact. Trading restrictions have not been removed to date.		**Moderate**		

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
	groundwater to Aboriginal people.					
Preserve basic landholder rights access to these groundwater sources and ensure the fair, equitable and reliable access to groundwater through the management of local impacts or interference effects.	• Extent to which domestic and stock rights requirements have been met. • Extent to which native title rights requirements have been met.	A few cases of BLR users with reduced assess were reported, these were assessed as a result of bore construction and drought conditions. An area has been identified in Lower Namoi showing long–term water level decline and significant drawdowns. Trade restrictions were introduced from 10 November 2008 and were implemented to limit further impacts from additional water being traded into these areas of greater impact. Trading restrictions have not been removed to date.		**Good**		
Contribute to the protection, maintenance and enhancement of the economic viability of groundwater users and their communities in the Namoi Valley	• Change in economic benefits derived from groundwater extraction and use. • Extent of recognition of spiritual, social and customary values of groundwater to Aboriginal people.	**Minimal information is available to assess the economic impact of the Water Sharing Plan.** This Plan was developed with an understanding that the pre–plan entitlement and extraction levels were unsustainable. Extraction limits were established in all water sources to provide groundwater resource security for extractive users. In some water sources, the extraction limit reduced gradually in line with reductions in available water for supplementary access licences. Impacts were partially offset by a structural adjustment		**Poor**	Consider reviewing the WSP objectives with a view to developing SMART objectives and performance indicators, along with the appropriate monitoring, to assess the economic impact of Water Sharing Plans.	Medium

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
		package, which provided approximately $123 million across 6 major inland groundwater plan areas to licence holders and communities. A total of approximately $75 million was provided in the Upper and Lower Namoi Groundwater Sources. The establishment of perpetual licences and tradeable rights by the plan increased security and flexibility for licence holders. Throughout the plan period full water allocations, carryover and annual extraction provisions provided groundwater extraction flexibility and allowed economic benefits to be maximised within the limitations of the plan rules.				
Ensure opportunities for market–based trading of groundwater access licence rights within sustainability and interference constraints	• Change in economic benefits derived from groundwater extraction and use. • Extent of recognition of spiritual, social and customary values of groundwater to Aboriginal people.	**The introduction of fully tradeable groundwater access licences with a wide range of allowed dealings has resulted in greater account management and trading flexibility. This has been a significant change to groundwater management.** Throughout the plan period full water allocations, carryover and annual extraction provisions provided groundwater extraction flexibility and allowed trading opportunities to be maximised within the limitations of the plan rules. In 2008 trade into some areas of the Lower Namoi Water Source was restricted following drawdown reaching 40%–50% of saturated thickness and declines in recovery levels. These restrictions remain in force to limit		**Good**		

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
		additional drawdown impacts and to maintain sustainability of the groundwater resource.				
Ensure sufficient flexibility in account management to encourage efficient use of these groundwater sources and to manage these groundwater sources to account for climatic variations.	• Change in groundwater extraction relative to the extraction limits. • Change in climate adjusted groundwater levels. • Change in economic benefits derived from groundwater extraction and use.	**The water sharing plan account management rules have introduced greater flexibility to individual holders to support preferred planting regimes, cater for individual levels of risk, and provide a greater level of account management choice by facilitating an active water trading market.** Flexibility (for aquifer access licence holders) is maintained through implementation of carryover and account limit provisions that equal or exceed maximum permissible annual available water determination, providing a use, trade or hold decision for individual licence holders. Over the period 2006/07 to 2014/15 the percentage of the total plans extraction limit that was used was; 58% total for the Upper Namoi and 81% for the Lower Namoi.		**Good**		

Table 8: Upper and Lower Namoi Groundwater WSP Performance Indicator Results Summary

Performance Indicator	Related Plan Objectives	Results	Strength of Information
Change in groundwater extraction relative to the extraction limits.	• Protect, maintain and, where practicable, enhance ecosystems dependent on groundwater, and the cultural and spiritual values of groundwater, by minimising the impacts on these of groundwater extraction • Protect the structural integrity of the aquifers and groundwater quality, by ensuring groundwater extraction does not result in any aquifer compaction, aquitard compaction, land subsidence or change in the beneficial use of the aquifer • Manage access to the extraction limits to ensure there are no long–term declines in water levels • Ensure sufficient flexibility in account management to encourage efficient use of these groundwater sources and to manage these groundwater sources to account for climatic variations	**Total entitlement was reduced under the water sharing plan to the long–term average extraction limit in each groundwater source excluding Upper Namoi Zones 6, 9 and 10 Access to groundwater was progressively reduced over the ten year life of the plan via supplementary licences which were cancelled at the end of the 2014/2015 water year.** **Groundwater extraction remained within the extraction limits for the plan term in the majority of groundwater sources**. The 3 year average usage exceeded the compliance with the extraction limit trigger in 2014/2015 in Upper Namoi Zone 2, Upper Namoi Zone 3 and Upper Namoi Zone 5. A decision was made not to reduce allocations in the following year in these groundwater sources in accordance with discretion provided by the plan. Average extraction in all other groundwater source remained below the compliance with the extraction limit level each year between 2006/07 and 2014/15. AWDs were announced in accordance with the requirements of the plan. **Over the period (2006/07 to 2014/15) the percentage of the plans extraction limt used in each groundwater source is as follows:** Upper Namoi Zone 1 – 42% Upper Namoi Zone 2 – 82% Upper Namoi Zone 3 – 74% Upper Namoi Zone 4 – 65% Upper Namoi Zone 5 – 90% Upper Namoi Zone 6 – 8% Upper Namoi Zone 7 – 36% Upper Namoi Zone 8 – 72% Upper Namoi Zone 9 – 21% Upper Namoi Zone 10 – <1% Upper Namoi Zone 11 – 23% Upper Namoi Zone 12 – 26% Lower Namoi – 81%	**Good**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
		There were no reported cases of change in the beneficial use category of the aquifer across the Lower Gwydir. **Over the period of the WSP some areas across the Upper and Lower Namoi showed water level decline, the water sharing plan allowed extraction to be in excess of the estimated average annual recharge to enable users to adjust to the reduction in entitlements that occurred at the beginning of the plan.** **These results show that during the plan term water was accessible for extractive uses up to the plan determined portion and that the water reserved by the plan for the environment was protected in most years.** ***References:*** NSW Office of Water (2011) *Audit of implementation –Inland alluvial aquifer water sharing plan audit report cards – Prepared for the period between 1 October 2006 and 30 June 2010 covering Lower Murrumbidgee, Lower Murray, Lower Macquarie, Lower Gwydir, Upper and Lower Namoi.* NSW Office of Water, Sydney Available at: http://www.water.nsw.gov.au/water–management/water–sharing/auditing–and–reporting NSW Office of Water (in press) *Audit of implementation – Inland alluvial aquifer water sharing plan audit report cards – Prepared for the period 1 July 2010 to 30 June 2014 covering Lower Murrumbidgee, Lower Murray, Lower Macquarie, Lower Gwydir, Upper and Lower Namoi,* NSW Office of Water, Sydney DPI Water (2017) *Namoi Alluvial Water Resource Plan Resource Description*. DPI Water, Sydney. The following references are available at: http://www.water.nsw.gov.au/water–management/water–availability/groundwater#reports	

Performance Indicator	Related Plan Objectives	Results	Strength of Information
		Barrett C., (2010), Upper Namoi Groundwater Sources – Resource condition assessment report – 2010, NSW Office of Water, Sydney Barrett C., (2012), Upper Namoi Groundwater Source – Status Report – 2011, NSW Department of Primary Industries, Office of Water, Sydney DPI Water (2017) *Namoi Alluvium Water Resource Plan (GW15),* Status and Issues Paper. DPI Water Sydney. NSW Office of Water (2013) Lower Namoi Groundwater Sources Summary Report 2006–2013, NSW Department of Primary Industries. NSW Office of Water (2015) Upper Namoi Zone 2 Groundwater Sources Summary Report 2006–2015, NSW Department of Primary Industries. NSW Office of Water (2015) Upper Namoi Zone 3 Groundwater Sources Summary Report 2006–2015, NSW Department of Primary Industries. NSW Office of Water (2015) Upper Namoi Zone 5 Groundwater Sources Summary Report 2006–2015, NSW Department of Primary Industries. Smithson, A., (2009), Lower Namoi Groundwater Source: Groundwater Management Area 001 Groundwater Status Report 2008, NSW Department of Water and Energy, Sydney	
Change in climate adjusted groundwater levels.	• Protect maintain and, where practicable, enhance ecosystems dependent on groundwater, and the cultural and spiritual values of groundwater, by minimising the impacts on these of groundwater extraction • Protect the structural integrity of the aquifers and groundwater quality, by ensuring groundwater extraction does not result in any aquifer compaction, aquitard compaction,	Groundwater levels are monitored at 1200 bores at 575 sites across the Upper and Lower Namoi Alluvium. This monitoring network includes 85 bores equipped with data loggers that record water levels continuously. An analysis of the groundwater levels is provided in the Namoi Alluvium Water Resource Plan Resource Description report. This analysis shows some areas where the groundwater levels have declined over the plan period. This decline in groundwater level over time is not unexpected as the water sharing plan allowed extraction to be in excess of the estimated average annual recharge to enable users to adjust to the reduction in entitlements that occurred at the beginning of the plan. Following community meetings in 2008 regarding the groundwater status in the Lower Namoi, trading was restricted in areas showing long–term water level decline and significant drawdowns. These restrictions took	**Good**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
	land subsidence or change in the beneficial use of the aquifer • manage access to the extraction limits to ensure there are no long–term declines in water levels • ensure sufficient flexibility in account management to encourage efficient use of these groundwater sources and to manage these groundwater sources to account for climatic variations	effect from 10 November 2008 and were implemented to limit further impacts from additional water being traded into these areas of greater impact. Trading restrictions have not been removed to date. A small number of complaints by groundwater users in the Upper and Lower Namoi areas about changes in reliability of water were investigated by DPIE, it was assessed that changes in reliability to be due to the prevailing climate and limited bore construction issues. In 2007 a Temporary Water Restriction Order under Section 323 of the Water Management Act 2000 was introduced to restrict groundwater extraction in the upstream portion of Upper Namoi Zone 11 Water Source. These restrictions were introduced because of the water shortage identified in Maules Creek and in the alluvial aquifer associated with the Creek upstream of Elfin Crossing. This was in response to concerns raised by landholders in the Maules Creek catchment on the impact of pumping groundwater for irrigation on stock and domestic groundwater wells and pools in Maules Creek. These restrictions were put in place from December 2007 until August 2009 when they were replaced by a Temporary Water Restriction Order under Section 324 of the Act. This order ceased on 30 June 2010 and was not reinstated due to the more favourable climatic conditions at the beginning of the 2010–2011 water year. ***References:*** DPI Water (2017) *Namoi Alluvial Water Resource Plan Resource Description*. DPI Water, Sydney. Barrett C., (2010), Upper Namoi Groundwater Sources – Resource condition assessment report – 2010, NSW Office of Water, Sydney Barrett C., (2012), Upper Namoi Groundwater Source – Status Report – 2011, NSW Department of Primary Industries, Office of Water, Sydney DPI Water (2017) *Namoi Alluvium Water Resource Plan (GW15),* Status and Issues Paper. DPI Water Sydney.	
Change in water levels adjacent to identified	• Protect maintain and, where practicable, enhance ecosystems dependent on groundwater, and the	**There are no high priority dependent ecosystems listed in the relevant plan schedule however a GDE identification process has**	**Poor**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
groundwater–dependent ecosystems (and change in condition of GDEs (incl. rivers and creeks) due to groundwater level changes)	cultural and spiritual values of groundwater, by minimising the impacts on these of groundwater extraction • Manage access to the extraction limits to ensure there are no long–term declines in water levels	**commenced. As a result, this performance indicator cannot be assessed.** **DPIE is conducting a State–wide project to identify GDEs, which is currently focussing on the northern Murray–Darling Basin**. The project will develop and refine a spatial model for the identification and mapping of high probability, high ecological value and high priority GDEs.	
Change in groundwater quality	• Protect maintain and, where practicable, enhance ecosystems dependent on groundwater, and the cultural and spiritual values of groundwater, by minimising the impacts on these of groundwater extraction • Protect the structural integrity of the aquifers and groundwater quality, by ensuring groundwater extraction does not result in any aquifer compaction, aquitard compaction, land subsidence or change in the beneficial use of the aquifer • Manage access to the extraction limits to ensure there are no long–term declines in water levels	**Groundwater quality is naturally highly variable across the groundwater sources of the Namoi, there have not been any reports of change in beneficial use across the Upper and Lower Namoi groundwater sources.** Timms et al. (2010) and Parsons Brinkerhoff (2011) provide more recent information on groundwater quality distribution within the Peel Valley Alluvium and Upper and Lower Namoi Alluvium. In 2009, the Cotton Catchment Communities CRC and the Namoi Catchment Management Authority commissioned the University of New South Wales Water Research Laboratory to run a project entitled 'Groundwater Monitoring, Evaluation and Grower Survey, Namoi Catchment' (Timms et al. 2010). 2011, the former NSW Office of Water commissioned Parsons Brinckerhoff to characterise the hydrogeochemistry and investigate the risks posed by groundwater pumping on groundwater quality in six alluvial groundwater systems across inland NSW, including the Lower Namoi Alluvium and part of the Upper Namoi Alluvium (Upper Namoi Zone 3) (Parsons Brinkerhoff, 2011). Groundwater salinity across the Upper and Lower Namoi Alluvium is generally less than 1,500 EC units, with areas of higher salinity up to 7,000 EC in the Upper Namoi and up to 30,000 EC in the Lower Namoi. **References:** DPI Water (2017) *Namoi Alluvium Water Resource Plan (GW15),* Status and Issues Paper. DPI Water Sydney.	**Moderate** Pre–plan, 2006–2009 **Good** 2009–2011 **Poor** 2012–2015 (no reporting available, may be unassessed data)

Performance Indicator	Related Plan Objectives	Results	Strength of Information
		Parsons Brinckerhoff (2011) *NSW Office of Water Characterisation of hydro–geochemistry and risks to groundwater quality – Impact of groundwater pumping on water quality: National Water Commission – Raising National Water Standards Programme.* NSW Office of Water, Sydney. **Further reading:** Timms, W.A., Badenhop, A.M., Rayner, D.S. and Mehrabi, S.M., 2010. *Groundwater monitoring, evaluation and grower survey, Namoi Catchment Report No. 2.* University of New South Wales Water Research Laboratory, Sydney on behalf of Cotton Catchment Communities CRC, Narrabri and Namoi Catchment Management Authority, Tamworth	
Change in economic benefits derived from groundwater extraction and use.	• Manage access to the extraction limits to ensure there are no long–term declines in water levels. • Contribute to the protection, maintenance and enhancement of the economic viability of groundwater users and their communities in the Namoi Valley. • Ensure opportunities for market–based trading of groundwater access licence rights within sustainability and interference constraints. • Ensure sufficient flexibility in account management to encourage efficient use of these groundwater sources and to manage these groundwater sources to account for climatic variations.	There is limited information available to measure the change in economic benefits to groundwater users directly as a result of the water sharing plan. The facilitation of an active trading market in the Upper and Lower Namoi Groundwater sources allows for a market–based demand solution to deliver the available water resource to the most productive and economical operations while protecting from overall growth in usage using the long–term average annual extraction limit for each respective water source. Through the water allocations market, 66,463 megalitres of water was transferred over the evaluation period for commercial purposes with a total consideration of $4,206,663. Additionally, 1,878 shares were permanently transferred (assignment of rights) for commercial consideration at a total value of $4,529,900. Note: these figures are representative of 71T and 71Q trades respectively. Transfer of licences under Section 71M of the Act were not included for the purpose of this report. ***References:***	**Poor**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
		Aither 2016, Water markets in New South Wales: market outcomes, trends and drivers, Aither Pty Ltd.	
Change in structural integrity of the aquifer.	• Protect maintain and, where practicable, enhance ecosystems dependent on groundwater, and the cultural and spiritual values of groundwater, by minimising the impacts on these of groundwater extraction • Protect the structural integrity of the aquifers and groundwater quality, by ensuring groundwater extraction does not result in any aquifer compaction, aquitard compaction, land subsidence or change in the beneficial use of the aquifer • Manage access to the extraction limits to ensure there are no long–term declines in water levels	**Change in saturated thickness and water table pressure fluctuations** **No reports of land subsidence or reduced bore yields have been received from extractors.** Following community meetings in 2008 regarding the groundwater status in the Lower Namoi, trading was restricted in areas showing long–term water level decline and significant drawdowns. These restrictions took effect from 10 November 2008 and were implemented to limit further impacts from additional water being traded into these areas of greater impact. Trading restrictions have not been removed to date. In 2007 a Temporary Water Restriction Order under Section 323 of the Water Management Act 2000 was introduced to restrict groundwater extraction in the upstream portion of Upper Namoi Zone 11 Water Source. These restrictions were introduced because of the water shortage identified in Maules Creek and in the alluvial aquifer associated with the Creek upstream of Elfin Crossing. This was in response to concerns raised by landholders in the Maules Creek catchment on the impact of pumping groundwater for irrigation on stock and domestic groundwater wells and pools in Maules Creek. These restrictions were put in place from December 2007 until August 2009 when they were replaced by a Temporary Water Restriction Order under Section 324 of the Act. This order ceased on 30 June 2010 and was not reinstated due to the more favourable climatic conditions at the beginning of the 2010–2011 water year. **Further reading:** Ali, A., Merrick, N.P., Williams, R.M, Mampitiya D, D 'Hautefeuille, F and Sinclair, P. 2004. Land Settlement due to Groundwater Pumping in the Lower Namoi Valley of NSW.	**Good**
Extent to which domestic and stock rights (BLR) requirements,	• Manage access to the extraction limits to ensure there are no long–term declines in water levels.	**BLRs have not been restricted during the evaluation period.** A small number of complaints by groundwater users in the Upper and Lower Namoi areas about changes in reliability of water were	**Good**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
domestic and stock access licence requirements and local water utility requirements have been met.	• Preserve basic landholder rights access to these groundwater sources and ensure the fair, equitable and reliable access to groundwater through the management of local impacts or interference effects	investigated by DPIE, it was assessed that changes in reliability to be due to the prevailing climate and limited bore depth issues. In 2007 a Temporary Water Restriction Order under Section 323 of the Water Management Act 2000 was introduced to restrict groundwater extraction in the upstream portion of Upper Namoi Zone 11 Water Source. These restrictions were introduced because of the water shortage identified in Maules Creek and in the alluvial aquifer associated with the Creek upstream of Elfin Crossing. This was in response to concerns raised by landholders in the Maules Creek catchment on the impact of pumping groundwater for irrigation on stock and domestic groundwater wells and pools in Maules Creek. These restrictions were put in place from December 2007 until August 2009 when they were replaced by a Temporary Water Restriction Order under Section 324 of the Act. This order ceased on 30 June 2010 and was not reinstated due to the more favourable climatic conditions at the beginning of the 2010–2011 water year. **Full entitlement was available at all times for licenced domestic and stock use** via annual available water determinations of 100%. No domestic and stock licences have been issued in these water sources. **Full entitlement was available at all times for local water utility use** via annual available water determinations of 100%. There have been no verified reports of interference impacts on bores accessing water for local water utility use. ***References*** AWDs issued throughout the plan term, available from the DPIE Water Register at: http://www.water.nsw.gov.au/water–licensing/registers	
Extent to which native title rights requirements have been met (and extent to which water has been made available and	• Manage access to the extraction limits to ensure there are no long–term declines in water levels. • Preserve basic landholder rights access to these groundwater sources and ensure the fair, equitable and reliable access to groundwater through the	**No native title rights for water were established in the plan area prior to or during the plan term**. Native title rights for water that where established under the Commonwealth Native Title Act 2003, are recognised, protected and prioritised by the plan under basic landholder rights provisions**.** **No Aboriginal Cultural access licences have been issued in this plan area.** Aboriginal cultural use of water is recognised by the plan.	**Good**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
used for Aboriginal purposes)	management of local impacts or interference effects	Licences for Aboriginal cultural use may be granted within specified limits. ***References*** *Native title determinations at:* http://www.nntt.gov.au/searchRegApps/Pages/default.aspx *Licence information available from the DPIE Water Register at:* http://www.water.nsw.gov.au/water–licensing/registers	
Extent of recognition of spiritual, social and customary values of groundwater to Aboriginal people	• Protect maintain and, where practicable, enhance ecosystems dependent on groundwater, and the cultural and spiritual values of groundwater, by minimising the impacts on these of groundwater extraction • Manage access to the extraction limits to ensure there are no long–term declines in water levels. • Contribute to the protection, maintenance and enhancement of the economic viability of groundwater users and their communities in the Namoi Valley. • Ensure opportunities for market–based trading of groundwater access licence rights within sustainability and interference constraints.	Native title rights for water and Aboriginal cultural licences are addressed above. The plan does not directly address or manage the recognition of spiritual, social and customary values beyond providing mechanisms to access water for cultural purposes. Some groundwater plans provide protection to cultural heritage sites through bore set back distances and associated extraction limits DPIE will continue to work with Aboriginal communities to identify opportunities to better address the needs and aspirations of the Aboriginal communities in terms of equitable access to water for social, cultural, spiritual and economic use of water.	**Poor**

Appendix 4: Upper and Lower Namoi– internal logic relationship diagrams

Relationship diagrams show the internal Plan logic supporting the delivery of each of the Plan's outcomes. One diagram has been created for each of the economic, social / cultural and environmental outcomes. The diagrams show linkages from the broad objectives (navy boxes) to the targeted objectives (blue boxes) and the rules (grey boxes). Where gaps in the program logic have been identified, these are shown as 'not specified' in the appropriate coloured box.

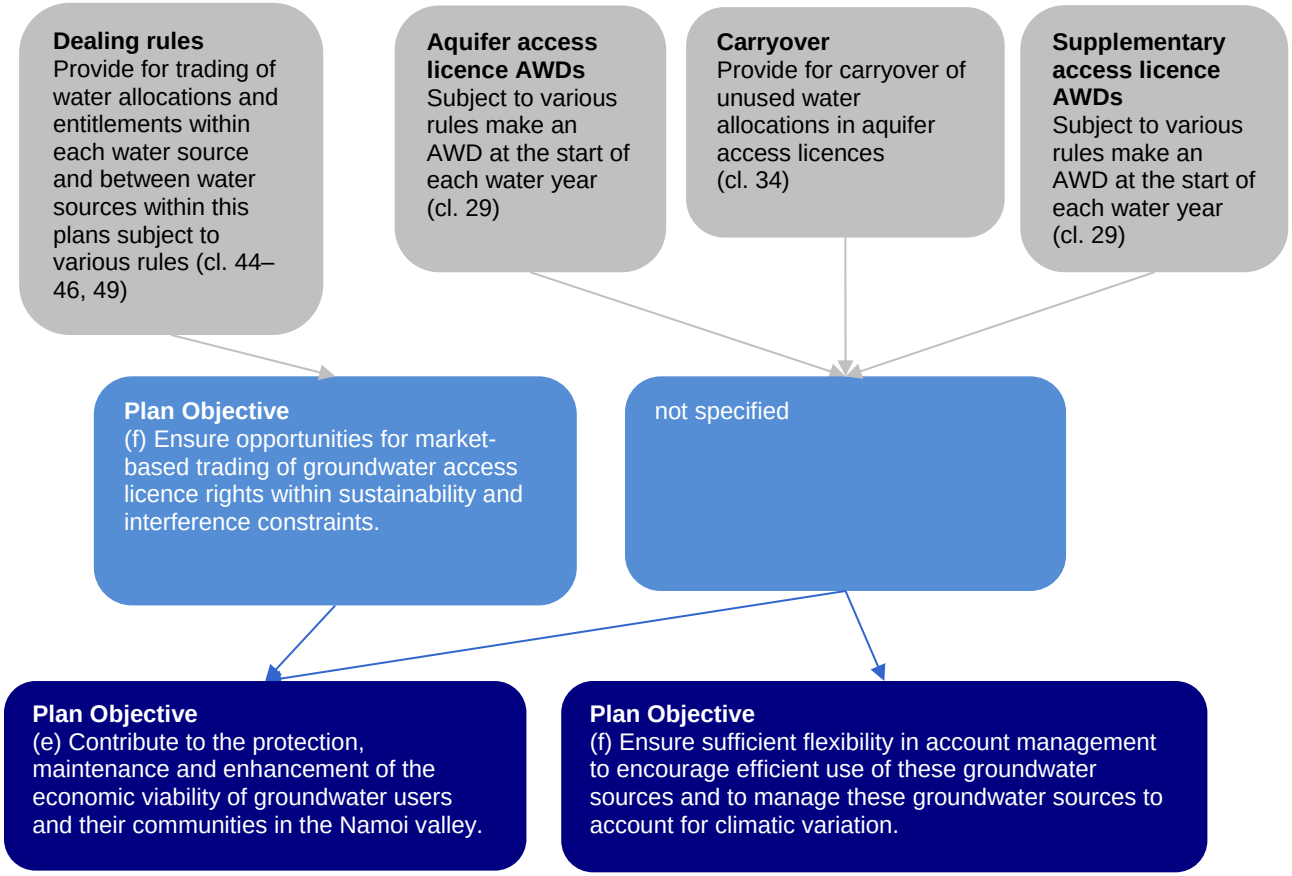

Figure 6: Upper and Lower Namoi Groundwater WSP – Economic internal logic relationship diagram

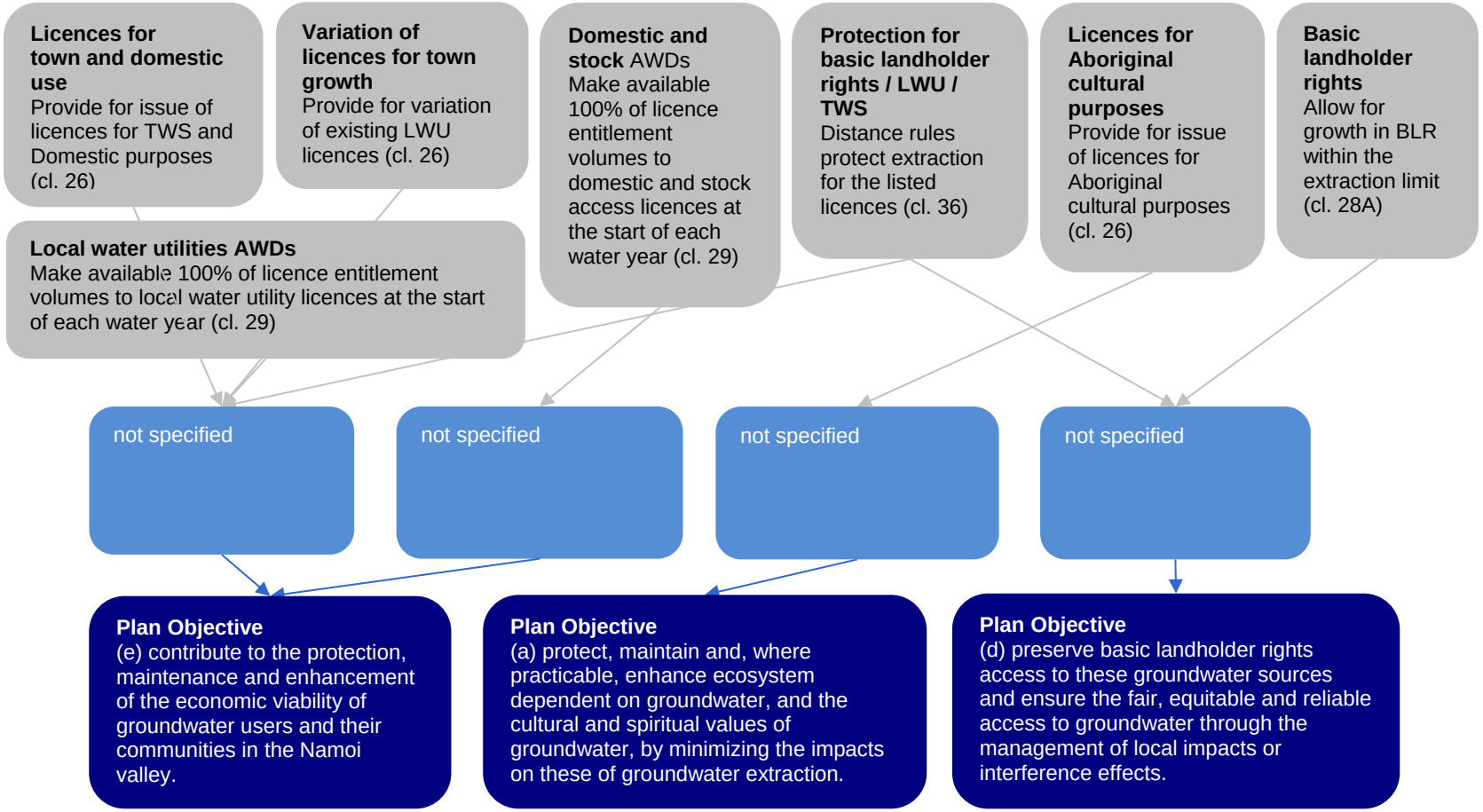

Figure 7: Upper and Lower Namoi Groundwater WSP – Social/Cultural internal logic relationship diagram

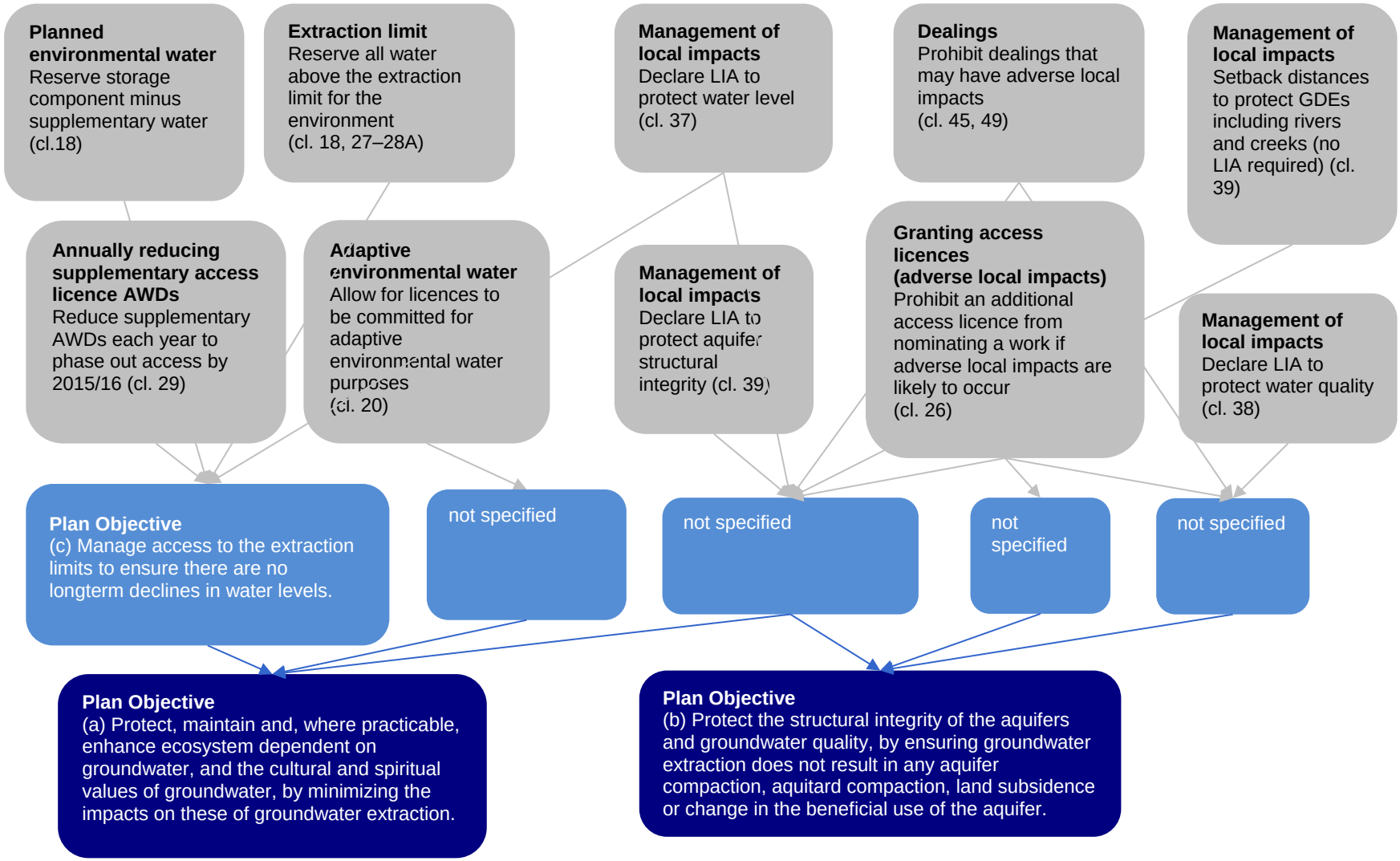

Figure 8: Upper and Lower Namoi Groundwater WSP – Environmental internal logic relationship diagram

Appendix 5: Lower Macquarie – evaluation report cards and performance indicator summary

Table 9: Lower Macquarie Groundwater WSP Appropriateness Evaluation Report Card

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
Plan scale	Is the scale of the Plan appropriate for water management?	Extent to which scale is appropriate for water sharing management	**The geographic scale of the water source in the Plan is considered appropriate for water sharing management**.			
Plan scope	Is the scope of the Plan appropriate for water management?	Extent to which interactions with other water sources are addressed appropriately within the Plan or other water sharing plans	**The Plan does not adequately recognise the interactions with other groundwater or surface water sources** (The Plan does include provision of setback distances to rivers, and the contribution of rivers to the groundwater storage through the calculation of the extraction limit). The Plan includes aquifers of the GAB. However, it does not include strategies to manage the interaction with the GAB outside the WSP boundaries.		Consider reviewing the WSP scope to achieve greater recognition of surface water and aquifer interactions with other identified connected water sources.	High
Prioritisation	Is the level of management required under the Plan appropriate for the risk to environmental, economic, or	Extent of risk to groundwater–dependent ecosystems, economic, and social and cultural values	**The prioritisation of the Plan as high risk is considered appropriate.** The level of management applied is considered appropriate based on high levels of pre plan groundwater allocation.			

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
	social and cultural values?	Extent to which risk is addressed	**The Plan provides for extraction to be limited to the long–term average extraction limit.** The plan sets rules for compliance against the extraction limit that includes reducing the AWD in a groundwater source if assessed necessary to bring average usage back to the extraction limit.			
			Plan rules allow local impact areas can be declared in critical areas. The Act also allows for temporary water restrictions to be imposed via section 324 orders.		Consider reviewing the use of plan based local impact area rules and the use of 324 Orders under the Act to minimise confusion and improve transparency.	High
		Identified future risks, including climate change, interception, change in industry base, etc.	**Climate change is not adequately addressed in the Plan as the extraction limit is based on historic climate rather than expected future climate predictions. The plan does provide for revised recharge estimates and amendments to the recharge figures and extraction limits.**		Consider reviewing recharge for climatic changes.	High
Internal logic	Is the vision appropriate for	Whether the vision reflects what is intended for water sharing	**The vision is considered**			

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
	water management?	plans in the Act	**appropriate** as it is consistent with the Act's intent for water sharing plans to achieve economic, social and environmental outcomes.			
	Are the objectives suitable for water management?	Whether the objectives align with the vision	**The objectives align with the plan vision.**			
		Whether the objectives align with the principles and objects of the Act	**The objectives align with the principles and objects of the Act.**			
		Extent to which the objectives are clear and comprehensive enough to reflect what the Plan intended to achieve	**The objectives do not represent a full list of the Plan's intended outcomes**. The objectives are all broad and do not clearly link to plan strategies or rules through targeted objectives – these are often included as notes to the objective.		Consider whether additional objectives should be developed to allow an effective evaluation of the Plan. Both clear broad and targeted objectives should be established to achieve specific economic, social and environmental outcomes.	High
		Extent to which the plan logic establishes SMART (Specific,Measurable,Attainable, Realistic, Time–bound) objectives	**The plan logic fails to set objectives which can be evaluated using SMART criteria.**		Consider whether plan logic should be reconsidered to improve measurement of success.	High
	Are the strategies suitable for water	Whether all plan rules are linked to a strategy	**All plan rules can be linked**		Consider whether	High

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
	management?		**to a strategy.**		more appropriate strategies should be developed. Current strategies relate to plan structure headings only and do not adequately show how the objectives will be achieved (targeted objectives). This is important as the Act requires performance indicators to be used to assess plan strategies.	
		Whether the strategies provide clear direction for the plan rules	**Strategies could be more specific** to guide the intent of the plan rules and to highlight the links with their intended outcomes.			
		Whether the strategies align with the objectives	**Not all strategies align with the objectives.** Most strategies point to the establishment of rule sets, but not to the intent or outcome of the rule sets.			
	Are the performance indicators suitable for water management?	Whether the performance indicators align with the objectives and strategies	**Most performance indicators align to the objectives.** However, in some cases performance indicators specified for an objective do not reflect the objective and in other cases additional performance indicators are required, for example in relation to GDEs.		Review alignment and relevance of performance indicators and measures against each objective and strategy.	
		Extent to which performance indicators are clear and comprehensive enough to measure what the Plan intended to achieve	**Most performance indicators are clear.** Additional measures are available for many performance indicators and have been included in this evaluation where possible.			

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
Quality of Supporting Documentation	Is documentation explaining the decisions underpinning the Plan available	Adequacy of documentation supporting the Plan	**The Plan has a comprehensive "Part A" document supporting plan development available internally.** **An implementation Program is available from the Government Gazette via the DPIE website.**			
		Extent to which documentation is made available to the public	**The "Part A" document was publicly available during the plan's initial exhibition period but is no longer publicly available. An implementation Progress Report is available.** No reports specific to the plan area (other than the Implementation Program) are available on the DPIE website.		Consider making the "Part A" document available of the website.	Low
Communication	Is the process for communication with stakeholders adequate	Extent of communication and processes supporting plan development	**Extensive consultation was carried out during plan development**, with the Lower Macquarie Groundwater Management Committee meeting to explore issues and develop management strategies. The Plan was placed on public exhibition.			
		Communication arrangements in place during plan operation	**Communication on operational matters has been appropriate, based on the management decisions being made.** During drought			

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
			periods, frequent discussions were held with water users. When conditions were good, communication has been on an as needs basis.			
		Arrangements for consideration at term review of Plan	**Sufficient opportunity will be provided for communication during the water resource plan development process**. Consultation will involve opportunities to make submissions, and face to face meetings will be held with stakeholders.			
Alignment with state priorities for natural resource management plans (S43A)	Is the Plan aligned with state priorities for natural resource management?	Extent of alignment of Plan with state priorities	**While the State priorities align clearly with the vision of the Plan. The alignment between the other internal logic elements could be clearer.** The 2016 NRC review of this Plan identified three key State Priorities for Water Sharing Plans: • Productive and resilient water–dependant industries, • Secure long–term water supplies for urban and rural communities, and • Healthy and reesilient water–dependant ecosystems.		Consider reviewing the alignment of Plan objectives with state priorities for natural resource management during the development of the Water Resource Plan (WRP).	High

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
			Note: the Plan was in place prior to the development of the state priorities for natural resource management and so full alignment is not expected.			

Table 10: Lower Macquarie Groundwater WSP Efficiency Evaluation Report Card

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
Basis for water sharing	Recharge	Were any changes made to annual average recharge estimates?	**No changes to average annual recharge estimates were made.**		Consider results of any new or updated groundwater models at term review.	Medium
		Were the required reviews completed within the specified timeframes?	**Reviews were not completed**		Consider the requirement to review the recharge estimates and undertake such a review if it is deemed necessary	Medium
Environmental water provisions	Planned environmental water	Was all water contained in the storage component of these water sources reserved for the environment?	**The water reserved each year for the environment was in acordance with the planned environmental water requirements and account management provisions.**			
		Was supplementary access to the storage component phased out to ensure all water in the storage was reserved for the environment?	**Supplementary water acccess was reduced annually so that it was phased out by the end of the plan term in accordance with the Plan rules.**			
		Was all water above the recharge extraction limit reserved?	**Extraction limits were complied with in all years.** Over the period (2006/07 to 2014/15) the percentage of the plans extraction limt used in each groundwater source is as follows: Lower Macquarie Zone 1 – 61% Lower Macquarie Zone 2 – 51% Lower Macquarie Zone 3 – 45% Lower Macquarie Zone 4 – 68%			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			Lower Macquarie Zone 5 – 14% Lower Macquarie Zone 6 – 50% *Note: 15% of the long–term average recharge, minus basic landholders rights requirements at the commencement of the plan, is reserved as planned environmental water under the Plan,but can be amended based on further studies of groundwater ecosystem dependency.* *Note: Planned environmental water provisions are implemented via limits to extraction.*			
		Were the extraction limits amended based on further recharge models and studies?	**No changes to extraction limits based on further average annual recharge estimates were made.**			
		Were the required reviews completed within the specified timeframes?	**Reviews were not completed**		Consider the requirement to review the reserved recharge and undertake such a review if it is deemed necessary	Medium
	Adaptive environmental water	Is there a process for licences to be committed for adaptive environmental purposes?	**All necessary systems are in place to apply and manage conditions should they be requested.** *Note: No licences have been committed as AEW in the plan area.*			
Basic Landholder Rights	Domestic and Stock	Are domestic and stock BLR provided for within the Plan?	**Domestic and stock BLR access is provided for in the Plan**.			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		Is domestic and stock BLR growth provided for within the Plan?	**Procedures are in place to allow for growth in domestic and stock BLR whilst maintaining extraction limit compliance.**			
		Have interference management strategies been required?	**Interference management strategies to address impacts on BLR bores have been continued in Zone 4. Interference strategies in other zones have not been required in this plan area.** Work approval holders nominated to AALs agreed to slow or halt extraction in Zone 4 when thresholds, based on DPIE groundwater level monitoring, are reached. The agreement to link extraction to groundwater level triggers has now been converted to a work approval condition for bore owners within this groundwater source. This was done to limit drawdown impacts on BLR bores			
		Are domestic and stock BLR consistent with reasonable use guidelines?	**Reasonable use guidelines (made under s.52 of the Act and provided for in the Plan) have not been made by the Minister.**		Endeavour to finalise and publish the reasonable use guidelines as a matter of priority.	High
	Native title	Are native title BLR provided for within the Plan?	**Procedures are in place to provide access if native title rights for water are granted in any of the water sources covered by this Plan.** *Note: No native title rights for water have been established in this plan area.*			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		Is growth in native title BLR protected within the Plan?	**Procedures are in place to allow for growth in native title BLR whilst maintaining extraction limit compliance.**			
Requirements for water for extraction under access licences	Conversion of access licences from *Water Act 1912* to *Water Management Act 2000*	Were licences established with share components calculated according to plan rules?	**All licences were established with share components calculated in line with Plan specifications**.			
	Changes to share components	Were the share components for supplementary licences reduced to 0 on 1st July 2015?	**Supplementary access has been reduced each year as part of a staged phase out of this licence category. Supplementary access licenes in this water source have now been cancelled.**			
Rules for granting access licences	Granting new access licences	Were plan rules followed for the granting of access licences?	**All access licences granted were in line with the plan provisions.** The Water Management (General) Regulations 2004 and 2011 set out the specific purpose access licences for which applications can be accepted in line with the Plan.			
Limits to the availability of water	Extraction limits	Was an extraction limit established?	**Extraction limits were established for the water sources**.			
	Variation of extraction limits	Were extraction limits varied?	**No changes to extraction limits have been made.** Changes to the extraction limits can occur after recharge is reviewed. The Plan provided for two reviews of the average annual recharge by specified dates if the Minister intended to amend the WSP to change the extraction limit.			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
	Extraction limit compliance	Were rules regarding compliance with the extraction limit implemented?	**The extraction limits were complied with in all years.**			
	AWDs	Were the rules for the making of AWDs for domestic and stock and local water utility aquifer access licences implemented?	**All AWDs were announced when required in accordance with the plan rules.**			
		Were the rules for the making of AWDs for aquifer access licences implemented?	**All available water determinations were announced when required in accordance with the plan rules.**			
		Were the rules for the making of AWDs for supplementary water aquifer access licences implemented?	**All available water determinations were announced when required in accordance with the plan rules and had the correct annual reductions applied.**			
Rules for managing access licences	Water allocation and account management	Were water allocation accounts established?	**Water allocation accounts were established for all licence holders.**			
		Were water allocations accrued annually?	**All accounts were credited annually following available water determinations.**			
		Was water extraction accounted for at least annually?	**All accounts were debited and credited in line with plan provisions.** A small number of accounts fell below zero.		Review account management practices to ensure all functions are undertaken in line with plan provisions.	Medium

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
	Management of local impacts	Were local impact areas established?	**No local impact areas have been required to be established.** Work approval holders nominated to AALs agreed to slow or halt extraction in Zone 4 when thresholds, based on DPIE groundwater level monitoring, are reached. The agreement to link extraction to groundwater level triggers has now been converted to a work approval condition for bore owners within this groundwater source. *Note: Amendments to the Act in 2009 provided an alternative procedure for dealing with short term localised impacts.*		Review the local impact management mechanisms available in the Plan and in the Act to ensure consistency and transparency.	High
		Was extraction interference between neighbouring bores managed?	**All approvals for new and replacement bores have been issued in line with the rules for minimum distance between neighbouring bores.** *Note: Distance requirements are included as a condition on new and replacement bore works approvals. Licence holders and licensed drillers are required to comply with these conditions.* *In some cases new or replacement works were within specified distances, however, in each case a DPIE hydrogeologist assessed the impacts as provided for in the Plan*			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			and found that they would be minimal.			
		Were water levels monitored and managed if required?	**Water levels have been monitored during the plan term.** Work approval holders nominated to AALs agreed to slow or halt extraction in Zone 4 when thresholds, based on DPIE groundwater level monitoring, are reached. The agreement to link extraction to groundwater level triggers has now been converted to a work approval condition for bore owners within this groundwater source. *Note: Amendments to the Act in 2009 provided an alternative procedure for dealing with short term localised impacts.*		Consider amending the Plan at term review to include the local water level thresholds in Zone 4.	High
		Was water quality monitored and managed if required?	**Some water quality monitoring has been undertaken**. There is currently no water source scale groundwater quality monitoring program. **No impact areas for water quality management have been required**.		Consider options for further water quality monitoring to improve water quality management outcomes.	Medium
		Was a baseline of electrical conductivity established in year 6 of the Plan?	**Some groundwater quality monitoring was undertaken by DPIE; however, it was not enough to establish the baseline.**		Review the need to establish a baseline of electrical conductivity, and if required	

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			The Plan states an electrical conductivity baseline will be set in year 6 of the Plan, against which changes in water quality will be measured. A monitoring program was undertaken from 2011 to 2014 however it was not sufficient to establish a baseline.		establish this at plan term review.	
		Were groundwater dependant ecosystems (GDEs) protected?	**No scheduled GDEs are listed.** Setback rules for new bores with respect to GDEs could not be implemented because there were no GDEs in the Schedule. **No additional GDEs were identified and included in the relevant schedule during the plan term.**		Ensure the addition of relevant GDEs to the relevant WSP schedule if/when they are identified.	High
		Were rivers protected?	**Rivers were protected through the application of setback distances for new bores.** No new BLR bores or production bores were permitted within setback distances applying to rivers. *Note: These rules are established in the GDE protection clause of the Plan.*			
		Was aquifer integrity protected?	**Aquifer integrity was protected.** This assessment is based on groundwater level monitoring (including the stabilisation and/or recovery of groundwater levels). There is currently no information available regarding land		Continue groundwater level monitoring and investigate if reports of subsidence, aquifer compaction or reduced bore yield are received.	Medium

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			subsidence or reduction in bore yields. **No local impact areas for aquifer integrity management have been required.**			
		Were extraction restrictions required?	**Alternate management strategies were implemented under the Act during the plan term.** Restrictions by the Minister on pumping rates and times have not been implemented in relation to local impact areas. However, the alternate management strategy implemented under the Act during the plan term required conditions to be included on work approvals for bores in Zone 4 which restrict extraction when triggers in the DPIE monitoring bores are reached.		Review the local impact management mechanisms available in the Plan and in the Act to ensure consistency and transparency.	High
		Was group registration required?	**No local impact areas have been required to be established. These provisions have not been required.**			
		Were there any failures of monitoring bores that are relied on to manage local impact restrictions?	**No local impact areas have been required to be established. These provisions have not been required.**			
Dealings	Minister's dealing principles	Were dealings in line with the Minister's	**All dealings have been made in line with Minister's dealing principles**.			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		dealing principles, the Act and the WSP?	*Note: Prohibited dealings in this plan area include conversions of access licence categories and interstate (transfer and assignment of allocation).*			
	Constraints within water source	Were dealings in line with rules relating to constraints within the water source?	**All dealings were undertaken in line with plan rules relating to constraints within the water sources**.			
	Change of water source	Were dealings in line with rules relating to change of water source?	**Clause 46 of the WSP requires review as it currently appears that it is self–contradictory.**		Review Clause 46 of the WSP and consider redrafting for clarity.	Medium
	Water allocation assignment between water sources	Were dealings in line with rules relating to allocation assignments between water sources?	**All dealings were in line with rules permitting allocation assignment trade between the groundwater sources of the Plan.**			
Mandatory conditions	Access licence conditions	Were mandatory conditions for access licences placed on licences?	**Mandatory conditions have been applied to access licences.** DPIE undertook a conditions reform project and developed guidelines for drafting conditions. As water sharing plans are remade DPIE is progressively reviewing conditions and, where relevant will apply conditions with improved wording and confirm appropriate application of the conditions.		Endeavour to ensure all conditions meet DPIE's new SMART conditions criteria in the next planning cycle.	Medium
	Water supply works approvals	Were mandatory conditions for works approvals placed on the works approvals?	**Mandatory conditions have been applied to work approvals.** DPIE undertook a conditions reform project and developed guidelines for drafting conditions.		Endeavour to ensure all conditions meet DPIE's new SMART conditions criteria in the next planning cycle.	Medium

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			As water sharing plans are remade DPIE is progressively reviewing conditions and, where relevant will apply conditions with improved wording and confirm appropriate application of the conditions.			
Plan Amendments	Annual average recharge	Were any amendments to annual average recharge made?	**No amendments to the average annual recharge have been made**.			
	Planned environmental water	Were any amendments made to planned environmental water?	**There have been no amendments to planned environmental water**.			
	Extraction limit	Were any amendments made to the extraction limit?	**The Plan was amended following gazettal but prior to commencement to include supplementary licences. There have been no further amendments.**			
	High priority GDEs	Was it necessary to amend GDE schedules in plans?	**There have been no amendments to the relevant schedule to include additional GDEs.**		See recommendations under ‘Were GDEs protected?’	
	Planned environmental water (Water recovery programs)	Were any amendments made to planned environmental water as a result of water recovery programs?	**No changes allowed for in the Plan have been made to environmental water provisions.**			
	Amendments made under s.45 (a) of the Act but not identified in the Plan	Were any further amendments made to the Plan?	**Subsequent to the making of the Plan some drafting errors were identified and have been corrected by amendment.**			

Table 11: Lower Macquarie Groundwater WSP Effectiveness Evaluation Report Card

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
Maintain, and if necessary restore groundwater–dependent ecological processes and biodiversity	• Change in groundwater extraction relative to the extraction limits. • Change in climate adjusted groundwater levels. • Change in structural integrity of the aquifer • Change in groundwater quality relative to beneficial use • Change in water levels adjacent to identified groundwater–dependent ecosystems. (Change in condition of GDEs (incl. rivers and creeks) due to groundwater level changes)	**There are no high priority dependent ecosystems listed in the relevant plan schedule. A GDE identification process is in progress.** **Ecological health is supported by the establishment of an extraction limit which reduced annually throughout the plan term. Extraction was within the extraction limit for all years of the plan.** Over the period (2006/07 to 2014/15) the percentage of the plans extraction limt used in each groundwater source is as follows: Lower Macquarie Zone 1 – 61% Lower Macquarie Zone 2 – 51% Lower Macquarie Zone 3 – 45% Lower Macquarie Zone 4 – 68% Lower Macquarie Zone 5 – 14% Lower Macquarie Zone 6 – 50%		**Poor**	Complete identification of relevant GDEs and include them in the Plan as appropriate.	High
Optimise or maximise the social outcomes of groundwater management	• Change in groundwater extraction relative to the extraction limits. • Change in climate adjusted groundwater levels.	**Basic landholder rights, domestic and stock, and local water utility needs were provided at all times with full access to water during the plan term. Priorities of access were**		**Good**		

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
	• Change in structural integrity of the aquifer. • Extent to which domestic and stock rights (BLR) requirements (and domestic and stock access licence requirements) have been met. • Extent to which local water utility requirements have been met.	**maintained as per the requirements of the Act.** Over the period (2006/07 to 2014/15) the percentage of the plans extraction limt used in each groundwater source is as follows: Lower Macquarie Zone 1 – 61% Lower Macquarie Zone 2 – 51% Lower Macquarie Zone 3 – 45% Lower Macquarie Zone 4 – 68% Lower Macquarie Zone 5 – 14% Lower Macquarie Zone 6 – 50% Water level drawdowns are monitored across the groundwater source. However, the value of this information as an indicator of long–term decline is limited as drawdown is seasonal. It is suggested that more appropriate performance indicators should be developed to assess this objective.				
Contribute to a sustainable regional economy	• Change in groundwater extraction relative to the extraction limits. • Change in climate adjusted groundwater levels. • Change in structural integrity of the aquifer. • Change in economic benefits derived from groundwater extraction and use.	**This Plan was developed with an understanding that the pre–plan entitlement and extraction levels in the groundwater source were unsustainable. As a result, the plan rules established an extraction limit which reduced annually in line with reductions in available water for supplementary access licences in three groundwater sources. As a result, it was recognised prior to plan commencement that achieving sustainability for the environment would result in**		Moderate	Consider clearer identification of SMART objectives and PIs, related to the Plan rules and differentiated from external factors, to the extent possible.	

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
	• Extent to which local water utility requirements have been met.	**significant economic impact. This impact was partially offset by a structural adjustment package, which provided approximately $11 million to licence holders and communities to allow for adjustment to the entitlement reductions.** **Throughout the plan period, water allocations were at the full allocation allowed under the plan rules, ensuring economic benefits were maximised within the limitations of the plan rules.** **The introduction of fully tradeable groundwater access licences with a wide range of allowed dealings has resulted in greater account management and trading flexibility. This has been a significant change to groundwater management, as well as enabling water users to gain improved control over managing their exposure to risk around their water account and portfolio. However, these changes cannot be clearly differentiated in economic data broader economic, social and climate factors.** **Therefore, while it can be reasonably concluded that the Plan contributed to economic benefits and a sustainable regional economy, it is**				

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
		recommended that clearer identification of SMART objectives and PIs, related to the Plan rules are developed.				
Recognise and respect Aboriginal cultural responsibilities and obligations to the landscape	• Extent to which native title rights requirements have been met (and water has been made available and used for Aboriginal purposes) • Extent of recognition of spiritual, social and customary values of water to Aboriginal people.	**There are no Performance Indicator results available to evaluate this objective** **The Plan does not directly recognise and respect Aboriginal cultural responsibilities and obligations to the landscape other than providing mechanisms to access water for cultural purposes under Native Title rights and Aboriginal Cultural access licences. Neither of which have been accessed during the evaluation period.**		**High**	Continue to work with Aboriginal communities to identify opportunities to better address the needs and aspirations in terms of equitable access to water for social, cultural, spiritual and economic use of water.	High
Preserve and enhance the cultural benefits and values derived from groundwater	• Extent of recognition of spiritual, social and customary values of groundwater to Aboriginal people. *Additional identified performance indicator:* • Extent to which native title rights requirements have been met (and water has been made available and used for Aboriginal purposes)	**There are no Performance Indicator results available to evaluate this objective** **The Plan does not directly protect or maintain cultural benefits and values other than providing mechanisms to access water for cultural purposes under Native Title rights and Aboriginal Cultural access licences. Neither of which have been accessed during the evaluation period.**		**High**	Continue to work with Aboriginal communities to identify opportunities to better address the needs and aspirations in terms of equitable access to water for social, cultural, spiritual and economic use of water.	High

Table 12: Lower Macquarie Groundwater WSP – Performance Indicator Results Summary

Performance Indicator	Related Plan Objectives	Results	Strength of Information
Change in groundwater extraction relative to the extraction limits.	• Maintain, and if necessary restore groundwater–dependent ecological processes and biodiversity • Optimise or maximise the social outcomes of groundwater management • Contribute to a sustainable regional economy	**The long–term average annual extraction limit reduced each year in three of the six groundwater sources to align pre–plan entitlement levels to the plan determined portion allocated for extractive uses.** This was a planned reduction supported by a structural adjustment package. **Groundwater extraction remained within the long–term average annual extraction limit during the term of the plan.** **These results show that during the plan term water was accessible for extractive uses up to the plan determined portion and that the water reserved by the plan for the environment was protected. Plan measures were effective in managing extraction to the long–term average annual extraction limits.** ***References:*** NSW Office of Water (2011) *Audit of implementation –Inland alluvial aquifer water sharing plan audit report cards – Prepared for the period between 1 October 2006 and 30 June 2010 covering Lower Murrumbidgee, Lower Murray, Lower Macquarie, Lower Gwydir, Upper and Lower Namoi.* NSW Office of Water, Sydney NSW Office of Water (in press) *Audit of implementation – Inland alluvial aquifer water sharing plan audit report cards – Prepared for the period 1 July 2010 to 30 June 2014 covering Lower Murrumbidgee, Lower Murray, Lower Macquarie, Lower Gwydir, Upper and Lower Namoi,* NSW Office of Water, Sydney	**Good**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
Change in climate adjusted groundwater levels.	• Maintain, and if necessary restore groundwater–dependent ecological processes and biodiversity • Optimise or maximise the social outcomes of groundwater management • Contribute to a sustainable regional economy	**Groundwater is managed on a long–term average basis allowing for groundwater extraction during drier seasons to continue utilising the groundwater storage. Consequently, greater drawdowns are observed in drier periods. Groundwater levels are not routinely adjusted for climate impacts as the absolute groundwater level, irrespective of the cause, is the target for management. Local impact management strategies are adopted, such as in Zone 4, to manage drawdowns to the identified acceptable level.** Groundwater levels are monitored at 116 bores at 71 sites across the Lower Macquarie. This monitoring network includes 46 bores equipped with data loggers that record water levels continuously. An analysis of the groundwater levels during the term of the WSP is provided in the Macquarie Castlereagh Alluvium Water Resource Plan Resource Description report. This analysis shows some areas where the groundwater levels have declined over the plan period and other areas have remained stable. ***References*** DPI Water (In Prep) *Lower Macquarie Castlereagh Alluvial Water Resource Plan Resource Description*. DPI Water, Sydney. Real time data available from the DPIE website at: http://realtimedata.water.nsw.gov.au/water.stm?ppbm=GROUND_WATER&gw&3&gwkm_url	**Good**
Change in water levels adjacent to identified groundwater–dependent ecosystems (and change in condition of GDEs (incl. rivers and creeks) due to groundwater level changes)	• Maintain, and if necessary restore groundwater–dependent ecological processes and biodiversity	**There are no high priority dependent ecosystems listed in the relevant plan schedule however a GDE identification process has commenced. As a result, this performance indicator cannot be assessed.**	**Poor**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
Change in groundwater quality	• Maintain, and if necessary restore groundwater–dependent ecological processes and biodiversity	**A water quality report identified for this plan area found not enough data was available to make water quality trend assessments to 2011. There is no analysed data from monitoring bores available for the period 2012–2015, although the use of available groundwater vulnerability mapping for this plan area may provide additional insights.** A characterisation of several NSW groundwater sources was completed by Parsons Brinckerhoff in 2011. This report covers department monitoring bore information; both pre–plan (from 1999) and plan term for the years 2009–2011. In the plan area, very limited monitoring data was available to assess short and long–term trends in salinity and beneficial use. ***References:*** *Parsons Brinckerhoff (2011) NSW Office of Water Characterisation of hydro–geochemistry and risks to groundwater quality – Impact of groundwater pumping on water quality: National Water Commission – Raising National Water Standards Programme*	**Poor**
Change in economic benefits derived from groundwater extraction and use.	• Contribute to a sustainable regional economy	There is limited information available to measure the change in economic benefits to groundwater users directly as a result of the water sharing plan. The facilitation of an active trading market in the Lower Macquarie groundwater sources allows for a market–based demand solution to deliver the available water resource to the most productive and economical operations while protecting overall growth in usage with the long–term average annual extraction limit for each respective water source. Through the temporary trade market, 15,923 megalitres of water was transferred over the evaluation period for commercial purposes with a total consideration of $1,306,019. Additionally, 1,520 shares were permanently transferred for commercial consideration at a total value of $1,236,718. Note: these figures are representative of 71T and 71Q trades respectively. Transfer of licences under Section 71M of the Act were not included for the purpose of this report. ***References:*** Aither 2016, Water markets in New South Wales: market outcomes, trends and drivers, Aither Pty Ltd.	**Poor**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
Change in structural integrity of the aquifer.	• Maintain, and if necessary restore groundwater–dependent ecological processes and biodiversity • Optimise or maximise the social outcomes of groundwater management • Contribute to a sustainable regional economy	**Change in saturated thickness and water table pressure fluctuations** The majority of monitoring bores have shown predevelopment to 2014 overall recovery declines to be quite small (<20% and <10m) across the plan area, although some zones show large seasonal oscillations. **Reports of land subsidence or reduced bore yields received from extractors** The use of local impact restrictions to manage extraction related issues linked to sediment compaction have not been required within the plan area. The extraction management strategy to address water level decline in the Lower Macquarie Zone 4 Water Source via pumping restrictions based on water level readings in DPIE monitoring bores is to limit impact on BLR bores. Groundwater extraction in Zones 3, 4 and 5 is from consolidated sandstone and therefore the risk of compaction of the aquifer matrix is considered negligible.) **Surveys undertaken** No surveys have been undertaken by DPIE. ***References*** DPI Water (In prep) Lower Macquarie Alluvial Risk Assessment. DPI Water, Sydney. NSW Office of Water (2011) *Audit of implementation –Inland alluvial aquifer water sharing plan audit report cards – Prepared for the period between 1 October 2006 and 30 June 2010 covering Lower Murrumbidgee, Lower Murray, Lower Macquarie, Lower Gwydir, Upper and Lower Namoi.* NSW Office of Water, Sydney NSW Office of Water (in press) *Audit of implementation – Inland alluvial aquifer water sharing plan audit report cards – Prepared for the period 1 July 2010 to 30 June 2014 covering Lower Murrumbidgee, Lower Murray, Lower Macquarie, Lower Gwydir, Upper and Lower Namoi,* NSW Office of Water, Sydney	**Good**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
Extent to which domestic and stock rights (BLR) (and domestic and stock access licence requirements have been met)	• Optimise or maximise the social outcomes of groundwater management	**BLRs have not been restricted** and there have been no verified reports of interference impacts on bores accessing BLR or any reported cases of bores requiring deepening to retain access. There are no clauses in the plan requiring setback distances to address interference between high yield extraction and basic rights bores. **Full entitlement was available at all times for licenced domestic and stock use** via annual available water determinations of 100%. No domestic and stock licences have been issued in this water source. **Full entitlement was available at all times for local water utility use** via annual available water determinations of 100%. There have been no verified reports of interference impacts on bores accessing water for local water utility use. ***References*** *AWDs issued throughout the plan term, available from the DPI Water, Water Register at: http://www.water.nsw.gov.au/water–licensing/registers*	**Good**
Extent to which native title rights requirements have been met, (and water has been made available and used for Aboriginal purposes)	• Optimise or maximise the social outcomes of groundwater management • Recognise and respect Aboriginal cultural responsibilities and obligations to the landscape • Preserve and enhance the cultural benefits and values derived from groundwater	**No native title rights for water were established in the plan area prior to or during the plan term**. Native title rights for water, where established under the Commonwealth Native Title Act 2003, are recognised, protected and prioritised by the plan under basic landholder rights provisions. **No Aboriginal Cultural access licences have been issued in this plan area.** Aboriginal cultural use of water is recognised by the plan. Licences for Aboriginal cultural use may be granted within specified limits. ***References*** *Native title determinations at:* http://www.nntt.gov.au/searchRegApps/Pages/default.aspx *Licence information available from the DPI Water, Water Register at:* http://www.water.nsw.gov.au/water–licensing/registers	**Moderate**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
Extent of recognition of spiritual, social and customary values of groundwater to Aboriginal people	• Recognise and respect Aboriginal cultural responsibilities and obligations to the landscape • Preserve and enhance the cultural benefits and values derived from groundwater	**The plan manages the recognition of spiritual, social and customary values by providing mechanisms to access water for cultural purposes**. Native title rights for water and Aboriginal cultural licences are also addressed above, no native title rights or Aboriginal Cultural licences have been established or issued in the plan area.	**Poor**

Appendix 6: Lower Macquarie– internal logic relationship diagrams

Relationship diagrams show the internal Plan logic supporting the delivery of each of the Plan's outcomes. One diagram has been created for each of the economic, social / cultural and environmental outcomes. The diagrams show linkages from the broad objectives (navy boxes) to the targeted objectives (blue boxes) and the rules (grey boxes). Where gaps in the program logic have been identified, these are shown as 'not specified' in the appropriate coloured box.

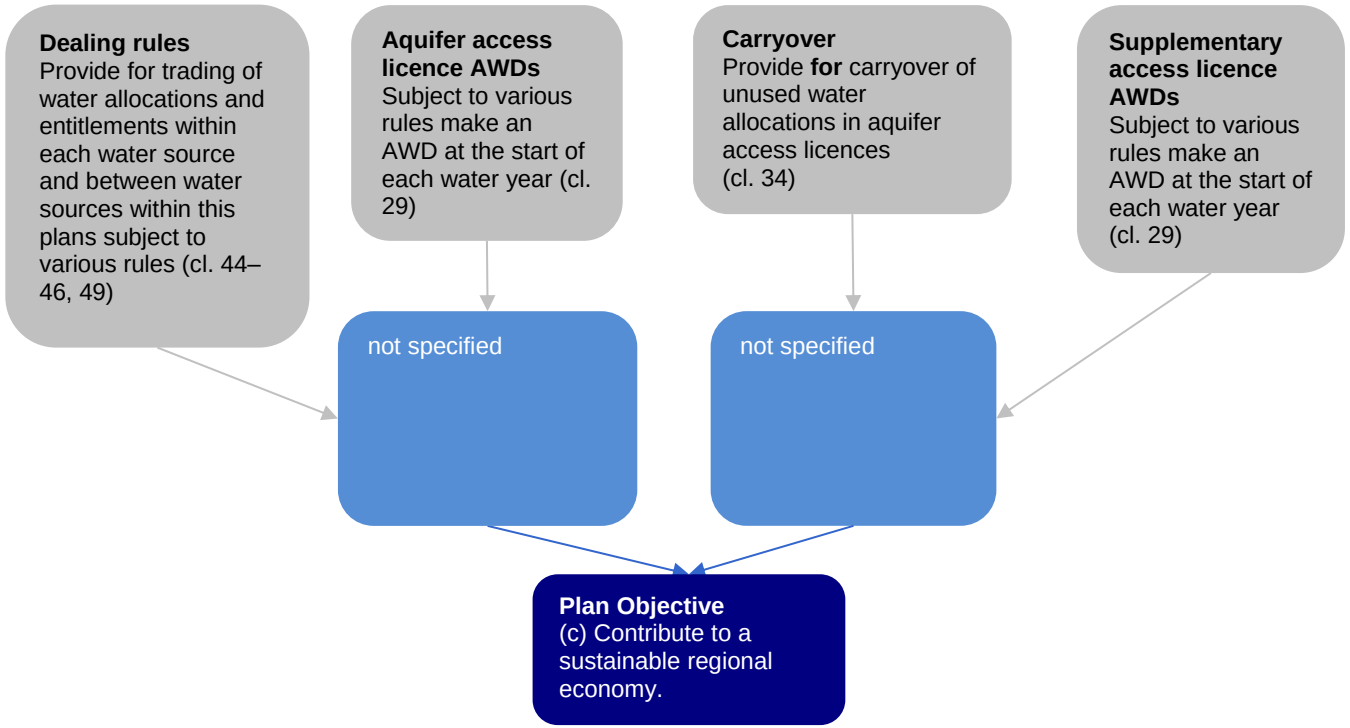

Figure 9: Lower Macquarie Groundwater WSP – Economic internal logic relationship diagram

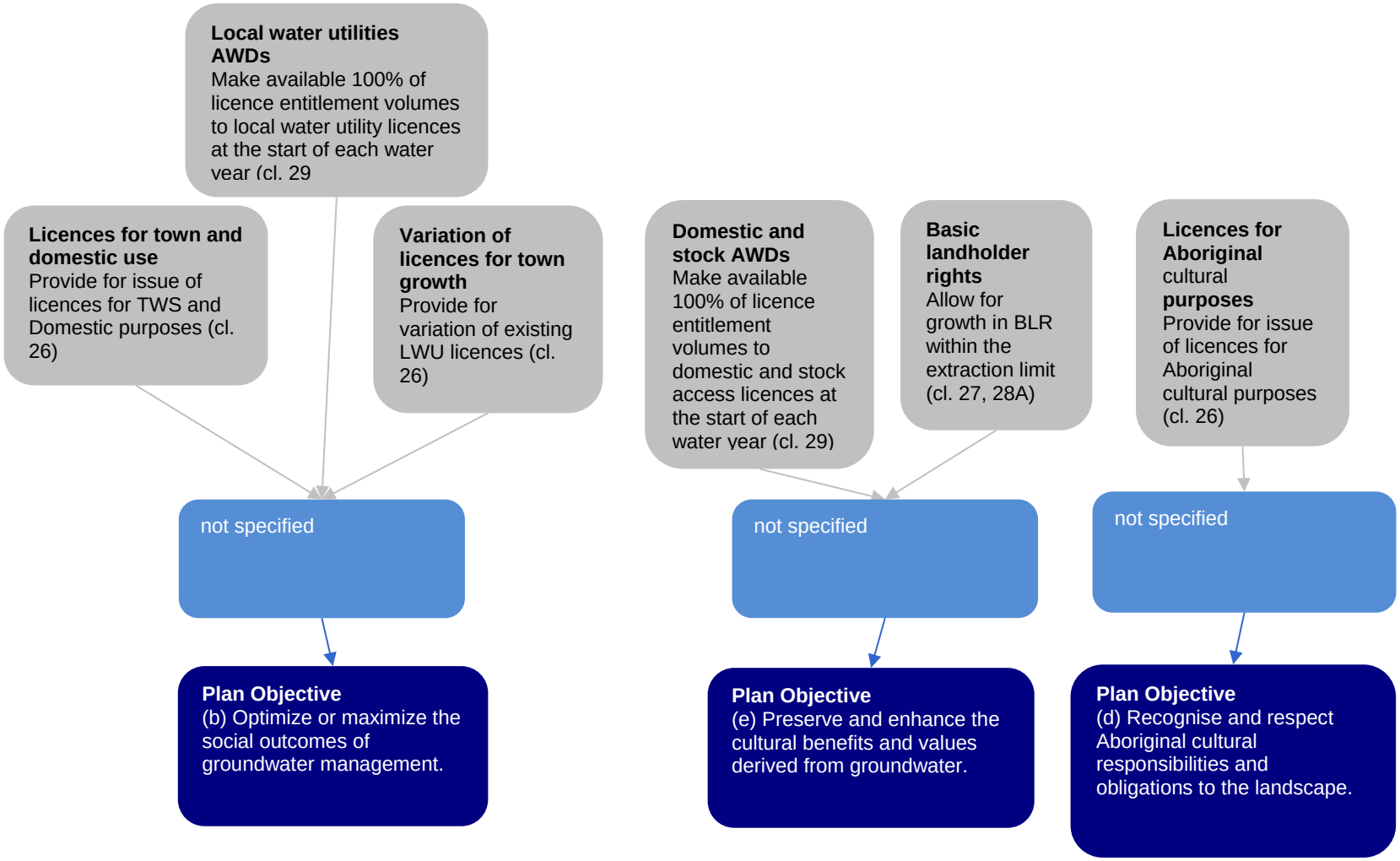

Figure 10: Lower Macquarie Groundwater WSP – Social/Cultural internal logic relationship diagram

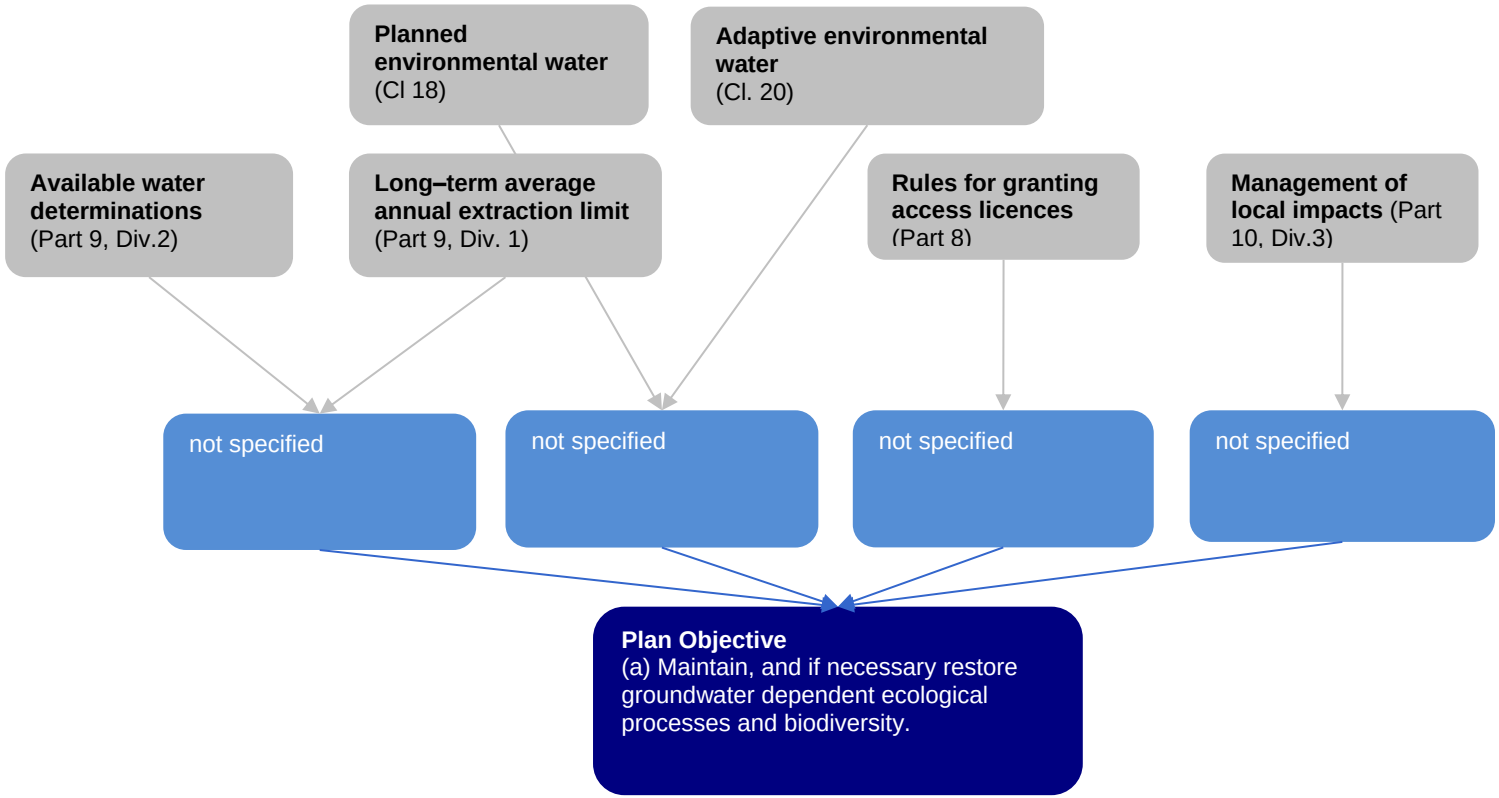

Figure 11: Lower Macquarie Groundwater WSP – Environmental internal logic relationship diagram

Appendix 7: Lower Lachlan – evaluation report cards and performance indicator summary

Table 13: Lower Lachlan Groundwater WSP Appropriateness Evaluation Report Card

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
Plan scale	Is the scale of the Plan appropriate for water management?	Extent to which scale is appropriate for water sharing management	**The geographic scale of the water source in the Plan is considered appropriate for water sharing management**.			
Plan scope	Is the scope of the Plan appropriate for water management?	Extent to which interactions with other water sources are addressed appropriately within the Plan or other water sharing plans	**The Plan does not adequately recognise the interactions with other aquifers or surface water** (The Plan does include provision of setback distances to rivers, and the contribution of rivers to the groundwater storage through the calculation of the extraction limit).		Consider reviewing the WSP scope to achieve greater recognition of surface water and aquifer interactions with other identified connected water sources.	High
Prioritisation	Is the level of management required under the Plan appropriate for the risk to environmental, economic, or social and cultural values?	Extent of risk to groundwater–dependent ecosystems, economic, and social and cultural values	**The prioritisation of the Plan as high risk is considered appropriate.** The level of management applied is considered appropriate based on high levels of pre plan groundwater allocation.			
		Extent to which risk is addressed	**The Plan provides for extraction to be limited**			

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
			to the long–term average extraction limit. The plan sets rules for compliance against the extraction limit that includes reducing the AWD in a water source if assessed necessary to bring average usage back to the extraction limit.			
			Plan rules allow local impact areas can be declared in critical areas. The Act also allows for temporary water restrictions to be imposed via section 324 orders.		Consider reviewing the use of plan based local impact area rules and the use of 324 Orders under the Act to minimise confusion and improve transparency.	High
		Identified future risks, including climate change, interception, change in industry base, etc.	**Climate change is not adequately addressed in the Plan as the extraction limit is based on historic climate rather than expected future climate predictions. The plan does provide for revised recharge estimates and amendments to the recharge figures and extraction limits.**		Consider reviewing recharge for climatic changes.	High
Internal logic	Is the vision appropriate for water management?	Whether the vision reflects what is intended for water sharing plans in the Act	**The vision is considered appropriate** as it is consistent with the Act's intent for water sharing			

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
			plans to achieve economic, social and environmental outcomes.			
	Are the objectives suitable for water management?	Whether the objectives align with the vision	**The objectives mostly align with the plan vision** although an objective directly relating to water quality is not included.		Review the WSP objectives against the vision.	Medium
		Whether the objectives align with the principles and objects of the Act	**The objectives mostly align with the principles and objects of the Act.**		Review the WSP objectives against the principles and objects of the Act.	Medium
		Extent to which the objectives are clear and comprehensive enough to reflect what the Plan intended to achieve	**The objectives do not represent a full list of the Plan's intended outcomes**. The objectives are mostly broad and do not clearly link to plan strategies or rules through targeted objectives. One objective relates to a combination of economic, social and environmental outcomes.		Consider whether additional objectives should be developed to allow an effective evaluation of the WSP. Clear broad and targeted objectives should be established to achieve specific economic, social and environmental outcomes.	High
		Extent to which the plan logic establishes SMART (Specific,Measurable,Attainable, Realistic, Time–bound) objectives	**The plan logic fails to set objectives which can be evaluated using SMART criteria.**		Consider whether plan logic should be reconsidered to improve measurement of success.	High
	Are the strategies	Whether all plan rules are linked to a strategy	**All plan rules can be linked to a strategy.**		Consider whether more appropriate	High

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
	suitable for water management?				strategies should be developed. Current strategies relate to plan structure only and do not adequately show how the objectives will be achieved. This is important as the Act requires performance indicators to be used to assess WSP strategies.	
		Whether the strategies provide clear direction for the plan rules	**Strategies could be more specific** to guide the intent of the plan rules and to highlight the links with their intended outcomes.			
		Whether the strategies align with the objectives	**Not all strategies align with the objectives.** Most strategies point to the establishment of rule sets, but not to the intent or outcome of the rule sets.			
	Are the performance indicators suitable for water management?	Whether the performance indicators align with the objectives and strategies	**Most performance indicators align to the objectives.** Performance Indicator (g) Extent to which local water utility requirements have been met is not aligned to an objective. In some cases, performance indicators specified for an objective do not reflect the objective and in other cases additional performance indicators are required, for example in relation to GDEs.		Review alignment and relevance of performance indicators and measures against each objective and strategy.	High
		Extent to which performance indicators are clear and comprehensive enough to measure what the Plan intended to achieve	**Most performance indicators are clear.** Additional measures are available for many performance indicators and have been included in this evaluation where		Ensure any further performance indicators which are developed are clear and comprehensive.	Medium

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
			possible.			
Quality of Supporting Documentation	Is documentation explaining the decisions underpinning the Plan available	Adequacy of documentation supporting the Plan	**The Plan has a comprehensive "Part A" document supporting plan development available internally.** A range of documents are available that support plan implementation.			
		Extent to which documentation is made available to the public	**The "Part A" document was publicly available during the plan's initial exhibition period but is no longer publicly available.** A summary report is available on the DPIE website.		Consider making the "Part A" document available of the website. Consider publishing completed status reports for the WSP area.	Medium
Communication	Is the process for communication with stakeholders adequate	Extent of communication and processes supporting plan development	**Extensive consultation was carried out during plan development**, with the Lower Lachlan Groundwater Management Committee meeting to explore issues and develop management strategies. The Plan was placed on public exhibition.			
		Communication arrangements in place during plan operation	**Communication on operational matters has been appropriate, based on the management decisions being made.** During drought periods, frequent discussions were held with water users.		Complete and publish status reports for the WSP.	Medium

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
			When conditions were good, communication has been on an as needs basis. A summary report is available on the DPIE website.			
		Arrangements for consideration at term review of plan	**Sufficient opportunity will be provided for communication during the water resource plan development process**. Consultation will involve opportunities to make submissions, and face to face meetings will be held with stakeholders.			
Alignment with state priorities for natural resource management plans (S43A)	Is the Plan aligned with state priorities for natural resource management?	Extent of alignment of Plan with state priorities	**While the State priorities align clearly with the vision of the Plan. The alignment between the other internal logic elements could be clearer.** The 2016 NRC review of this Plan identified three key State Priorities for Water Sharing Plans: • Productive and resilient water–dependant industries, • Secure long–term water supplies for urban and rural communities, and • Healthy and reesilient		Consider reviewing the alignment of Plan objectives with state priorities for natural resource management during the development of the Water Resource Plan (WRP).	High

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
			water–dependant ecosystems. Note: the Plan was in place prior to the development of the state priorities for natural resource management and so full alignment is not expected.			

Table 14: Lower Lachlan Groundwater WSP Efficiency Evaluation Report Card

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
Basis for water sharing	Recharge	Were any changes made to annual average recharge estimates after 30 June 2010?	**No changes to average annual recharge estimates were made.** A model review has not been undertaken to date to change recharge estimates.		Consider the results of any new or updated groundwater models at term review.	Medium
Environmental water provisions	Planned environmental water	Was all water contained in the storage component of these water sources reserved for the environment?	**The water reserved each year for the environment was in acordance with the planned environmental water requirements and account management provisions.**			
		Was supplementary access to the storage component phased out to ensure all water in the storage was reserved for the environment?	**Supplementary water acccess was reduced annually so that by the end of the plan term all in accordance with the Plan rules.**			
		Was all the water above the long–term average extraction limit reserved for the environment?	**Extraction limits were complied with in all years.** *Note: No portion of the long–term average recharge is reserved as planned environmental water under the Plan,but can be amended based on further studies of groundwater ecosystem dependency.* *Note: Planned environmental water provisions are implemented via limits to extraction.*			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		Were the extraction limits amended based on further recharge models and studies?	**No change to the extraction limit based on further average annual recharge estimates was made.**			
	Adaptive environmental water	Is there a process for licences to be committed for adaptive environmental purposes?	**All necessary systems are in place to apply and manage conditions should they be requested.** *Note: No licences have been committed as AEW in the plan area.*			
Basic Landholder Rights	Domestic and Stock	Are domestic and stock BLR provided for within the Plan?	**Domestic and stock BLR access is provided for in the Plan**.			
		Is domestic and stock BLR growth provided for within the Plan?	**Procedures are in place to allow for growth in domestic and stock BLR whilst maintaining extraction limit compliance.**			
		Have interference management strategies been required?	**No interference management strategies have been required in this plan area.** A small number of telephone complaints have been received from groundwater users in the plan area about drawdown but no interruption to water supply was identified and no formal complaints were lodged. As such no action was required.			
		Are domestic and stock BLR consistent with reasonable use guidelines?	**Reasonable use guidelines (made under s.52 of the Act and provided for in the Plan) have not been made by the Minister.**		Endeavour to finalise and publish the reasonable use guidelines as a matter of priority.	High

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
	Native title	Are native title BLR provided for within the Plan?	**Procedures are in place to provide access if native title rights for water are granted in the water source covered by this Plan.** *Note: No native title rights for water have been established in this plan area.*			
		Is growth in native title BLR protected within the Plan?	**Procedures are in place to allow for growth in native title BLR whilst maintaining extraction limit compliance.**			
Requirements for water for extraction under access licences	Conversion of access licences from *Water Act 1912* to *Water Management Act 2000*	Were licences established with share components calculated according to plan rules?	**All licences were established with share components calculated in line with plan specifications**.			
	Changes to share components	Were the share components for supplementary licences reduced to 0 at the commencement of the 2017/18 water year?	**The reduction of supplementary licences to 0 unit shares is due to occur outside of the evaluation period currently being considered by this report.**		Complete the phase out of supplementary water access licences by the specified date.	High
Rules for granting access licences	Granting new access licences	Were plan rules followed for the granting of access licences?	**All access licences granted were in line with the plan provisions.** The Water Management (General) Regulations 2004 and 2011 set out the specific purpose access licences for which applications can be accepted in line with the Plan.			
Limits to the availability of water	Extraction limits	Was an extraction limit established?	**An extraction limit was established for the water source**.			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
	Variation of extraction limits	Were extraction limits varied?	**No changes to extraction limits have been required.**			
	Extraction limit compliance	Were rules regarding compliance with the extraction limit implemented?	**The extraction limit was complied with in all years.**			
	AWDs	Were the rules for the making of AWDs for domestic and stock and local water utility aquifer access licences implemented?	**All AWDs were announced in accordance with the requirements of the plan.**			
		Were the rules for the making of AWDs for aquifer access licences implemented?	**All AWDs were announced when required in accordance with the plan rules.**			
		Were the rules for the making of AWDs for supplementary water aquifer access licences implemented?	**All AWDs were announced when required in accordance with the plan rules and had the correct annual reductions applied.**			
Rules for managing access licences	Water allocation and account management	Were water allocation accounts established?	**Water allocation accounts were established for all licence holders.**			
		Were water allocations accrued annually?	**All accounts were credited annually following available water determinations.**			
		Was water extraction accounted for at least annually?	**All accounts were debited and credited in line with plan provisions.** Note: A small number of accounts fell below zero.		Review account management practices to ensure all functions are undertaken in line with plan provisions.	Medium

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
	Management of local impacts	Were local impact areas established?	**No local impact areas have been required to be established.** Monitoring has indicated that local impact areas or other management strategies have not been required. *Note: Amendments to the Act in 2009 provided an alternative procedure for dealing with short term localised impacts and the Plan may need to be updated to reflect this.*		Review the local impact management mechanisms available in the Plan and in the Act to ensure consistency and transparency.	High
		Was extraction interference between neighbouring bores managed?	**All approvals for new and replacement bores have been issued in line with the plan rules for minimum distance between neighbouring bores.** **The WSP allows exceptions to minimum distances in specific circumstances. These exceptions have been utilised during the WSP term.** *Note: Distance requirements are included as a condition on new and replacement bore works approvals. Licence holders and licensed drillers are required to comply with these conditions.* *In some cases new or replacement works were within specified distances, however, in each case a DPIE hydrogeologist assessed the impacts, as allowed for under the Plan and recommended additional conditions where appropriate.*		Continue to ensure work approvals for non BLR bores within minimum distances are conditioned appropriately.	

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		Were water levels monitored and managed if required?	**Water levels have been monitored during the plan term.** Water level monitoring has indicated that local impact areas or other management strategies were not required. **No impact areas for water level management have been required.**			
		Was water quality monitored and managed if required?	**Some water quality monitoring has been undertaken**. There is no water source scale groundwater quality monitoring program. **No impact areas for water quality management have been required**.		Continue to monitor and where necessary manage groundwater quality impacts of extraction.	Medium
		Was a baseline of electrical conductivity set in year 6 of the Plan?	**A baseline of electrical conductivity was not set in year 6 of the Plan due to lack of available water quality data.**		Review the need for this requirement.	Medium
		Were GDEs protected?	**No scheduled GDEs are listed.** Setback rules for new bores with respect to GDEs could not be implemented because there were no GDEs in the Schedule. **No additional GDEs were identified and included in the relevant schedule during the evaluation period.**		Ensure the addition of relevant GDEs to the relevant WSP schedule if/when they are identified.	High

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		Were Aboriginal cultural heritage values protected?	**There are no results available specific to setback rules for Aboriginal cultural heritage values.** DPIE aims to improve Aboriginal involvement and representation in water planning and management within NSW. This includes identifying key water–related environmental, social, cultural and economic opportunities and priorities for Aboriginal communities (including GDEs and cultural values). *Note: There is no requirement for Aboriginal cultural heritage values to be scheduled.* *Note: These rules are established in the GDE protection clause of the Plan.*		Establish process for the identification and assessment of setback distances for Aboriginal cultural heritage values.	High
		Were rivers and creeks protected?	**Rivers were protected through the application of setback distances for new bores.** No new BLR bores or production bores were permitted within setback distances applying to rivers. *Note: some exceptions are provided for in the Plan for replacement bores.* *Note: These rules are established in the GDE protection clause of the Plan.*			
		Was aquifer integrity protected?	**Aquifer integrity was protected.**		Continue groundwater level monitoring and investigate if reports of	Medium

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			This assessment is based on results of groundwater level monitoring (including the stabilisation and/or recovery of groundwater levels), absence of reports of land subsidence (aquifer compaction) or reduction in bore yields. **No local impact areas for aquifer integrity management have been required.**		subsidence, aquifer compaction or reduced bore yield are received.	
		Were extraction restrictions required?	**No local impact areas have been required to be established.** **These provisions have not been required.** All new bores constructed after the commencement of the Plan have restrictions on annual pumping rates to limit potential impacts on neighbouring bores.		Review the local impact management mechanisms available in the Plan and in the Act to ensure consistency and transparency.	High
		Was group registration required?	**No local impact areas have been required to be established. These provisions have not been required.**			
		Were there any failures of monitoring bores that are relied on to manage local impact restrictions?	**No local impact areas have been required to be established. These provisions have not been required.**			
Dealings	Minister's dealing principles	Were dealings in line with the Minister's dealing principles, the Act and the WSP?	**All dealings have been made in line with Minister's dealing principles**. *Note: Prohibited dealings in this plan area include change of water source, water allocation assignment between water sources,*			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			conversions of access licence categories and interstate (transfer and assignment of allocation).			
	Constraints within water source	Were dealings in line with rules relating to constraints within the water source?	**All dealings were undertaken in line with plan rules relating to constraints within the water source**.			
Mandatory conditions	Access licence conditions	Were mandatory conditions for access licences placed on licences?	**Mandatory conditions have been applied to access licences.** DPIE undertook a conditions reform project and developed guidelines for drafting conditions. As water sharing plans are remade DPIE is progressively reviewing conditions and, where relevant will apply conditions with improved wording and confirm appropriate application of the conditions.		Endeavour to ensure all conditions meet DPIE's new SMART conditions criteria in the next planning cycle.	Medium
	Water supply works approvals	Were mandatory conditions for works approvals placed on the works approvals?	**Mandatory conditions have been applied to work approvals.** DPIE undertook a conditions reform project and developed guidelines for drafting conditions. As water sharing plans are remade DPIE is progressively reviewing conditions and, where relevant will apply conditions with improved wording and confirm appropriate application of the conditions.		Endeavour to ensure all conditions meet DPIE's new SMART conditions criteria in the next planning cycle.	Medium
Plan Amendments	Annual average recharge	Were any amendments to annual average recharge made?	**No amendments to the average annual recharge have been made during the plan term**. The Plan was amended in January 2008 following gazettal, but prior to			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			commencement, to reduce the recharge volume from 120,000 ML/year to 108,000 ML/year.			
	Planned environmental water	Were any amendments made to planned environmental water?	**There have been no amendments to planned environmental water**.			
	Extraction Limit	Were any amendments made to the Extraction Limit?	**The Plan was amended following gazettal but prior to commencement.** The amendment made to the recharge figure in 2008 affected the figures used to determine the extraction limit. Therefore, the extraction limit set in 2008 was amended from 96,000 ML/yr to 108,000 ML/yr plus water allocations made to supplementary water access licences, plus the requirements for basic landholder rights.			
	High priority GDEs	Was it necessary to amend GDE schedules in plan?	**There have been no amendments to the relevant schedule to include additional GDEs**		See recommendations under 'Were GDEs protected?'	
	Planned environmental water (Water recovery programs)	Were any amendments made to planned environmental water as a result of water recovery programs?	**No changes allowed for in the Plan have been made to environmental water provisions.**			
	Amendments made under s.45 (a) of the Act but not identified in the Plan	Were any further amendments made to the Plan?	**Subsequent to the making of the Plan some drafting errors were identified and have been corrected by amendment.**			

Table 15: Lower Lachlan Groundwater WSP Effectiveness Evaluation Report Card

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
Protect ecological processes and biodiversity dependent on groundwater *Plan note: The expected outcomes of this objective are that groundwater–dependent ecosystems and their degree of dependency will be identified, and that there will be no loss of ecological values due to groundwater extraction.*	• Change in groundwater extraction relative to the extraction limit. • Change in climate adjusted groundwater levels. • Change in groundwater quality • Change in water levels adjacent to identified groundwater–dependent ecosystems *Additional performance indicator identified:* • Change in structural integrity of the aquifer	**There are no high priority dependent ecosystems listed in the relevant plan schedule. A GDE identification process is in progress.** DPIE has a current State–wide project to identify high probability GDEs and assign an ecological value. High and very high ecological value will be scheduled into the plan as high priority GDEs. Currently the Murray–Darling Basin is complete for vegetation, the majority of wetlands and springs. Base flow systems and remaining wetlands will be identified within the next 12 months. **Ecological health is supported by the establishment of a long–term average annual extraction limit which reduced annually throughout the plan term. Extraction was within the LTAAEL for all years of the plan.** Over the period (2006/07 to 2014/15) 79% of the Plan's extraction limit was used.		Poor	Ensure the addition of relevant GDEs to the relevant WSP schedule if/when they are identified.	High
Determine resource access and clarify reliability for groundwater users	• Change in economic benefits derived from groundwater extraction and use. • Change in groundwater quality • Extent to which domestic and stock rights have been met.	**This WSP was developed with an understanding that the pre plan entitlement and extraction levels in the groundwater source were unsustainable. As a result, the plan rules established a long–term average extraction limit which reduced annually in line with reductions in**		Moderate		

Plan note. The expected outcomes of this objective are that: groundwater usage does not exceed the extraction limit; the rate of extraction does not induce detrimental changes to water quality; groundwater users have a clear understanding of resource access and reliability; sustainable economic benefits will be maximised; more flexible and efficient use of water will be facilitated; and, there will be equitable access to the groundwater source within the extraction limit.		**available water for supplementary access licences.** It was recognised prior to plan commencement that achieving sustainability for the environment would result in significant economic impact. This impact was partially offset by a structural adjustment package, which provided approximately $3.5 million to licence holders and communities to allow for adjustment to the entitlement reductions. The introduction of fully tradeable groundwater access licences with a wide range of allowed dealings has resulted in greater account management and trading flexibility. This has been a significant change to groundwater management. **Throughout the plan period (2006/07 to 2014/15), water allocations were at the full allocation allowed under the plan rules, ensuring economic and social benefits were maximised within the limitations of the plan rules. As a result, there is no evidence that groundwater sharing has been inequitable.** Limited information is available to assess water quality change; however, no changes have been reported.				

Recognise and protect community needs that rely on groundwater *Plan note. The expected outcomes of this objective are that: basic rights to access water will be protected; the rate of extraction will not induce detrimental changes to water quality; and, community wellbeing is enhanced.*	• Change in economic benefits derived from groundwater extraction and use. • Extent to which native title rights requirements have been met. • Extent to which domestic and stock rights requirements *Additional performance indicator identified:* • Extent to which local water utility requirements have been met. • Change in structural integrity of the aquifer	**Basic landholder rights, domestic and stock, and local water utility needs were provided at all times with full access to water during the Plan term. Priorities of access were maintained as per the requirements of the Act.** Limited information is available to assess water quality change; however, no changes have been reported. There is no information available to accurately the effect of the Plan on "community wellbeing"		Moderate		
Provide for the recognition and protection of heritage sites and cultural values associated with groundwater. *Plan note. The expected outcomes of*	• Extent to which native title rights requirements have been met. • Extent of recognition of spiritual, social and customary values of groundwater to Aboriginal people.	**Although the plan provides several mechanisms to protect and maintain heritage sites and cultural values, identification is at an early stage.**		Poor	Continue to work with Aboriginal communities to identify opportunities to better address the needs and aspirations in terms of equitable access to water for social, cultural, spiritual and economic use of water.	High

this objective are that: heritage sites and cultural values associated with groundwater and their degree of dependency are identified; and, there is no loss of heritage and cultural values due to groundwater extraction.						

Table 16: Lower Lachlan Groundwater WSP – Performance Indicator Results Summary

Performance Indicator	Related Plan Objectives	Results	Strength of Information
Change in groundwater extraction relative to the extraction limits.	• Protect ecological processes and biodiversity dependent on groundwater *Additional identified objectives:* • Determine resource access and clarify reliability for groundwater users • Recognise and protect community needs that rely on groundwater	**Total entitlement was reduced under the water sharing plan to the long–term average extraction limit. Access to groundwater was progressively reduced over the ten–year life of the plan via supplementary licences which will be cancelled at the end of the 2017/2018 water year.** **Groundwater extraction remained within the long–term average annual extraction limit during the term of the plan.** **Each year from 2006/07 to 2014/15 an AWD of 1 ML/unit share was announced in accordance with the requirements of the plan.** ***References:*** NSW Office of Water (2011) *Audit of implementation –Inland alluvial aquifer water sharing plan audit report cards – Prepared for the period between 1 October 2006 and 30 June 2010 covering Lower Murrumbidgee, Lower Murray, Lower Macquarie, Lower Gwydir, Upper and Lower Namoi.* NSW Office of Water, Sydney NSW Office of Water (in press) *Audit of implementation – Inland alluvial aquifer water sharing plan audit report cards – Prepared for the period 1 July 2010 to 30 June 2014 covering Lower Murrumbidgee, Lower Murray, Lower Macquarie, Lower Gwydir, Upper and Lower Namoi,* NSW Office of Water, Sydney	**Good**
Change in climate adjusted groundwater levels.	• Protect ecological processes and biodiversity dependent on groundwater *Additional identified objectives:* • Determine resource access and clarify reliability for groundwater users • Recognise and protect community needs that rely on groundwater	Groundwater levels are monitored at 189 bores at 90 sites across the Lower Lachlan Alluvium. This monitoring network includes 20 sites equipped with data loggers that record water levels continuously. An analysis of the groundwater levels is provided in the Lachlan Alluvium Water Resource Plan Resource Description report. This analysis shows areas where the groundwater levels have declined over the Plan period. This decline in groundwater level over time is not unexpected as the water sharing plan for the Lower Lachlan Alluvium allowed extraction to be in excess of the estimated average annual recharge to enable users to adjust to the reduction in entitlements that occurred at the beginning of the plan. Declines in some areas are also attributed to high levels of localised pumping.	**Good**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
		Access to groundwater has been progressively reduced over the ten–year life of the plan via supplementary licences which were cancelled at the end of the 2017/2018 water year. ***References:*** DPI Water (In Prep) *Lower Lachlan Alluvial Water Resource Plan Resource Description*. DPI Water, Sydney.	
Change in water levels adjacent to identified groundwater–dependent ecosystems.	• Protect ecological processes and biodiversity dependent on groundwater	**There are no high priority dependent ecosystems listed in the relevant plan schedule however a GDE identification process has commenced. As a result, this performance indicator cannot be assessed.**	**Poor**
Change in groundwater quality	• Protect ecological processes and biodiversity dependent on groundwater • Determine resource access and clarify reliability for groundwater users	**There was no change in beneficial use category during 2008–2010, although there was some decline recorded for some water quality parameters. There is no analysed data from monitoring bores available for the period 2011–2015.** In 2009 the former NSW Office of Water commissioned Parsons Brinckerhoff to characterise the hydrochemistry and investigate the risks posed by groundwater pumping on groundwater quality in six alluvial systems including the Lower Lachlan Alluvium. Thirty–three monitoring bores were sampled during 2009 and 2011. The study focussed on an area approximately within 50 km around Hillston. The main finding of this study relating to salinity is that groundwater in both aquifer systems is fresh (271 –1,795 µS/cm in the shallow aquifer and 456 –1,350 µS/cm in the deep aquifer) and is suitable for multiple beneficial uses including drinking water supply, irrigation and stock water supply. No significant long–term increasing trends in salinity were identified. There is no on–going groundwater quality monitoring program for this water source. ***References:*** *Parsons Brinckerhoff (2011) NSW Office of Water Characterisation of hydro–geochemistry and risks to groundwater quality – Impact of*	**Moderate**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
		groundwater pumping on water quality: National Water Commission – Raising National Water Standards Programme *Department of Primary Industries (2017) NSW Lachlan Alluvium Water Resource Plan Status and Issues Paper.*	
Change in economic benefits derived from groundwater extraction and use.	• Determine resource access and clarify reliability for groundwater users • Recognise and protect community needs that rely on groundwater	There is limited information available to measure the change in economic benefits to groundwater users directly as a result of the water sharing plan. The facilitation of an active trading market in the Lower Lachlan groundwater source allows for a market–based demand solution to deliver the available water resource to the most productive and economical operations while protecting overall growth in usage with the long–term average annual extraction limit for each respective water source. Through the temporary trade market, 79,116 megalitres of water was transferred over the evaluation period for commercial purposes with a total consideration of $3,449,943. Additionally, 18,349 shares were permanently transferred for commercial consideration at a total value of $1,569,250. Note: these figures are representative of 71T and 71Q trades respectively. Transfer of licences under Section 71M of the Act were not included for the purpose of this report. ***References:*** Aither 2016, Water markets in New South Wales: market outcomes, trends and drivers, Aither Pty Ltd.	**Poor**
Change in structural integrity of the aquifer. *(additional identified performance indicator)*	• Protect ecological processes and biodiversity dependent on groundwater • Recognise and protect community needs that rely on groundwater	The risk to structural integrity is managed through the establishment of local impact areas to restrict trade and extractions in areas of large drawdowns. Establishment of local impact areas were not required There have been no reports of subsidence or reduced bore yields indicating any compromised structural integrity.	
Extent to which domestic and stock rights (BLR)	• Recognise and protect community needs that rely on groundwater	**BLRs have not been restricted** and there have been no verified reports of interference impacts on bores accessing BLR or any reported cases of bores requiring deepening to retain access. There	**Good**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
requirements, domestic and stock access licence requirements and local water utility requirements have been met.	• Determine resource access and clarify reliability for groundwater users	are no clauses in the plan requiring setback distances to address interference between high yield extraction and basic rights bores. **Full entitlement was available at all times for licenced domestic and stock use** via annual available water determinations of 100%. No domestic and stock licences have been issued in this water source. **Full entitlement was available at all times for local water utility use** via annual available water determinations of 100%. There have been no verified reports of interference impacts on bores accessing water for local water utility use. ***References:*** *AWDs issued throughout the plan term, available from the DPIE Water Register at: http://www.water.nsw.gov.au/water–licensing/registers*	
Extent to which native title rights requirements have been met.	• Recognise and protect community needs that rely on groundwater • Provide for the recognition and protection of heritage sites and cultural values associated with groundwater	**No native title rights for water were established in the plan area prior to or during the plan term**. Native title rights for water, where established under the Commonwealth Native Title Act 2003, are recognised, protected and prioritised by the plan under basic landholder rights provisions**.** **No Aboriginal Cultural access licences have been issued in this plan area.** Aboriginal cultural use of water is recognised by the plan. Licences for Aboriginal cultural use may be granted within specified limits. ***References:*** *Native title determinations at:* http://www.nntt.gov.au/searchRegApps/Pages/default.aspx *Licence information available from the DPIE Water Register at:* http://www.water.nsw.gov.au/water–licensing/registers	**N/A**
Extent of recognition of spiritual, social and customary values of groundwater to Aboriginal people	• Provide for the recognition and protection of heritage sites and cultural values associated with groundwater	**The plan manages the recognition of spiritual, social and customary values by providing mechanisms to access water for cultural purposes**. Native title rights for water and Aboriginal cultural licences are also addressed above, no native title rights or Aboriginal Cultural licences have been established or issued in the plan area.	**Poor**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
		The plan also provides protection from impact to Aboriginal cultural heritage values through new or replacement bore set back distances and extraction restrictions (if required) on all bores. There are no results available specific to setback rules for Aboriginal cultural heritage values. **Groundwater–dependent ecosystems with identified Aboriginal cultural heritage may be classed as high priority and scheduled within the plan.** There are no high priority groundwater–dependent ecosystems listed in the relevant plan schedule.	

Appendix 8: Lower Lachlan– internal logic relationship diagrams

Relationship diagrams show the internal Plan logic supporting the delivery of each of the Plan's outcomes. One diagram has been created for each of the economic, social / cultural and environmental outcomes. The diagrams show linkages from the broad objectives (navy boxes) to the targeted objectives (blue boxes) and the rules (grey boxes). Where gaps in the program logic have been identified, these are shown as 'not specified' in the appropriate coloured box.

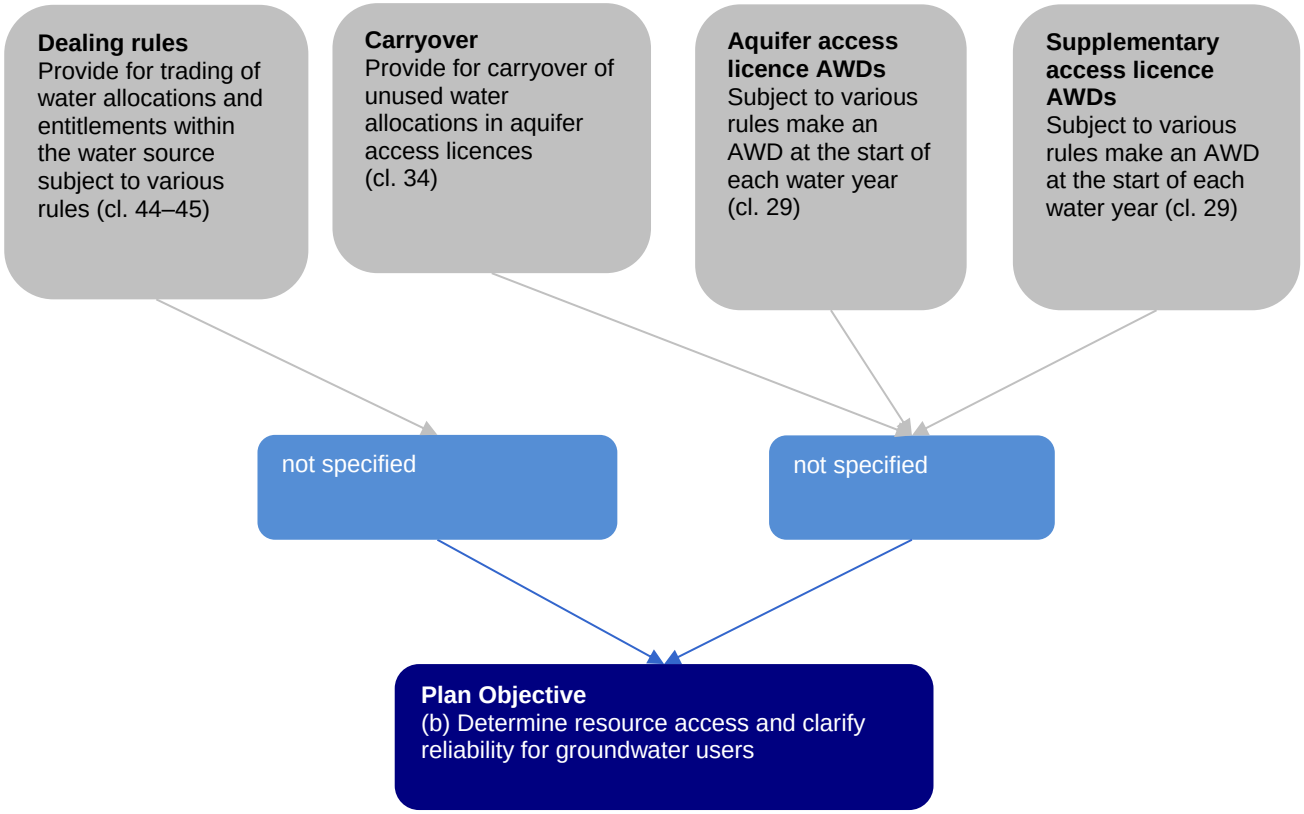

Figure 12: Lower Lachlan Groundwater WSP – Economic internal relationship diagram

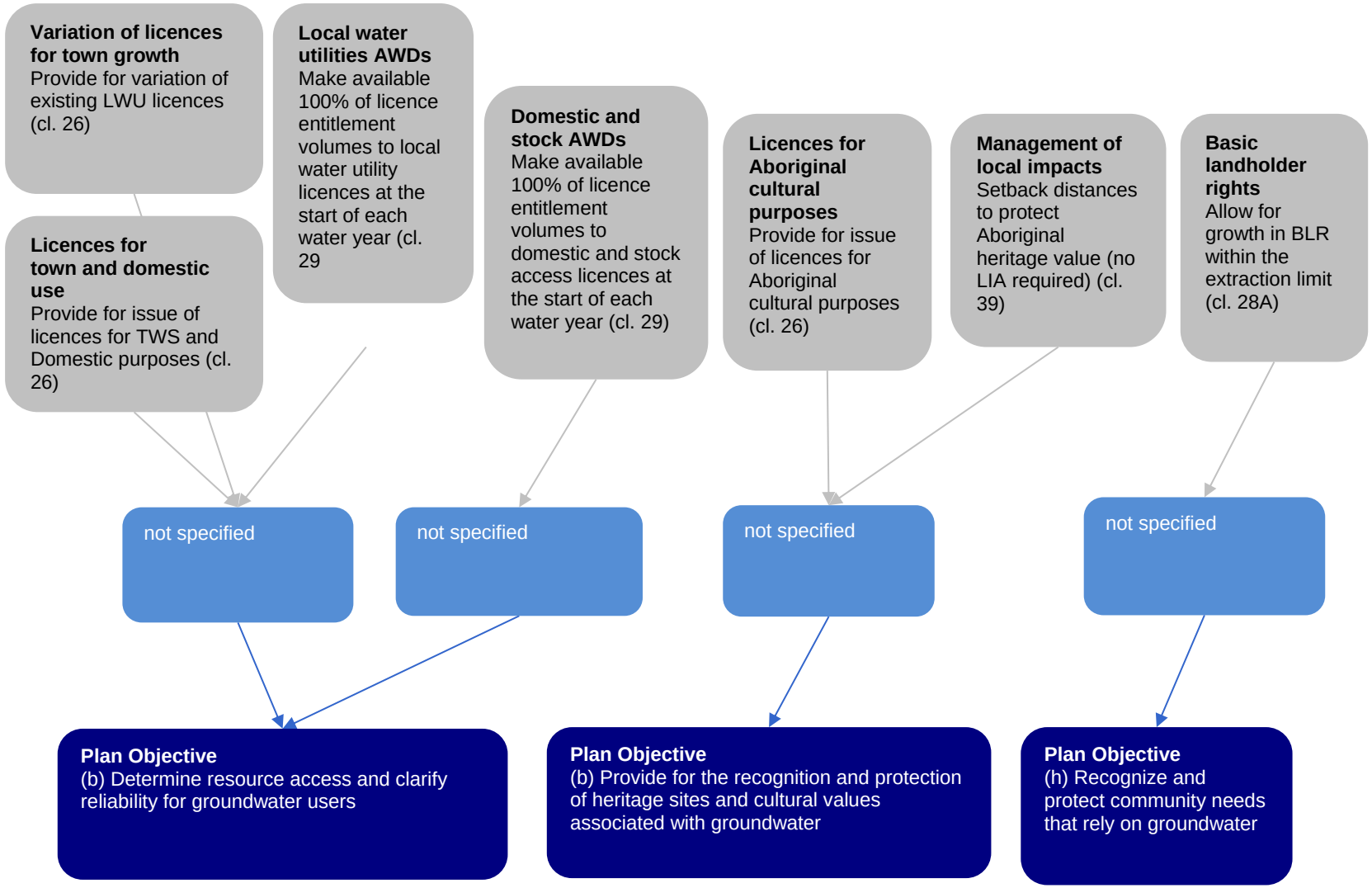

Figure 13: Lower Lachlan Groundwater WSP – Social/Cultural internal relationship diagram

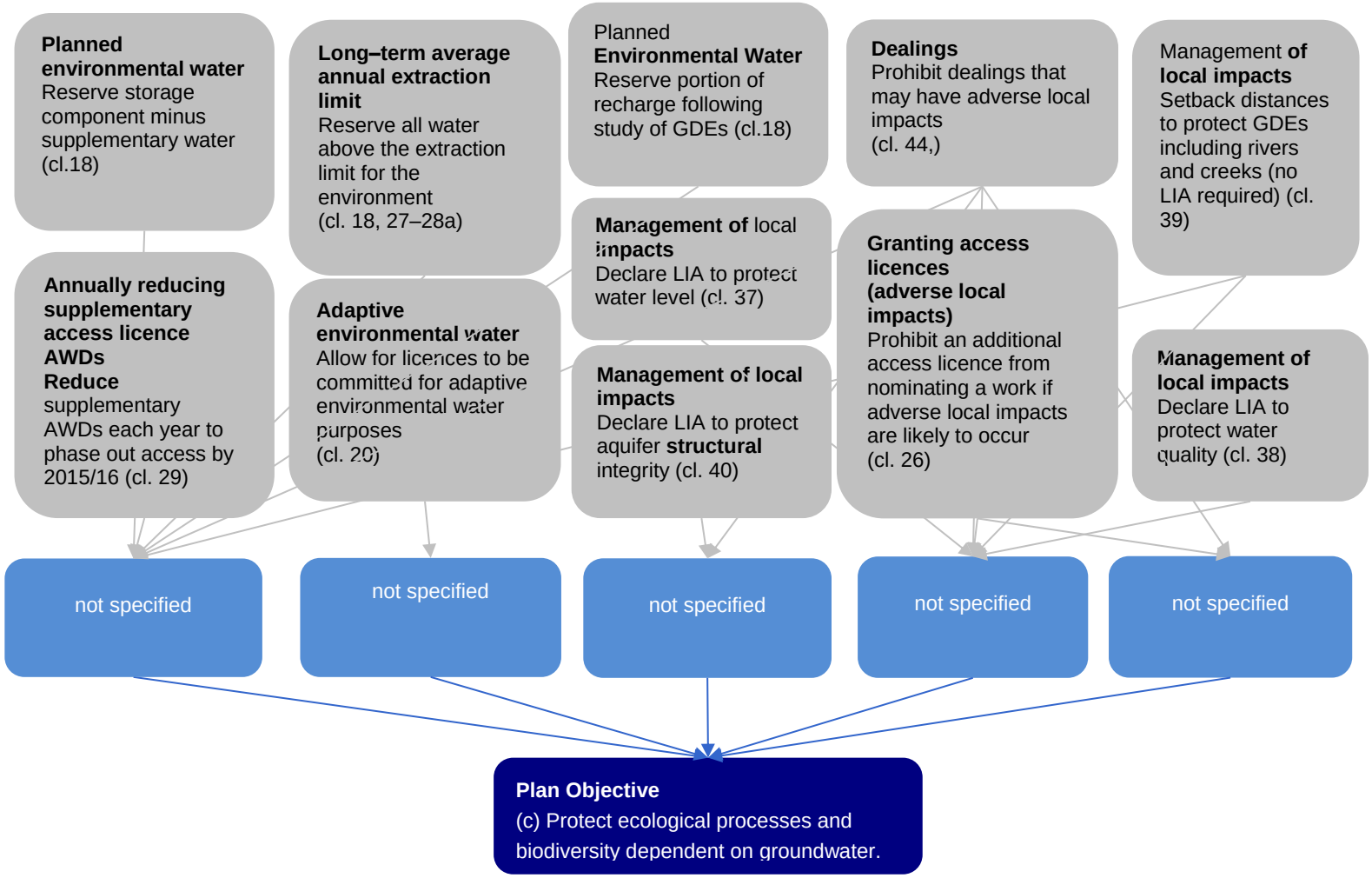

Figure 14: Lower Lachlan Groundwater WSP – Environmental internal relationship diagram

Appendix 9: Lower Murrumbidgee – evaluation report cards and performance indicator summary

Table 17: Lower Murrumbidgee Groundwater WSP Appropriateness Evaluation Report Card

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
Plan scale	Is the scale of the Plan appropriate for water management?	Extent to which scale is appropriate for water sharing management	**The geographic scale of the water sources in the Plan is considered appropriate for water sharing management**.			
Plan scope	Is the scope of the Plan appropriate for water management?	Extent to which interactions with other water sources are addressed appropriately within the Plan or other water sharing plans	**The Plan does not adequately recognise the interactions with other groundwater or surface water sources** (The Plan does include provision of setback distances to rivers, and the contribution of rivers to the groundwater storage through the calculation of the extraction limit).		Consider reviewing the WSP scope to achieve greater recognition of surface water and aquifer interactions with other identified connected water sources.	High
Prioritisation	Is the level of management required under the Plan appropriate for the risk to environmental, economic, or social and cultural values?	Extent of risk to groundwater–dependent ecosystems, economic, and social and cultural values	**The prioritisation of the Plan as high risk is considered appropriate.** The level of management applied is considered appropriate based on high levels of pre plan groundwater allocation.			
		Extent to which risk is addressed	**The Plan provides for extraction to be managed to the extraction limit.** The Plan sets rules for compliance against the extraction limit that includes reducing the AWD in a water source if assessed necessary to bring average usage back to the extraction limit.			

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
			Plan rules allow local impact areas to be declared in critical areas. The Act also allows for temporary water restrictions to be imposed via section 324 orders.		Consider reviewing the use of plan based local impact area rules and the use of 324 Orders under the Act to minimise confusion and improve transparency.	High
		Identified future risks, including climate change, interception, change in industry base, etc.	**Climate change is not adequately addressed in the Plan as the extraction limit is based on historic climate rather than expected future climate predictions. The plan does provide for revised recharge estimates and amendments to the recharge figures and extraction limits.**		Consider reviewing recharge for climatic changes.	High
Internal logic	Is the vision appropriate for water management?	Whether the vision reflects what is intended for water sharing plans in the Act	**The vision is considered appropriate** as it is consistent with the Act's intent for water sharing plans to achieve economic, social and environmental outcomes.			
	Are the objectives suitable for water management?	Whether the objectives align with the vision	**The objectives mostly align with the plan vision** although a clear objective relating singularly to environmental sustainability is not included.		Review the objectives against the Plan vision.	Medium
		Whether the objectives align with the principles and objects of the Act	**The objectives align with the principles and objects of the Act although an objective relating singularly to environmental sustainability is not included.**		Review the objectives against the principles and objects of the Act.	Medium
		Extent to which the objectives are clear and comprehensive enough to reflect what the Plan intended to achieve	**The objectives do not represent a full list of the Plan's intended outcomes**. The objectives are mostly broad and do not clearly link to plan strategies or rules through targeted objectives. Several objectives relate to a combination of economic, social and environmental outcomes.		Consider whether additional objectives should be developed to allow an effective evaluation of the Plan. Both clear broad and targeted objectives should be considered to achieve specific economic, social and environmental outcomes.	High

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
		Extent to which the plan logic establishes SMART (Specific,Measurable,Attainable, Realistic, Time–bound) objectives	**The plan logic fails to set objectives which can be evaluated using SMART criteria.**		Consider whether plan logic should be reconsidered to improve measurement of success.	High
	Are the strategies suitable for water management?	Whether all plan rules are linked to a strategy	**All plan rules can be linked to a strategy.**		Consider whether more appropriate strategies should be developed. Current strategies relate to the Plan structure headings only and do not adequately show how the objectives will be achieved (targeted objectives). This is important as the performance indicators should be used to assess the strategies under the Act.	High
		Whether the strategies provide clear direction for the plan rules	**Strategies could be more specific** to guide the intent of the plan rules and to highlight the links with their intended outcomes.			
		Whether the strategies align with the objectives	**Not all strategies align with the objectives.** Most strategies point to the establishment of rule sets, but not to the intent or outcome of the rule sets.			
	Are the performance indicators suitable for water management?	Whether the performance indicators align with the objectives and strategies	**Most performance indicators align to the objectives.** However, in some cases performance indicators specified for an objective do not reflect the objective and in other cases additional performance indicators are required, for example in relation to GDEs.		Review the alignment and relevance of performance indicators and measures against each objective and strategy.	High
		Extent to which performance indicators are clear and comprehensive enough to measure what the Plan intended to achieve	**Most performance indicators are clear.** Additional measures are available for many performance indicators and have been included in this evaluation.			
Quality of Supporting Documentation	Is documentation explaining the decisions underpinning the Plan available	Adequacy of documentation supporting the Plan	**The Plan has a comprehensive "Part A" document supporting plan development and available internally.** A range of documents available that support plan implementation.			

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
		Extent to which documentation is made available to the public	**The "Part A" document was publicly available during the plan's initial exhibition period but is no longer publicly available.** Status reports, summary reports and/or resource condition reports are available on the DPIE website.		Consider making the "Part A" document publicly available.	Low
Communication	Is the process for communication with stakeholders adequate	Extent of communication and processes supporting plan development	**Extensive consultation was carried out during plan development**, with the Lower Murrumbidgee Groundwater Management Committee meeting to explore issues and develop management strategies. The Plan was placed on public exhibition.			
		Communication arrangements in place during plan operation	**Communication on operational matters has been appropriate, based on the management decisions being made.** During drought periods, frequent discussions were held with water users. When conditions were good, communication has been on an as needs basis. A series of status, summary and resource condition reports are available on the DPIE website.			
		Arrangements for consideration at term review of Plan	**Sufficient opportunity will be provided for communication during the water resource plan development process**. Consultation will involve opportunities to make submissions, and face to face meetings will be held with stakeholders.			

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
Alignment with state priorities for natural resource management plans (S43A)	Is the Plan aligned with state priorities for natural resource management?	Extent of alignment of Plan with state priorities	**While the State priorities align clearly with the vision of the Plan. The alignment between the other internal logic elements could be clearer.** The 2016 NRC review of this Plan identified three key State Priorities for Water Sharing Plans: • Productive and resilient water–dependant industries, • Secure long–term water supplies for urban and rural communities, and • Healthy and reesilient water–dependant ecosystems. Note: the Plan was in place prior to the development of the state priorities for natural resource management and so full alignment is not expected.		Consider reviewing the alignment of Plan objectives with state priorities for natural resource management during the development of the Water Resource Plan (WRP).	High

Table 18: Lower Murrumbidgee Groundwater WSP Efficiency Evaluation Report Card

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
Basis for water sharing	Recharge	Were any changes made to annual average recharge estimates?	No changes to average annual recharge estimates were required. A model review has not been undertaken to date to change recharge estimates.		Consider results of any new or updated groundwater models at term review.	Medium
Environmental water provisions	Planned environmental water	Was all water contained in the storage component of these water sources reserved for the environment?	The water reserved each year for the environment was in acordance with the planned environmental water requirements and account management provisions.			
		Was supplementary access to the storage component phased out to ensure all water in the storage was reserved for the environment?	Supplementary water acccess was reduced annually so that it was phased out by the end of the Plan term in accordance with the Plan rules.			
		Was all water above the long–term average extraction limit reserved for the environment?	In the shallow water source extraction limits were complied with in all years. In the deep water source the annual extraction limit was exceeded in 2007/2008, 2008/2009, and 2014/2015, but remained within the complaince			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			with the extraction limit rules specified within the plan.			
		Were the extraction limits amended based on further recharge models and studies?	No changes to extraction limits based on further average annual recharge estimates were required.			
	Adaptive environmental water	Is there a process for licences to be committed for adaptive environmental purposes?	All necessary systems are in place to apply and manage conditions should they be requested. *Note: No licences have been committed as AEW in the plan area.*			
Basic Landholder Rights	Domestic and Stock	Are domestic and stock BLR provided for within the Plan?	Domestic and stock BLR access is provided for in the Plan.			
		Is domestic and stock BLR growth provided for within the Plan?	Procedures are in place to allow for growth in domestic and stock BLR whilst maintaining extraction limit compliance.			
		Have interference management strategies been required?	No interference management strategies have been required in this plan area.			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		Are domestic and stock BLR consistent with reasonable use guidelines?	Reasonable use guidelines (made under s.52 of the Act and provided for in the Plan) have not been made by the Minister.		Endeavour to finalise and publish the reasonable use guidelines as a matter of priority.	High
	Native title	Are native title BLR provided for within the Plan?	Procedures are in place to provide access if native title rights for water are granted in any of the water sources covered by this Plan. *Note: No native title rights for water have been established in this plan area.*			
		Is growth in native title BLR protected within the Plan?	Procedures are in place to allow for growth in native title BLR whilst maintaining extraction limit compliance.			
Requirements for water for extraction under access licences	Conversion of access licences from *Water Act 1912* to *Water Management Act 2000*	Were licences established with share components calculated according to plan rules?	All licences were established with share components calculated in line with Plan specifications.			
	Changes to share components	Were the share components for supplementary licences reduced to 0 on 1st July 2015?	Yes		.	

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
Rules for granting access licences	Granting new access licences	Were plan rules followed for the granting of access licences?	All access licences granted were in line with the plan provisions. The Water Management (General) Regulations 2004 and 2011 set out the specific purpose access licences for which applications can be accepted in line with the Plan.			
Limits to the availability of water	Extraction limits	Was an extraction limit established?	Extraction limits were established for both water sources.			
	Variation of extraction limits	Were extraction limits varied?	No changes to extraction limits have been required.			
	Extraction limit compliance	Were rules regarding compliance with the extraction limit implemented?	Yes. In both the shallow and deep groundwater sources the rules regarding the extraction limit was complied with in all years.			
	AWDs	Were the rules for the making of AWDs for domestic and stock and local water utility aquifer access licences implemented?	All AWDs were announced when required in accordance with the plan rules.			
		Were the rules for the making of AWDs for aquifer access licences implemented?	All AWDs were announced when required in accordance with the plan rules.			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		Were the rules for the making of AWDs for supplementary water aquifer access licences implemented?	All AWDs were announced when required in accordance with the plan rules and had the correct annual reductions applied.			
Rules for managing access licences	Water allocation and account management	Were water allocation accounts established?	Water allocation accounts were established for all licence holders.			
		Were water allocations accrued annually?	All accounts were credited annually following available water determinations.			
		Was water extraction accounted for at least annually?	All accounts were debited and credited in line with plan provisions. A small number of accounts fell below zero.		Review account management practices to ensure all functions are undertaken in line with plan provisions.	Medium
	Management of local impacts	Were local impact areas established?	Two local impact management areas to manage groundwater levels were established in August 2007 by an Access Licence Dealing Principles Order under section 71Z of the Act, which remains in force. *Note: Amendments to the Act in 2009 provided an alternative procedure for dealing with short term localised impacts and the*		Review the local impact management mechanisms available in the Plan and in the Act to ensure consistency and transparency.	High

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			Plan may need to be updated to reflect this.			
		Was extraction interference between neighbouring bores managed?	All approvals for new bores (except BLR) include annual extraction limits to minimise interference between neighbouring bores. Similarly, extraction limits are introduced following permanent trades onto existing bores. *Note: There is no specific clause in the plan relating to extraction interference between neighbouring bores. Similar plans address the issue in a specific clause.*		Review the application of rules managing interference between neighbouring bores with a view to maximum consistency across Water Sharing Plan areas on how this is managed.	Medium
		Were water levels monitored and managed if required?	Water levels have been monitored during the plan term. Two local impact management areas were established in August 2007 to manage groundwater levels by limiting trade. These remain in force. Water level monitoring indicates the local impact rules have satisfactorily managed drawdown and mitigated seasonal fluctuations.			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		Was water quality monitored and managed if required?	Some water quality monitoring has been undertaken. There is no water source scale groundwater quality monitoring program. No impact areas for water quality management have been required.		Continue to monitor and where necessary manage groundwater level impacts of extraction.	Medium
		Were GDEs protected?	The scheduled GDE (“prior streams”) was indirectly protected. Setback rules for new bores could not be implemented because there was no mapping available for “prior streams”. Production bores accessing the deep water source have conditions restricting access to overlying aquifers, with flow on protection to “prior streams”. This does not apply to BLR bores or to bores in the shallow aquifer. No additional GDEs were identified and included in the relevant schedule during the plan term DPIE is currently conducting a State–wide project to identify GDEs. .	 	Consider reassessing the inclusion of “prior streams” in Schedule 4 of the Plan due to unavailability of mapping. Ensure the addition of relevant GDEs to the relevant WSP schedule if/when they are identified.	High

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		Were rivers and creeks protected?	Rivers and creeks were protected through the application of setback distances for new bores. No new BLR bores or production bores were permitted within setback distances applying to rivers and creeks. Additionally, all production bores accessing the deep water source have conditions restricting access to overlying aquifers, with flow on protection to rivers and creeks. *Note: These rules are established in the GDE protection clause of the Plan.*			
		Was aquifer integrity protected?	Aquifer integrity was protected. This assessment is based on groundwater level monitoring (including the stabilisation and/or recovery of groundwater levels). There is currently no information available regarding land subsidence or reduction in bore yields. No local impact areas for aquifer integrity management have been required.		Continue groundwater level monitoring and investigate if reports of subsidence, aquifer compaction or reduced bore yield are received	Medium

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		Were extraction restrictions required?	No local impact areas have been required to be established. Alternate management strategies were implemented under the Act during the plan term. All new bores constructed after the commencement of the Plan have restrictions on annual pumping rates to limit potential impacts on neighbouring bores.		Review the local impact management mechanisms available in the Plan and in the Act to ensure consistency and transparency.	High
		Was group registration required?	No local impact areas have been required to be established. These provisions have not been required.			
		Were there any failures of monitoring bores that are relied on to manage local impact restrictions?	No local impact areas have been required to be established. These provisions have not been required.			
Dealings	Minister's dealing principles	Were dealings in line with the Minister's dealing principles, the Act and the WSP?	All dealings have been made in line with Minister's dealing principles. *Note: Prohibited dealings in this plan area include conversions of access licence categories and interstate (transfer and assignment of allocation).*			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
	Constraints within water source	Were dealings in line with rules relating to constraints within the water source?	All dealings were undertaken in line with plan rules relating to constraints within the groundwater sources. *Note: Also refer to 'Were water levels monitored and managed if required?' for additional information on local impact areas and dealing constraints.*			
	Change of water source	Were dealings in line with rules relating to change of water source?	All dealings were in line with rules permitting change of water source trade between the shallow and deep groundwater sources of the Plan.			
	Water allocation assignment between water sources	Were dealings in line with rules relating to allocation assignments between water sources?	All dealings were in line with rules permitting allocation assignment trade between the shallow and deep groundwater sources of the Plan.			
Mandatory conditions	Access licence conditions	Were mandatory conditions for access licences placed on licences?	Mandatory conditions have been applied to for access licences. DPIE undertook a conditions reform project and developed guidelines for drafting conditions. As water sharing plans are remade DPIE is progressively reviewing conditions and, where relevant will apply conditions with improved wording and confirm		Endeavour to ensure all conditions meet DPIE's new SMART conditions criteria in the next planning cycle.	Medium

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			appropriate application of the conditions.			
	Water supply works approvals	Were mandatory conditions for works approvals placed on the works approvals?	Mandatory conditions have been applied to work approvals. DPIE undertook a conditions reform project and developed guidelines for drafting conditions. As water sharing plans are remade DPIE is progressively reviewing conditions and, where relevant will apply conditions with improved wording and confirm appropriate application of the conditions.		Endeavour to ensure all conditions meet DPIE's new SMART conditions criteria in the next planning cycle.	Medium
Plan Amendments	Annual average recharge	Were any amendments to annual average recharge made?	No amendments to the average annual recharge have been made.			
	Planned environmental water	Were any amendments made to planned environmental water?	There have been no amendments to planned environmental water.			
	Extraction limit	Were any amendments made to the extraction limit?	The Plan was amended following gazettal but prior to commencement to include BLR in the extraction limit calculations.			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			There have been no further amendments.			
	Water allocation account management rules	Were any amendments made to water allocation account management rules?	The Plan was amended following gazettal but prior to commencement to revise water allocation account management rules.			
	High priority GDEs	Was it necessary to amend GDE schedules in plan?	There have been no amendments to the relevant schedule to include additional GDEs.		See recommendations under ‘Were GDEs protected?’	
	Planned environmental water (Water recovery programs)	Were any amendments made to planned environmental water as a result of water recovery programs?	No changes allowed for in the Plan have been made to environmental water provisions.			
	Amendments made under s.45 (a) of the Act but not identified in the Plan	Were any further amendments made to the Plan?	Subsequent to the commencement of the Plan some drafting errors were identified and have been corrected by amendment.			

Plan Objective	Performance Indicators	Effectiveness Evaluation Finding	Performance	Strength	Recommendation	Priority
Share groundwater sustainably between users and the environment	Change in groundwater extraction relative to the extraction limits. Change in climate adjusted groundwater levels. Change in water levels adjacent to identified groundwater–dependent ecosystems. Change in groundwater quality relative to beneficial use. Change in structural integrity of the aquifer. Extent to which domestic and stock rights have been met. Extent to which local water utility requirements have been met.	This Plan was developed with an understanding that the pre plan entitlement and extraction levels in the deep groundwater source were unsustainable. As a result, the plan rules established a long–term average annual extraction limit which reduced annually during the term of the plan in line with reductions in available water for supplementary access licences. It was recognised prior to plan commencement that achieving sustainability for the environment would result in significant economic impact. This impact was partially offset by a structural adjustment package, which provided approximately $6 million to licence holders and communities to allow for adjustment to the entitlement reductions. Over the period (2006/07 to 2014/15) 78% of the plans extraction limt was used. Two local management areas in place and have been successful in mitigating large seasonal fluctuations and any structural integrity issues.		Good		
Share groundwater equitably amongst	Change in groundwater extraction relative to the extraction limits.	Throughout the plan term, water was shared amongst extractive users in accordance with the priority determined by the Plan.		Good		

extractive users	Change in climate adjusted groundwater levels. Change in economic benefits derived from groundwater extraction and use. Change in structural integrity of the aquifer. Extent to which domestic and stock rights have been met. Extent to which local water utility requirements have been met.	BLRs use was unrestricted, and domestic and stock and local water utilities licenced use received 100% allocations. Aquifer access licence accounts received 100% in all years and complied with the rules of the plan. Supplementary access licences in the deep groundwater source had available water determinations reduced annually in line with plan rules, supported by a structural adjustment package. Two local management areas are in place. This has resulted in the management of seasonal drawdowns and any likely integrity issues.				
Provide for basic landholder rights and priorities of use	Change in groundwater extraction relative to the extraction limits. Change in water levels adjacent to identified groundwater–dependent ecosystems. Change in groundwater quality relative to beneficial use. Change in economic benefits derived from groundwater extraction and use.	Basic Landholder rights were provided at all times with full access to water during the plan term. Priorities of access were maintained as per the requirements of the Act		Good		

	Extent to which native title rights requirements have been met. Extent of recognition of spiritual, social and customary values of water to Aboriginal people.					
Protect groundwater quality	Change in groundwater quality relative to beneficial use. Extent to which local water utility requirements have been met.	There has not been any significant change in beneficial use over most of the plan area during term of the plan.		Moderate	Consider monitoring and where necessary manage groundwater quality impacts of extraction.	Medium
Maximise the social, economic and environmental benefits of groundwater management strategies	Change in climate adjusted groundwater levels. Change in economic benefits derived from groundwater extraction and use. Change in structural integrity of the aquifer. Extent to which domestic and stock rights have been met. Extent to which local water utility requirements have been met. Extent to which native title rights requirements have been met. Extent of recognition of spiritual, social and	Basic Landholder rights were provided at all times with full access to water during the plan term. Throughout the plan period, water allocations were at or close to the full allocation allowed under the plan rules, ensuring economic benefits were maximised within the limitations of the plan rules. In line with plan rules, allocations were reduced for supplementary water licences. These reductions benefited the environment through an annual reduction in the extraction limit designed to achieve sustainable extraction levels by the end of the 10–year plan term.		Moderate		

	customary values of water to Aboriginal people.	Two local management areas in place and have been successful in mitigating large seasonal fluctuations and any structural integrity issues.				
Minimise the negative social and economic impacts of groundwater management strategies	Change in groundwater quality relative to beneficial use. Change in economic benefits derived from groundwater extraction and use.	The water sharing plan contains one groundwater management strategy which has the potential to impact negatively of social and economic outcomes. This strategy is the reduction in the extraction limit as a result of reductions in allocations for Supplementary groundwater access licences. This negative impact was recognised prior to plan commencement, and the impacts minimised both within the plan, via a gradual reduction in allocations over 10–years to allow a period of adjustment for water users, and via a structural adjustment package which, while it operated outside the plan, provided financial assistance to licence holders to allow them to put in place strategies to adjust to the entitlement reductions.		Moderate		

Table 19: Lower Murrumbidgee Groundwater WSP Effectiveness Evaluation Report Card

Performance Indicator	Related Plan Objectives	Result Summary	Strength of Information
Change in groundwater extraction relative to the extraction limits.	Share groundwater sustainably between users and the environment Share groundwater equitably amongst extractive users Maximise the social, economic and environmental benefits of groundwater management strategies Minimise the negative social and economic impacts of groundwater management strategies. Provide for basic landholder rights and priorities of use Share groundwater sustainably between users and the environment	Groundwater extraction exceeded the annual extraction limit in four years, 2006–2007, 2007–2008, 2008–2009 and 2014–2015. However, it did not exceed the Plan's extraction limit compliance rules which provides for it to be managed against a 5% exceedance of a rolling 3 year average. Over the 10–year period from 2006–2007 to 2015–2016, 84% of the Plan's extraction limit was extracted. *References:* *DPIE Water Register at: http://www.water.nsw.gov.au/water–licensing/registers*	Good
Change in climate adjusted groundwater levels.	Share groundwater sustainably between users and the environment Share groundwater equitably amongst extractive users Maximise the social, economic and environmental benefits of groundwater management strategies Minimise the negative social and economic impacts of groundwater management strategies. Provide for basic landholder rights and priorities of use	Groundwater levels are monitored at 260 bores at 139 sites across the Lower Murrumbidgee. This monitoring network includes 36 bores equipped with data loggers that record water levels continuously. An analysis of the groundwater levels is provided in the Murrumbidgee Alluvium Water Resource Plan (GW9), Status and Issues Paper. This analysis shows some areas where the groundwater levels have declined over the plan period. This decline in groundwater level over time is not unexpected as the water sharing plan for the Lower Murrumbidgee Alluvium allows extraction to be in excess of the estimated average annual recharge to enable users to adjust to the reduction in entitlements that occurred at the beginning of the plan. Access to groundwater has been progressively reduced over the ten	Good

Performance Indicator	Related Plan Objectives	Result Summary	Strength of Information
		year life of the plan via supplementary licences which were cancelled at the end of the 2014/2015 water year. The declines in some areas could also be attributed to localised pumping. *References:* *Department of Primary Industries (2017), Murrumbidgee Alluvium Water Resource Plan (GW9), Status and Issues Paper*	
Change in economic benefits derived from groundwater extraction and use.	Share groundwater sustainably between users and the environment Share groundwater equitably amongst extractive users Maximise the social, economic and environmental benefits of groundwater management strategies Minimise the negative social and economic impacts of groundwater management strategies.	The introduction of fully tradeable groundwater access licences with a wide range of allowed dealings has resulted in greater account management and trading flexibility. This has been a significant change to groundwater management. There is limited information available to measure the change in economic benefits to groundwater users directly as a result of the water sharing plan. The facilitation of an active trading market in the Lower Murrumbidgee groundwater sources allows for a market based demand solution to deliver the available water resource to the most productive and economical operations while protecting overall growth in usage with the long–term average annual extraction limit for each respective water source. Through the temporary trade market, 330,067 megalitres of water was transferred over the evaluation period for commercial purposes with a total consideration of $19,547,947. Additionally, 20,944 shares were permanently transferred for commercial consideration at a total value of $23,497,395	Poor

Performance Indicator	Related Plan Objectives	Result Summary	Strength of Information
		Note: these figures are representative of 71T and 71Q trades respectively. Transfer of licences under Section 71M of the Act were not included for the purpose of this report. *References:* Aither 2016, *Water markets in New South Wales: market outcomes, trends and drivers*, Aither Pty Ltd.	
Extent to which domestic and stock rights (BLR) requirements, domestic and stock access licence requirements and local water utility requirements have been met.	Share groundwater sustainably between users and the environment Share groundwater equitably amongst extractive users Maximise the social, economic and environmental benefits of groundwater management strategies Minimise the negative social and economic impacts of groundwater management strategies. Provide for basic landholder rights and priorities of use	BLR have not been restricted and there have been no verified reports of interference impacts on bores accessing BLR or any reported cases of bores requiring deepening to retain access. Full entitlement was available at all times for licenced domestic and stock, and local water utility extraction via 100% available water determinations. There have been no verified reports of interference impacts on bores accessing water for these purposes. *References* *DPIE Water Register at: http://www.water.nsw.gov.au/water–licensing/registers*	Good
Extent to which native title rights requirements have been met and extent to which water has been made available and used for Aboriginal purposes	Share groundwater sustainably between users and the environment Share groundwater equitably amongst extractive users Maximise the social, economic and environmental benefits of groundwater management strategies	No native title rights for water were established in the plan area prior to or during the plan term. Native title rights for water, where established under the Commonwealth Native Title Act 2003, are recognised, protected and prioritised by the plan under basic landholder rights provisions. No Aboriginal Cultural access licences have been issued in this plan area. Aboriginal cultural use of water is recognised by the plan. Licences for Aboriginal cultural use may be granted within specified limits.	Good

Performance Indicator	Related Plan Objectives	Result Summary	Strength of Information
	Minimise the negative social and economic impacts of groundwater management strategies. Provide for basic landholder rights and priorities of use	*References:* *Native title determinations at:* www.nntt.gov.au/searchRegApps/Pages/default.aspx *DPIE Water Register at:* www.water.nsw.gov.au/water–licensing/registers	
Change in water levels adjacent to identified groundwater–dependent ecosystems and change in condition of GDEs (incl. rivers and creeks) due to groundwater level changes	Share groundwater sustainably between users and the environment Maximise the social, economic and environmental benefits of groundwater management strategies	There is no information available to make an assessment of this performance indicator. The Plan recognises “prior streams” as high priority GDEs, no further GDEs have been scheduled during the plan term. However, a GDE identification process has commenced. As a result, this performance indicator cannot be assessed.	Poor
Change in groundwater quality relative to beneficial use	Share groundwater sustainably between users and the environment Maximise the social, economic and environmental benefits of groundwater management strategies Minimise the negative social and economic impacts of groundwater management strategies. Protect groundwater quality	There has not been any significant change in beneficial use over most of the plan area during the term of the Plan. The current beneficial use classifications are comparable to historical classifications. In 2009 the former NSW Office of Water commissioned Parsons Brinckerhoff to characterise the hydrochemistry and investigate the risks posed by groundwater pumping on groundwater quality in six alluvial systems including the Lower Murrumbidgee Alluvium. Thirty–five monitoring bores were sampled during 2009 and 2011. The study focussed on an area east of Hay. The main finding of this study relating to salinity is that groundwater is fresh to brackish (320 – 5,500 µS/cm) and is suitable for multiple beneficial uses including drinking water	Good 2008–2010 Poor 2011–2015 (no reporting available, may be unassessed data)

Performance Indicator	Related Plan Objectives	Result Summary	Strength of Information
		supply, irrigation and stock water supply. There was an increasing salinity trend in some bores within irrigation areas. *References:* *Parsons Brinckerhoff (2011) NSW Office of Water Characterisation of hydro–geochemistry and risks to groundwater quality – Impact of groundwater pumping on water quality: National Water Commission – Raising National Water Standards Programme*	
Change in structural integrity of the aquifer.	Share groundwater sustainably between users and the environment Maximise the social, economic and environmental benefits of groundwater management strategies Minimise the negative social and economic impacts of groundwater management strategies. Provide for basic landholder rights and priorities of use Protect groundwater quality	In the deep groundwater source, pressure level monitoring showed localised declines in two areas. The risk to structural integrity was managed by the establishment of local management areas in July 2007 to restrict trade from areas of low pumping stress to areas of higher pumping stress. These measures appear to have halted water level declines and worsening seasonal fluctuations without the need for any restrictions on actual extraction volumes. There have been no reports of subsidence or reduced bore yields indicating compromised structural integrity. *References* Kumar, P. B., (2013) *Groundwater trading and management of local impacts – Lower Murrumbidgee Deep Groundwater Source – 2013*, NSW Office of Water, Sydney	Good

Table 20: Lower Murrumbidgee Groundwater WSP – Performance Indicator Results Summary

Performance Indicator	Related Plan Objectives	Result Summary	Strength of Information
Change in groundwater extraction relative to the extraction limits.	Share groundwater sustainably between users and the environment Share groundwater equitably amongst extractive users Maximise the social, economic and environmental benefits of groundwater management strategies Minimise the negative social and economic impacts of groundwater management strategies. Provide for basic landholder rights and priorities of use Share groundwater sustainably between users and the environment	Groundwater extraction exceeded the annual extraction limit in four years, 2006–2007, 2007–2008, 2008–2009 and 2014–2015. However, it did not exceed the Plan's extraction limit compliance rules which provides for it to be managed against a 5% exceedance of a rolling 3 year average. Over the 10–year period from 2006–2007 to 2015–2016, 84% of the Plan's extraction limit was extracted. *References:* *DPIE Water Register at: http://www.water.nsw.gov.au/water–licensing/registers*	Good
Change in climate adjusted groundwater levels.	Share groundwater sustainably between users and the environment Share groundwater equitably amongst extractive users Maximise the social, economic and environmental benefits of groundwater management strategies Minimise the negative social and economic impacts of groundwater management strategies. Provide for basic landholder rights and priorities of use	Groundwater levels are monitored at 260 bores at 139 sites across the Lower Murrumbidgee. This monitoring network includes 36 bores equipped with data loggers that record water levels continuously. An analysis of the groundwater levels is provided in the Murrumbidgee Alluvium Water Resource Plan (GW9), Status and Issues Paper. This analysis shows some areas where the groundwater levels have declined over the plan period. This decline in groundwater level over time is not unexpected as the water sharing plan for the Lower Murrumbidgee Alluvium allows extraction to be in excess of the estimated average annual recharge to enable users to adjust to the reduction in entitlements that occurred at the beginning of the plan. Access to groundwater has been progressively reduced over the ten	Good

Performance Indicator	Related Plan Objectives	Result Summary	Strength of Information
		year life of the plan via supplementary licences which were cancelled at the end of the 2014/2015 water year. The declines in some areas could also be attributed to localised pumping. *References:* *Department of Primary Industries (2017), Murrumbidgee Alluvium Water Resource Plan (GW9), Status and Issues Paper*	
Change in economic benefits derived from groundwater extraction and use.	Share groundwater sustainably between users and the environment Share groundwater equitably amongst extractive users Maximise the social, economic and environmental benefits of groundwater management strategies Minimise the negative social and economic impacts of groundwater management strategies.	The introduction of fully tradeable groundwater access licences with a wide range of allowed dealings has resulted in greater account management and trading flexibility. This has been a significant change to groundwater management. There is limited information available to measure the change in economic benefits to groundwater users directly as a result of the water sharing plan. The facilitation of an active trading market in the Lower Murrumbidgee groundwater sources allows for a market based demand solution to deliver the available water resource to the most productive and economical operations while protecting overall growth in usage with the long–term average annual extraction limit for each respective water source. Through the temporary trade market, 330,067 megalitres of water was transferred over the evaluation period for commercial purposes with a total consideration of $19,547,947. Additionally, 20,944 shares were permanently transferred for commercial consideration at a total value of $23,497,395	Poor

Performance Indicator	Related Plan Objectives	Result Summary	Strength of Information
		Note: these figures are representative of 71T and 71Q trades respectively. Transfer of licences under Section 71M of the Act were not included for the purpose of this report. *References:* Aither 2016, *Water markets in New South Wales: market outcomes, trends and drivers*, Aither Pty Ltd.	
Extent to which domestic and stock rights (BLR) requirements, domestic and stock access licence requirements and local water utility requirements have been met.	Share groundwater sustainably between users and the environment Share groundwater equitably amongst extractive users Maximise the social, economic and environmental benefits of groundwater management strategies Minimise the negative social and economic impacts of groundwater management strategies. Provide for basic landholder rights and priorities of use	BLR have not been restricted and there have been no verified reports of interference impacts on bores accessing BLR or any reported cases of bores requiring deepening to retain access. Full entitlement was available at all times for licenced domestic and stock, and local water utility extraction via 100% available water determinations. There have been no verified reports of interference impacts on bores accessing water for these purposes. *References* *DPIE Water Register at: http://www.water.nsw.gov.au/water–licensing/registers*	Good
Extent to which native title rights requirements have been met and extent to which water has been made available and used for Aboriginal purposes	Share groundwater sustainably between users and the environment Share groundwater equitably amongst extractive users Maximise the social, economic and environmental benefits of groundwater management strategies	No native title rights for water were established in the plan area prior to or during the plan term. Native title rights for water, where established under the Commonwealth Native Title Act 2003, are recognised, protected and prioritised by the plan under basic landholder rights provisions. No Aboriginal Cultural access licences have been issued in this plan area. Aboriginal cultural use of water is recognised by the plan. Licences for Aboriginal cultural use may be granted within specified limits.	Good

Performance Indicator	Related Plan Objectives	Result Summary	Strength of Information
	Minimise the negative social and economic impacts of groundwater management strategies. Provide for basic landholder rights and priorities of use	*References:* *Native title determinations at:* www.nntt.gov.au/searchRegApps/Pages/default.aspx *DPIE Water Register at:* www.water.nsw.gov.au/water–licensing/registers	
Change in water levels adjacent to identified groundwater–dependent ecosystems and change in condition of GDEs (incl. rivers and creeks) due to groundwater level changes	Share groundwater sustainably between users and the environment Maximise the social, economic and environmental benefits of groundwater management strategies	There is no information available to make an assessment of this performance indicator. The Plan recognises “prior streams” as high priority GDEs, no further GDEs have been scheduled during the plan term. However, a GDE identification process has commenced. As a result, this performance indicator cannot be assessed.	Poor
Change in groundwater quality relative to beneficial use	Share groundwater sustainably between users and the environment Maximise the social, economic and environmental benefits of groundwater management strategies Minimise the negative social and economic impacts of groundwater management strategies. Protect groundwater quality	There has not been any significant change in beneficial use over most of the plan area during the term of the Plan. The current beneficial use classifications are comparable to historical classifications. In 2009 the former NSW Office of Water commissioned Parsons Brinckerhoff to characterise the hydrochemistry and investigate the risks posed by groundwater pumping on groundwater quality in six alluvial systems including the Lower Murrumbidgee Alluvium. Thirty–five monitoring bores were sampled during 2009 and 2011. The study focussed on an area east of Hay. The main finding of this study relating to salinity is that groundwater is fresh to brackish (320 – 5,500 µS/cm) and is suitable for multiple beneficial uses including drinking water	Good 2008–2010 Poor 2011–2015 (no reporting available, may be unassessed data)

Performance Indicator	Related Plan Objectives	Result Summary	Strength of Information
		supply, irrigation and stock water supply. There was an increasing salinity trend in some bores within irrigation areas. *References:* *Parsons Brinckerhoff (2011) NSW Office of Water Characterisation of hydro–geochemistry and risks to groundwater quality – Impact of groundwater pumping on water quality: National Water Commission – Raising National Water Standards Programme*	
Change in structural integrity of the aquifer.	Share groundwater sustainably between users and the environment Maximise the social, economic and environmental benefits of groundwater management strategies Minimise the negative social and economic impacts of groundwater management strategies. Provide for basic landholder rights and priorities of use Protect groundwater quality	In the deep groundwater source, pressure level monitoring showed localised declines in two areas. The risk to structural integrity was managed by the establishment of local management areas in July 2007 to restrict trade from areas of low pumping stress to areas of higher pumping stress. These measures appear to have halted water level declines and worsening seasonal fluctuations without the need for any restrictions on actual extraction volumes. There have been no reports of subsidence or reduced bore yields indicating compromised structural integrity. *References* Kumar, P. B., (2013) *Groundwater trading and management of local impacts – Lower Murrumbidgee Deep Groundwater Source – 2013*, NSW Office of Water, Sydney	Good

Appendix 10: Lower Murrumbidgee– internal logic relationship diagrams

Relationship diagrams show the internal Plan logic supporting the delivery of each of the Plan's outcomes. One diagram has been created for each of the economic, social / cultural and environmental outcomes. The diagrams show linkages from the broad objectives (navy boxes) to the targeted objectives (blue boxes) and the rules (grey boxes). Where gaps in the program logic have been identified, these are shown as 'not specified' in the appropriate coloured box.

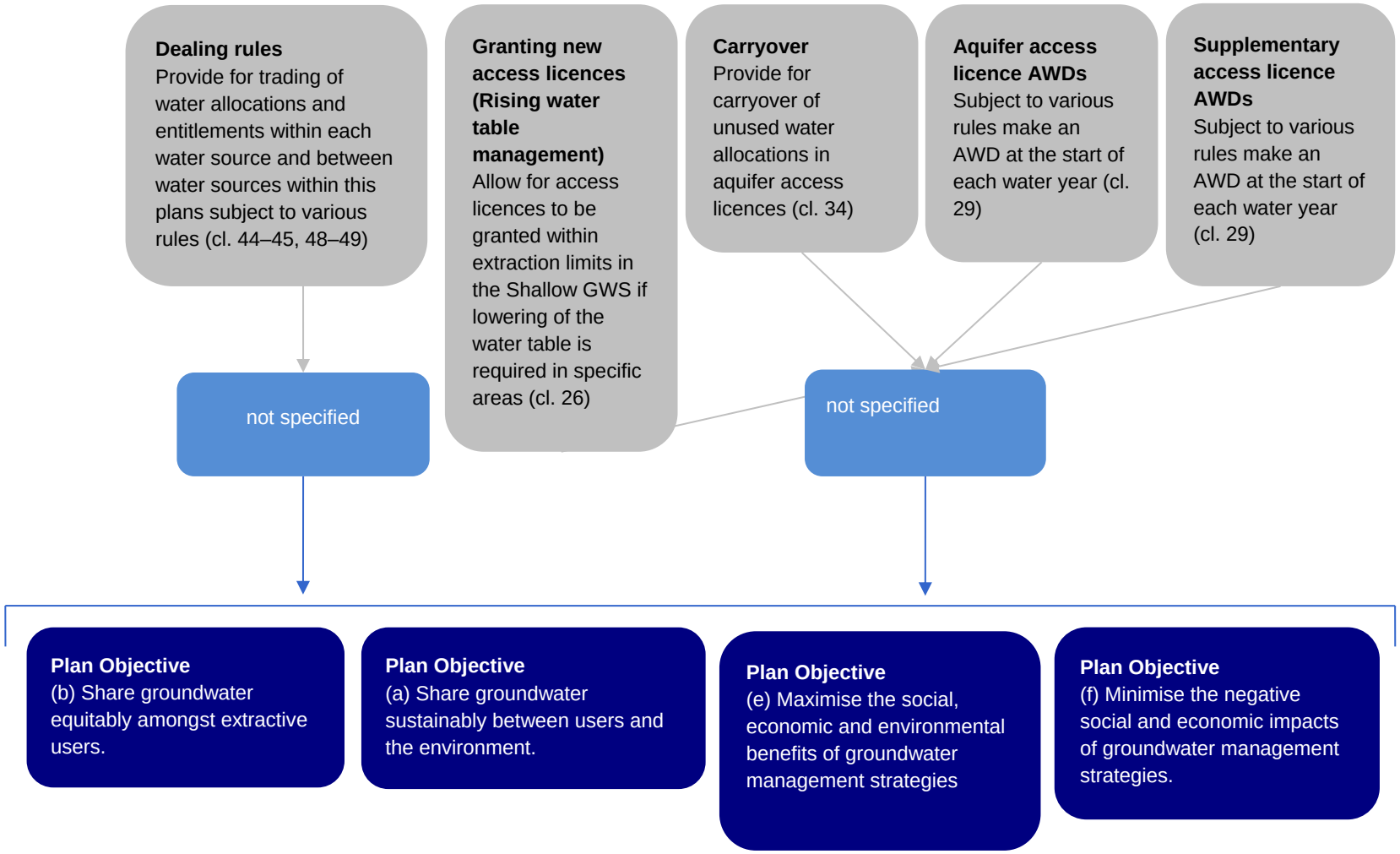

Figure 15: Lower Murrumbidgee Groundwater WSP – Economic internal logic relationship diagram

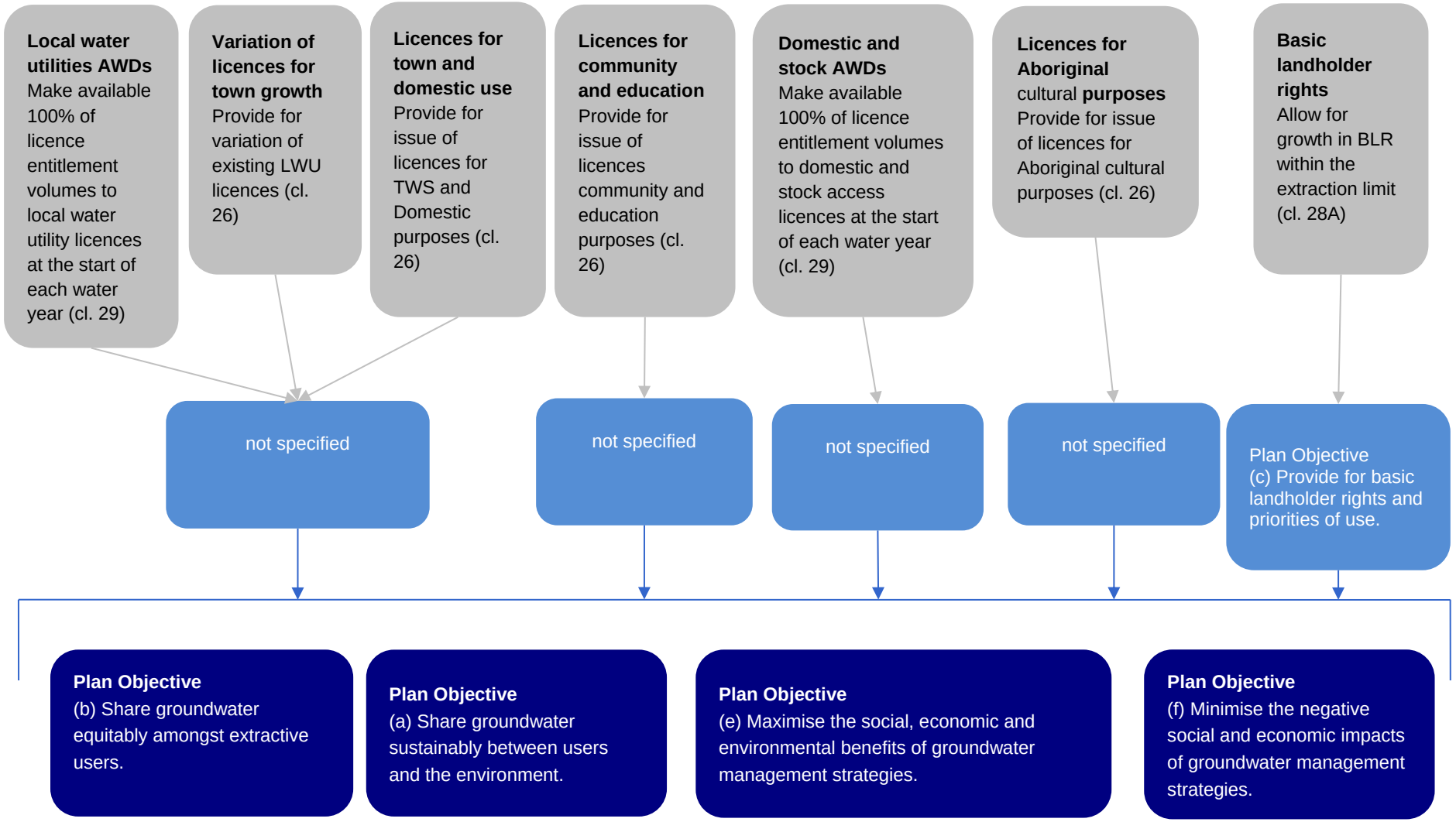

Figure 16 Lower Murrumbidgee Groundwater WSP – Social/Cultural internal logic relationship diagram

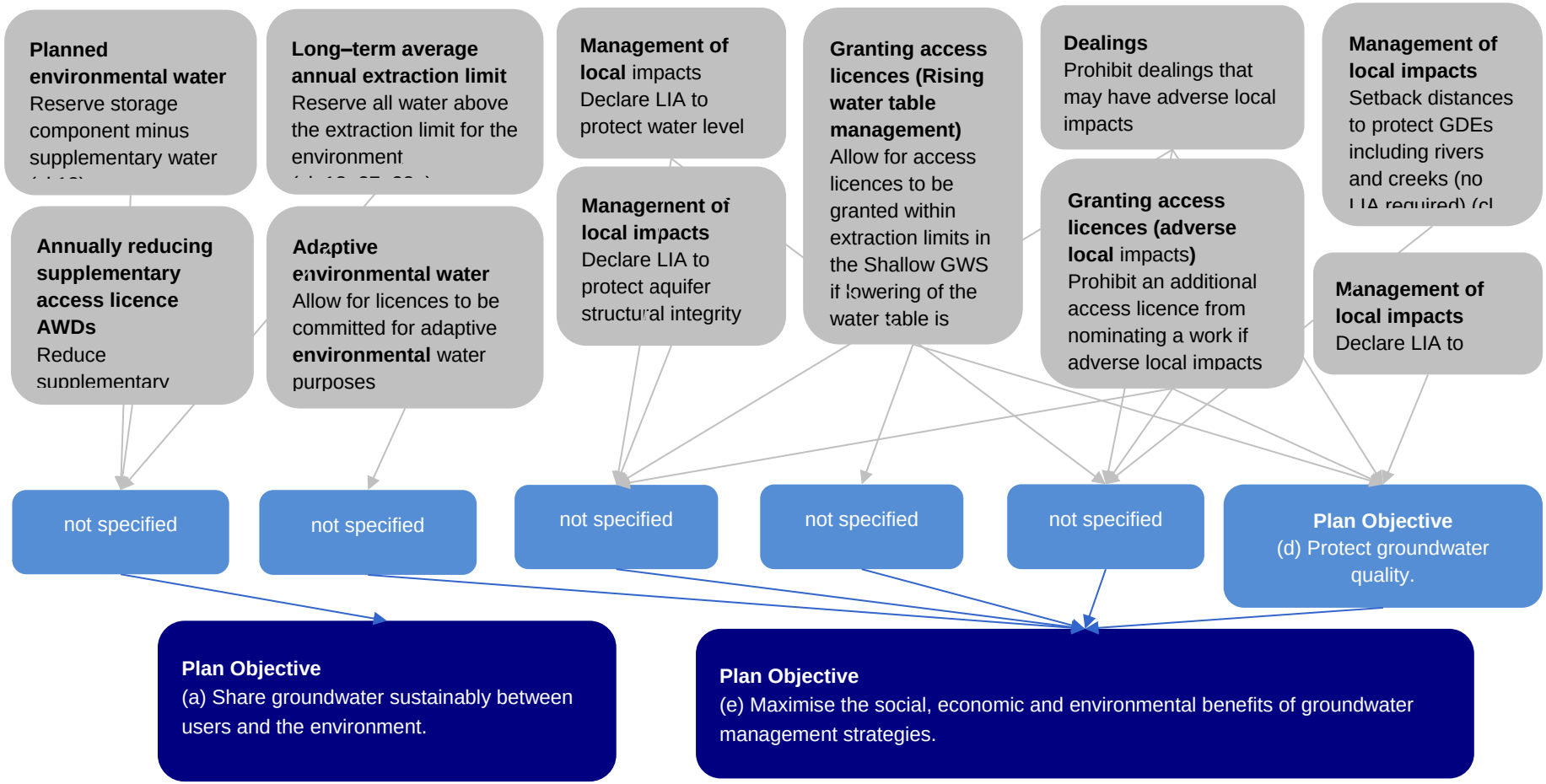

Figure 17: Lower Murrumbidgee Groundwater WSP – Economic internal logic relationship diagram

Appendix 11: Lower Murray – evaluation report cards and performance indicator summary

Table 21: Lower Murray groundwater WSP Appropriateness Evaluation Report Card

Evaluation Criteria	Evaluation question	Evaluation indicator	Results	Performance	Recommendation	Priority
Plan scale	Is the scale of the Plan appropriate for water management?	Extent to which scale is appropriate for water sharing management	**The geographic scale of the water source in the Plan is considered appropriate for water sharing management**.			
Plan scope	Is the scope of the Plan appropriate for water management?	Extent to which interactions with other water sources are addressed appropriately within the Plan or other water sharing plans	**The Plan does not adequately recognise the interactions with other groundwater or surface water sources** (The Plan does include provision of setback distances to rivers, and the contribution of rivers to the groundwater storage through the calculation of the extraction limit).		Consider reviewing the WSP scope to achieve greater recognition of surface water and aquifer interactions with other identified connected water sources.	High
Prioritisation	Is the level of management required under the Plan appropriate for the risk to environmental, economic, or social and cultural values?	Extent of risk to groundwater–dependent ecosystems, economic, and social and cultural values	**The prioritisation of the Plan as high risk is considered appropriate.** The level of management applied is considered appropriate based on high levels of pre plan groundwater allocation.			
		Extent to which risk is addressed	**The Plan provides for extraction to be limited**			

			to the long–term average extraction limit. The plan sets rules for compliance against the extraction limit that includes reducing the AWD in a groundwater source if assessed necessary to bring average usage back to the extraction limit.			
			Plan rules allow local impact areas to be declared in critical areas. The Act also allows for temporary water restrictions to be imposed via section 324 orders.		Consider reviewing the use of plan based local impact area rules and the use of 324 Orders under the Act to minimise confusion and improve transparency.	High
		Identified future risks, including climate change, interception, change in industry base, etc.	**Climate change is not adequately addressed in the Plan as the extraction limit is based on historic climate rather than expected future climate predictions. The plan does provide for revised recharge estimates and amendments to the recharge figures and extraction limits.**		Consider reviewing recharge for climatic changes.	High
Internal logic	Is the vision appropriate for water management?	Whether the vision reflects what is intended for water sharing plans in the Act	**The vision is considered appropriate** as it is consistent with the Act's intent for water sharing plans to achieve economic, social and environmental outcomes.			

	Are the objectives suitable for water management?	Whether the objectives align with the vision	**The objectives mostly align with the plan vision.**		Review the objectives against the Plan vision.	Medium
		Whether the objectives align with the principles and objects of the Act	**The objectives align with the principles and objects of the Act.** The Plan has varying degrees of broad and targeted objectives, not always related.		Review objectives against the principles and objects of the Act.	Medium
		Extent to which the objectives are clear and comprehensive enough to reflect what the Plan intended to achieve	**The objectives do not represent a full list of the Plan's intended outcomes**. The plan contains a mixture of broad and targeted objectives. Several objectives relate to a combination of economic, social and environmental outcomes. The broad objectives do not clearly link to plan strategies or rules through targeted objectives.		Consider whether additional objectives should be developed to allow an effective evaluation of the Plan. Both clear broad and targeted objectives should be established to achieve specific economic, social and environmental outcomes.	High
		Extent to which the plan logic establishes SMART (Specific,Measurable,Attainable, Realistic, Time–bound) objectives	**The plan logic fails to set objectives which can be evaluated using SMART criteria.**		Consider whether plan logic should be reconsidered to improve measurement of success.	High
	Are the strategies suitable for water management?	Whether all plan rules are linked to a strategy	**All plan rules can be linked to a strategy.**		Consider whether more appropriate strategies should be developed. Current strategies relate to plan structure headings only and do not adequately show how the	High
		Whether the strategies provide clear direction for the plan rules	**Strategies could be more specific** to guide the intent of the plan rules and to highlight the links with their intended outcomes.			

		Whether the strategies align with the objectives	**Not all strategies align with the objectives.** Most strategies point to the establishment of rule sets, but not to the intent or outcome of the rule sets.		objectives will be achieved (targeted objectives). This is important as the performance indicators should be used to assess the strategies under the Act.	
	Are the performance indicators suitable for water management?	Whether the performance indicators align with the objectives and strategies	**Most performance indicators align to the objectives.** However, in some cases performance indicators specified for an objective do not reflect the objective and in other cases additional performance indicators are required, for example in relation to GDEs.		Review the alignment and relevance of performance indicators and measures against each objective and strategy.	High
		Extent to which performance indicators are clear and comprehensive enough to measure what the Plan intended to achieve	**Most performance indicators are clear.** Additional measures are available for many performance indicators and have been included in this evaluation where possible.			
Quality of Supporting Documentation	Is documentation explaining the decisions underpinning the Plan available	Adequacy of documentation supporting the Plan	**The Plan has a comprehensive "Part A" document supporting plan development and available internally.** A range of documents available that support plan implementation.			
		Extent to which documentation is made available to the public	**The "Part A" document was publicly available during the plan's initial exhibition period but is**		Consider making the "Part A" document publicly available.	Low

			no longer publicly available. Status reports, summary reports and/or resource condition reports are available on the DPIE website.			
Communication	Is the process for communication with stakeholders adequate	Extent of communication and processes supporting plan development	**Extensive consultation was carried out during plan development**, with the Lower Murray Groundwater Management Committee meeting to explore issues and develop management strategies. The Plan was placed on public exhibition.			
		Communication arrangements in place during plan operation	**Communication on operational matters has been appropriate, based on the management decisions being made.** During drought periods, frequent discussions were held with water users. When conditions were good, communication has been on an as needs basis. A series of status and summary reports are available on the DPIE website.			
		Arrangements for consideration at term review of Plan	**Sufficient opportunity will be provided for communication during the water resource plan development process**. Consultation will involve opportunities to make submissions, and face to face meetings will be held with stakeholders.			

Alignment with state priorities for natural resource management plans (S43A)	Is the Plan aligned with state priorities for natural resource management?	Extent of alignment of Plan with state priorities	**While the State priorities align clearly with the vision of the Plan. The alignment between the other internal logic elements could be clearer.** The 2016 NRC review of this Plan identified three key State Priorities for Water Sharing Plans: • Productive and resilient water–dependant industries, • Secure long–term water supplies for urban and rural communities, and • Healthy and reesilient water–dependant ecosystems. Note: the Plan was in place prior to the development of the state priorities for natural resource management and so full alignment is not expected.		Consider reviewing the alignment of Plan objectives with state priorities for natural resource management during the development of the Water Resource Plan (WRP).	High

Table 22: Lower Murray groundwater WSP Efficiency Evaluation Report Card

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
Basis for water sharing	Recharge	Were any changes made to annual average recharge estimates?	**No changes to average annual recharge estimates were made.** The Plan does not require any such changes.			
Environmental water provisions	Planned environmental water	Was all water contained in the storage component of these water sources reserved for the environment?	**The water reserved each year for the environment was in acordance with the planned environmental water requirements and account management provisions.**			
		Was supplementary access to the storage component phased out to ensure all water in the storage was reserved for the environment?	**Supplementary water acccess was reduced annually so that it was phased out by the end of the Plan term in accordance with the Plan rules.**			
		Was all water above the extraction limit reserved?	**Extraction limits were complied with in all years.** *Note: No portion of the long–term average recharge is reserved as planned environmental water under the plan.* *Note: Planned environmental water provisions are implemented via limits to extraction.*			
		Were the extraction limits amended based on further recharge models and studies?	**No changes to extraction limits based on further average annual recharge estimates are permitted under the Plan.**			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
	Adaptive environmental water	Is there a process for licences to be committed for adaptive environmental purposes?	**All necessary systems are in place to apply and manage conditions should they be requested.** *Note: No licences have been committed as AEW in the plan area.*			
Basic Landholder Rights	Domestic and Stock	Are domestic and stock BLR provided for within the Plan?	**Domestic and stock BLR access is provided for in the Plan**.			
		Is domestic and stock BLR growth provided for within the Plan?	**Procedures are in place to allow for growth in domestic and stock BLR whilst maintaining extraction limit compliance.**			
		Have interference management strategies been required?	**No interference management strategies have been required in this plan area.**			
		Are domestic and stock BLR consistent with reasonable use guidelines?	**Reasonable use guidelines (made under s.52 of the Act and provided for in the Plan) have not been made by the Minister.**		Endeavour to finalise and publish the reasonable use guidelines as a matter of priority.	High
	Native title	Are native title BLRs provided for within the Plan?	**Procedures are in place to provide access if native title rights for water are granted in the water source covered by this Plan.** *Note: No native title rights for water have been established in this plan area.*			
		Is growth in native title BLR protected within the plan?	**Procedures are in place to allow for growth in native title BLR whilst maintaining extraction limit compliance.**			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
Requirements for water for extraction under access licences	Conversion of access licences from *Water Act 1912* to *Water Management Act 2000*	Were licences established with share components calculated according to Plan rules?	**All licences were established with share components calculated in line with Plan specifications**.			
	Changes to share components	Were the share components for supplementary licences reduced to 0 on 1st July 2015?	**Yes**			High
Rules for granting access licences	Granting new access licences	Were plan rules followed for the granting of access licences?	**All access licences granted were in line with the plan provisions.** The Water Management (General) Regulations 2004 and 2011 set out the specific purpose access licences for which applications can be accepted in line with the Plan.			
Rules for granting or amending water supply works approvals	Granting new or amended water supply works approval	Were plan rules followed for the granting of new or amended water supply works approval?	**All new bores constructed have been in line with the distance provisions of the Plan.** *Note: The Lower Murray Plan establishes rules for granting or amending water supply work approvals in Part 8 of the Plan. These rules manage potential localised impacts of pumping induced drawdown on adjacent works, sensitive environmental areas and water quality. The other groundwater plans include these rules in Part 10 of the plans.*			
Limits to the availability of water	Extraction limits	Was an extraction limit established?	**Extraction limit was established for the water source**.			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
	Variation of extraction limits	Were extraction limits varied?	**No change to the extraction limit is permitted under the Plan.**			
	Extraction limit compliance	Were rules regarding compliance with the extraction limit implemented?	**The extraction limit was complied with in all years.**			
	AWDs	Were the rules for the making of AWDs for domestic and stock and local water utility aquifer access licences implemented?	**All AWDs were announced when required in accordance with the plan rules.**			
		Were the rules for the making of AWDs for aquifer access licences implemented?	**All AWDs were announced when required in accordance with the plan rules.**			
		Were the rules for the making of AWDs for supplementary water aquifer access licences implemented?	**All AWDs were announced when required in accordance with the plan rules and had the correct annual reductions applied.**			
Rules for managing access licences	Water allocation and account management	Were water allocation accounts established?	**Water allocation accounts were established for all licence holders.**			
		Were water allocations accrued annually?	**All accounts were credited annually following available water determinations.**			
		Was water extraction accounted for at least annually?	**All accounts were debited and credited in line with plan provisions.** A small number of accounts fell below zero.		Review account management practices to ensure all functions are undertaken in line with plan provisions.	Medium

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
	Management of local impacts	Were local impact areas established?	**No local impact areas have been required to be established.** Monitoring has indicated that local impact areas or other management strategies have not been required. *Note: Amendments to the Act in 2009 provided an alternative procedure for dealing with short term localised impacts and the Plan may need to be updated to reflect this.*		Review the local impact management mechanisms available in the Plan and in the Act to ensure consistency and transparency.	High
		Were water levels monitored and managed if required?	**Water levels have been monitored during the plan term.** Monitoring has indicated that local impact areas or other management strategies have not been required. **No impact areas for water level management have been required**.			
		Was water quality monitored and managed if required?	**Some water quality monitoring has been undertaken**. There is no water source scale groundwater quality monitoring program. **No impact areas for water quality management have been required**. Aquifer salinity baseline or sodium absorption ratio for each production bore to use in water quality management strategies has not been established as required by the Plan.		Continue to monitor and where necessary manage groundwater level impacts of extraction. Review the requirement to establish salinity baseline or sodium absorption ratio for each production bore.	Medium

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		Were GDEs protected?	**The Plan states there are no GDEs identified within or dependent on the groundwater source.** **The Plan contains setback rules relating to protection of GDEs reliant on the overlying aquifer.** **No additional GDEs were identified during the Plan term and the Plan does not include a relevant schedule.**		Consider review of the WSP to allow for the addition of relevant GDEs if/when they are identified.	High
		Were rivers and creeks protected?	**Rivers and creeks were protected through the application of setback distances for new bores.** No new BLR bores or production bores were permitted within setback distances applying to rivers and creeks. *Note: These rules are established in the GDE protection clause of the Plan.*			
		Were significant wetlands protected?	**Significant wetlands were protected through the application of setback distances for new bores.** No production bores were permitted within setback distances applying to significant wetlands. *Note: These rules are established in the GDE protection clause of the Plan.*		Define and list significant groundwater dependant wetlands.	Low

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
		Was aquifer integrity protected?	**Aquifer integrity was protected.** This assessment is based on groundwater level monitoring (including the stabilisation and/or recovery of groundwater levels). There is currently no information available regarding land subsidence or reduction in bore yields. **No local impact areas for aquifer integrity management have been required.**		Continue groundwater level monitoring and investigate if reports of subsidence, aquifer compaction or reduced bore yield are received	Medium
		Were extraction restrictions required?	**No local impact areas have been required to be established.**		Review the local impact management mechanisms available in the Plan and in the Act to ensure consistency and transparency.	High
		Was group registration required?	**No local impact areas have been required to be established. These provisions have not been required.**			
		Were there any failures of monitoring bores that are relied on to manage local impact restrictions?	**No local impact areas have been required to be established. These provisions have not been required.**			
Dealings	Minister's dealing principles	Were dealings in line with the Minister's dealing principles, the Act and the WSP?	**All dealings have been made in line with Minister's dealing principles**. *Note: Prohibited dealings in this plan area include change of water source, water allocation assignment between water sources, conversions of access*			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
			licence categories and interstate (transfer and assignment of allocation).			
	Constraints within water source	Were dealings in line with rules relating to constraints within the water source?	**All dealings were undertaken in line with plan rules relating to constraints within the water source**.			
Mandatory conditions	Access licence conditions	Were mandatory conditions for access licences placed on licences?	**Mandatory conditions have been applied to for access licences.** DPIE undertook a conditions reform project and developed guidelines for drafting conditions. As water sharing plans are remade DPIE is progressively reviewing conditions and, where relevant will apply conditions with improved wording and confirm appropriate application of the conditions.		On remake review conditions meet DPIE's new SMART conditions criteria.	Medium
	Water supply works approvals	Were mandatory conditions for works approvals placed on the works approvals?	**Mandatory conditions have been applied to work approvals.** DPIE undertook a conditions reform project and developed guidelines for drafting conditions. As water sharing plans are remade DPIE is progressively reviewing conditions and, where relevant will apply conditions with improved wording and confirm appropriate application of the conditions.		On remake review conditions meet DPIE's new SMART conditions criteria.	Medium
Plan Amendments *Note: No amendments were*	Amendments made under s.45 (a) of the Act but not identified in the Plan	Were any further amendments made to the Plan?	**Subsequent to the making of the Plan some drafting errors were identified and have been corrected by amendment.**			

Plan part	Plan rule groups	Evaluation question	Results	Performance	Recommendation	Priority
anticipated by the Plan						

Table 23: Lower Murray groundwater WSP Effectiveness Evaluation Report Card

Plan Objective	Performance Indicators	Effectiveness Evaluation	Performance	Strength	Recommendation	Priority
Manage aquifers to support dependent terrestrial and subterranean ecosystems	• Change in groundwater extraction relative to the extraction limit • Change in climate adjusted groundwater levels. • Change in water levels adjacent to identified groundwater–dependent ecosystems (and change in condition of GDEs (incl. rivers and creeks) due to groundwater level changes) • Change in groundwater quality relative to beneficial use • Change in structural integrity of the aquifer. • Extent to which domestic and stock rights requirements (and domestic and stock access licence requirements have been met) • Extent to which local water utility requirements have been met.	**There are no high priority dependent ecosystems are listed in the Plan schedule. A GDE identification process is in progress.** DPIE has a current State–wide project to identify high probability GDEs and assign an ecological value. High and very high ecological value will be scheduled into the plan as high priority GDEs. Currently the Murray–Darling Basin is complete for vegetation, the majority of wetlands and springs. Base flow systems and remaining wetlands will be identified within the next 12 months. **Ecological health is supported by the establishment of a long–term average annual extraction limit which reduced annually throughout the plan term. Extraction was within the LTAAEL for all years of the plan.** Over the period (2006/07 to 2014/15) 56% of the plans extraction limt was used.		Poor	Ensure the addition of relevant GDEs to the relevant WSP schedule if/when they are identified.	High
Manage the extraction of groundwater for estimated sustainable yield	• Change in groundwater extraction relative to the extraction limits. • Change in climate adjusted groundwater levels.	**Extraction was within the LTAAEL for all years of the plan.** Over the period (2006/07 to 2014/15) 56% of the plans extraction limt was used.		Good		

	• Change in economic benefits derived from groundwater extraction and use. • Change in structural integrity of the aquifer. • Extent to which domestic and stock rights have been met. • Extent to which local water utility requirements have been met.	Water levels have improved due to low levels of extraction during the term of the Plan.				
Establish and manage groundwater resource security for communities and industries	• Change in groundwater extraction relative to the extraction limits. • Change in water levels adjacent to identified groundwater–dependent ecosystems. • Change in groundwater quality relative to beneficial use. • Change in economic benefits derived from groundwater extraction and use. • Extent of recognition of spiritual, social and customary values of water to Aboriginal people.	**Extraction was within the LTAAEL for all years of the plan.** Over the period (2006/07 to 2014/15) 56% of the plan's extraction limit was used. Water levels have improved due to low levels of extraction during the term of the Plan. No impact areas for water quality management have been required		Good		
Protect groundwater quality from external pollution sources and cross aquifer pollution	• Change in groundwater quality relative to beneficial use. • Extent to which local water utility requirements have been met.	Some water quality monitoring has been undertaken. However, there is no water source scale groundwater quality monitoring program. This limits the capacity to provide a full assessment. However, **there has been no significant change in beneficial use category**.		Moderate	Continue to monitor and where necessary manage groundwater level impacts of extraction.	Medium

Protect the natural surface environment by managing the extraction of poor quality groundwater from aquifers	• Change in climate adjusted groundwater levels. • Change in economic benefits derived from groundwater extraction and use. • Change in structural integrity of the aquifer. • Extent to which domestic and stock rights have been met. • Extent to which local water utility requirements have been met. • Extent to which native title rights requirements have been met. • Extent of recognition of spiritual, social and customary values of water to Aboriginal people.	**No impact areas for water quality management have been required.** Aquifer salinity baseline or sodium absorption ratio for each production bore to use in water quality management strategies has not been established as required by the Plan.		Poor	Review the requirement to establish salinity baseline or sodium absorption ratio for each production bore.	Medium
Acknowledge, respect, and protect the Indigenous culture and cultural heritage of the traditional peoples of the Murray Region.	*Note: Issue identified with objective/performance indicator alignment.* • Change in groundwater quality relative to beneficial use. • Change in economic benefits derived from groundwater extraction and use.	**Although the plan provides several mechanisms to protect and maintain heritage sites and cultural values, identification is at an early stage.**		Poor	Continue to work with Aboriginal communities to identify opportunities to better address the needs and aspirations in terms of equitable access to water for social, cultural, spiritual and economic use of water.	High

Table 24: Lower Murray groundwater WSP – Performance Indicator Results Summary

Performance Indicator	Related Plan Objectives	Results	Strength of Information
Change in groundwater extraction relative to the extraction limit and draw down rates prescribed by the Plan	• Manage aquifers to support dependent terrestrial and subterranean ecosystems • Manage the extraction of groundwater for estimated sustainable yield • Establish and manage groundwater resource security for communities and industries	**The long–term average annual extraction limit reduced each year starting from year 6 to align pre–plan extraction to the plan determined share allocated for extractive uses.** This was a planned reduction supported by a structural adjustment package. **Groundwater extraction always remained within the long–term average annual extraction limit during the term of the plan allowing maximum available water determinations to be announced for aquifer access licences. Over the period (2006/07 to 2014/15) 56% of the plan's extraction limit was used.** **These results show that during the plan term water was accessible for extractive uses up to the plan determined portion and that the water reserved by the plan for the environment was protected. Plan measures were effective in managing extraction to the long–term average annual extraction limits.** ***References*** NSW Office of Water (2011) *Audit of implementation –Inland alluvial aquifer water sharing plan audit report cards – Prepared for the period between 1 October 2006 and 30 June 2010 covering Lower Murrumbidgee, Lower Murray, Lower Macquarie, Lower Gwydir, Upper and Lower Namoi.* NSW Office of Water, Sydney NSW Office of Water (in press) *Audit of implementation – Inland alluvial aquifer water sharing plan audit report cards – Prepared for the period 1 July 2010 to 30 June 2014 covering Lower Murrumbidgee, Lower Murray, Lower Macquarie, Lower Gwydir, Upper and Lower Namoi,* NSW Office of Water, Sydney	**Good**
Change in climate adjusted groundwater levels.	• Manage aquifers to support dependent terrestrial and subterranean ecosystems • Establish and manage groundwater resource	**Climate impacts should be included when determining appropriate management criteria.** **Groundwater levels are monitored at 189 bores at 81 sites across the Lower Murrumbidgee. This monitoring network includes 46 bores equipped with data loggers that record water levels continuously.**	**Good**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
	security for communities and industries • Protect groundwater quality from external pollution sources and cross aquifer pollution, • Acknowledge, respect, and protect the Indigenous culture and cultural heritage of the traditional peoples of the Murray Region.	**An analysis of the groundwater levels is provided in Murray Alluvium Water Resource Plan (GW8), Status and Issues Paper. This analysis shows that in most parts of the water source the groundwater levels have raised during the plan period. This rise in groundwater level over time is attributed to low levels (below extraction limit) of pumping. In addition, access to groundwater has been progressively reduced over the ten year life of the plan via supplementary licences which were cancelled at the end of the 2014/2015 water year.** ***References:*** *For non–climate adjusted monitoring bore hydrographs, see:* NSW Office of Water (2015) Lower Murray Groundwater Sources Summary Report 2006–2014, NSW Department of Primary Industries. At http://www.water.nsw.gov.au/water–management/water–availability/groundwater#reports Department of Primary Industries (2017), Murray Alluvium Water Resource Plan (GW8), Status and Issues Paper	
Change in water levels adjacent to identified groundwater–dependent ecosystems (and change in condition of GDEs (incl. rivers and creeks) due to groundwater level changes)	• Manage aquifers to support dependent terrestrial and subterranean ecosystems	**The Plan states there are no ecosystems dependent on the groundwater source. No GDEs have been identified in the Plan and there is no plan mechanism for amendment to incorporate GDEs.** The Plan does contain setback rules relating to protection of GDEs reliant on the overlying groundwater source. Although not specified, this is assumed to be the Lower Murray Shallow Groundwater Source covered by the LMSGW WSP 2012 (check with hydros). The shallow plan does not have any scheduled high priority GDEs although it does contain a mechanism to incorporate them. Assessment of buffer zone adequacy has not been undertaken based on water level comparisons near or in scheduled high priority GDEs to a pre plan baseline as there is no schedule in the Plan and there are no scheduled GDEs identified in the related plan for the overlying groundwater source. There is no mechanism within the Plan to declare a local impact area for the protection of GDEs. There have been no GDE adverse impact reports from OEH.	**N/A**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
Change in groundwater quality	• Manage aquifers to support dependent terrestrial and subterranean ecosystems • Acknowledge, respect, and protect the Indigenous culture and cultural heritage of the traditional peoples of the Murray Region. • Protect groundwater quality from external pollution sources and cross aquifer pollution	There has not been any significant change in beneficial use over most of the plan area during the term of the Plan. The current beneficial use classifications are comparable to historical classifications. In 2009, the former NSW Office of Water commissioned Parsons Brinckerhoff to characterise the hydrochemistry and investigate the risks posed by groundwater pumping on groundwater quality in six alluvial systems including the Lower Murray Alluvium. Twenty–eight monitoring bores were sampled during 2009 and 2011 with the study focussed in the Murray Irrigation District area. The results indicated rising trends in salinity in both the aquifer systems at some locations between Deniliquin and Tocumwal. This has not resulted in a change in beneficial use class in the shallow system. However, increases in salinity at some locations in the deep aquifer system have resulted in a change in the suitability of groundwater for the irrigation of some crops (Parsons Brinckerhoff 2011).	**Good**
Change in economic benefits derived from groundwater extraction and use.	• Establish and manage groundwater resource security for communities and industries	**The introduction of fully tradeable groundwater access licences with a wide range of allowed dealings has resulted in greater account management and trading flexibility.** This has been a significant change to groundwater management. There is limited information available to measure the change in economic benefits to groundwater users directly as a result of the water sharing plan. The facilitation of an active trading market in Lower Gwydir Groundwater source allows for a market based demand solution to deliver the available water resource to the most productive and economical operations while protecting overall growth in usage with the long–term average annual extraction limit for each respective water source. Through the temporary trade market, 118,620 megalitres of water was transferred over the evaluation period for commercial purposes with a total consideration of $8,477,904. Additionally, 11,284 shares were permanently assigned for commercial consideration at a total value of $7,414,774. Note: these figures are representative of 71T and 71Q trades respectively. Transfer of licences under Section 71M of the Act were not included for the purpose of this report. References:	**Poor**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
		Aither 2016, Water markets in New South Wales: market outcomes, trends and drivers, Aither Pty Ltd.	
Change in structural integrity of the aquifer.	• Manage aquifers to support dependent terrestrial and subterranean ecosystems • Establish and manage groundwater resource security for communities and industries	**The risk to structural integrity is managed through the establishment of local impact areas to restrict trade and extractions in areas of large drawdowns. Establishment of local impact areas were not required.** **There have been no reports of subsidence or reduced bore yields indicating any compromised structural integrity.**	**Good**
Extent to which domestic and stock rights requirements (and domestic and stock access licence requirements have been met)	• Establish and manage groundwater resource security for communities and industries	BLR were not restricted. No verified cases of interference between high yield extraction and basic rights extraction, and no reported cases of BLR bores that have been deepened to retain access. *Note: There are no clauses relating to setback distances in the Lower Murray that address interference between high yield extraction and basic rights bores (BLR bores have a work approval but no WAL is required, setback rules relate to licenced extraction only).* At the commencement of the Plan there was no domestic and stock access licences and no new licenses were issued during the plan term.	**Good**
Extent to which local water utility requirements have been met.	• Establish and manage groundwater resource security for communities and industries	During the term of the Plan, AWDs of 100% were announced at the commencement of each year for local water utility access licences – There is only a small volume of LWU (12ML per year). There was no increase during plan term (new applications or increase in entitlement). There have not been any reported cases of interference between high yield and local water utility extraction.	**Good**
Extent to which native title rights requirements have been met, (and water has been made available and used	• Establish and manage groundwater resource security for communities and industries • Protect the natural surface environment by managing	No native title rights for water have been established in the plan area under the Native Title Act 2003 during the term of the plan. No Aboriginal Cultural access licences have been issued in this plan area.	**Poor**

Performance Indicator	Related Plan Objectives	Results	Strength of Information
for Aboriginal purposes)	the extraction of poor quality groundwater from aquifers		
Extent of recognition of spiritual, social and customary values of groundwater to Aboriginal people	• Establish and manage groundwater resource security for communities and industries • Protect the natural surface environment by managing the extraction of poor quality groundwater from aquifers	**No native title rights for water were established in the plan area prior to or during the plan term**. Native title rights for water, where established under the Commonwealth Native Title Act 2003, are recognised, protected and prioritised by the plan under basic landholder rights provisions. **No Aboriginal Cultural access licences have been issued in this plan area.** Aboriginal cultural use of water is recognised by the plan. Licences for Aboriginal cultural use may be granted within specified limits. ***References*** *Native title determinations at:* http://www.nntt.gov.au/searchRegApps/Pages/default.aspx *Licence information available from the DPIE Water Register at:* http://www.water.nsw.gov.au/water–licensing/registers	**Poor**

Appendix 12: Lower Murray– internal logic relationship diagrams

Relationship diagrams show the internal Plan logic supporting the delivery of each of the Plan's outcomes. One diagram has been created for each of the economic, social / cultural and environmental outcomes. The diagrams show linkages from the broad objectives (navy boxes) to the targeted objectives (blue boxes) and the rules (grey boxes). Where gaps in the program logic have been identified, these are shown as 'not specified' in the appropriate coloured box.

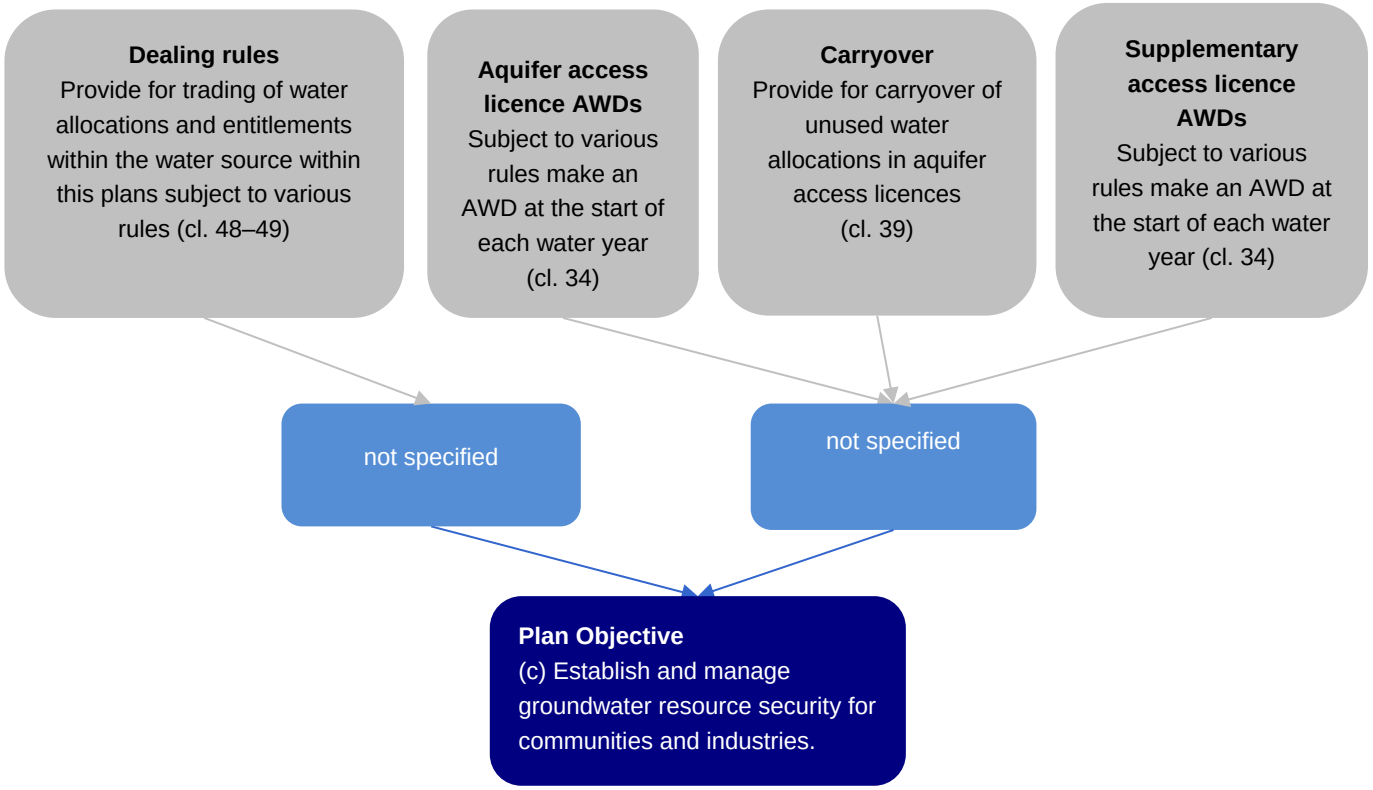

Figure 14: Lower Murray Groundwater WSP – Economic internal relationship diagram

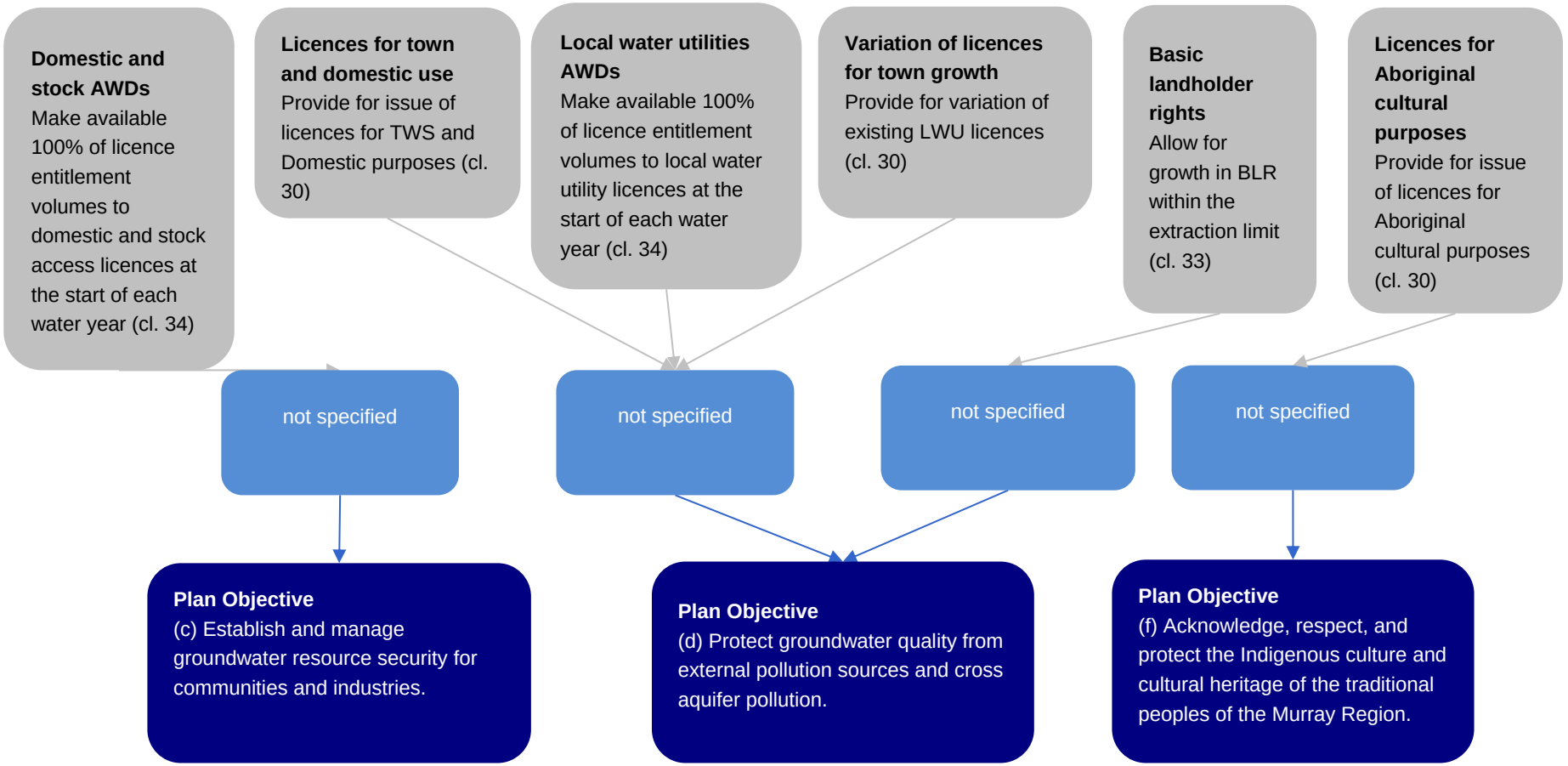

Figure 19: Lower Murray Groundwater WSP – Social/Cultural internal logic relationship diagram

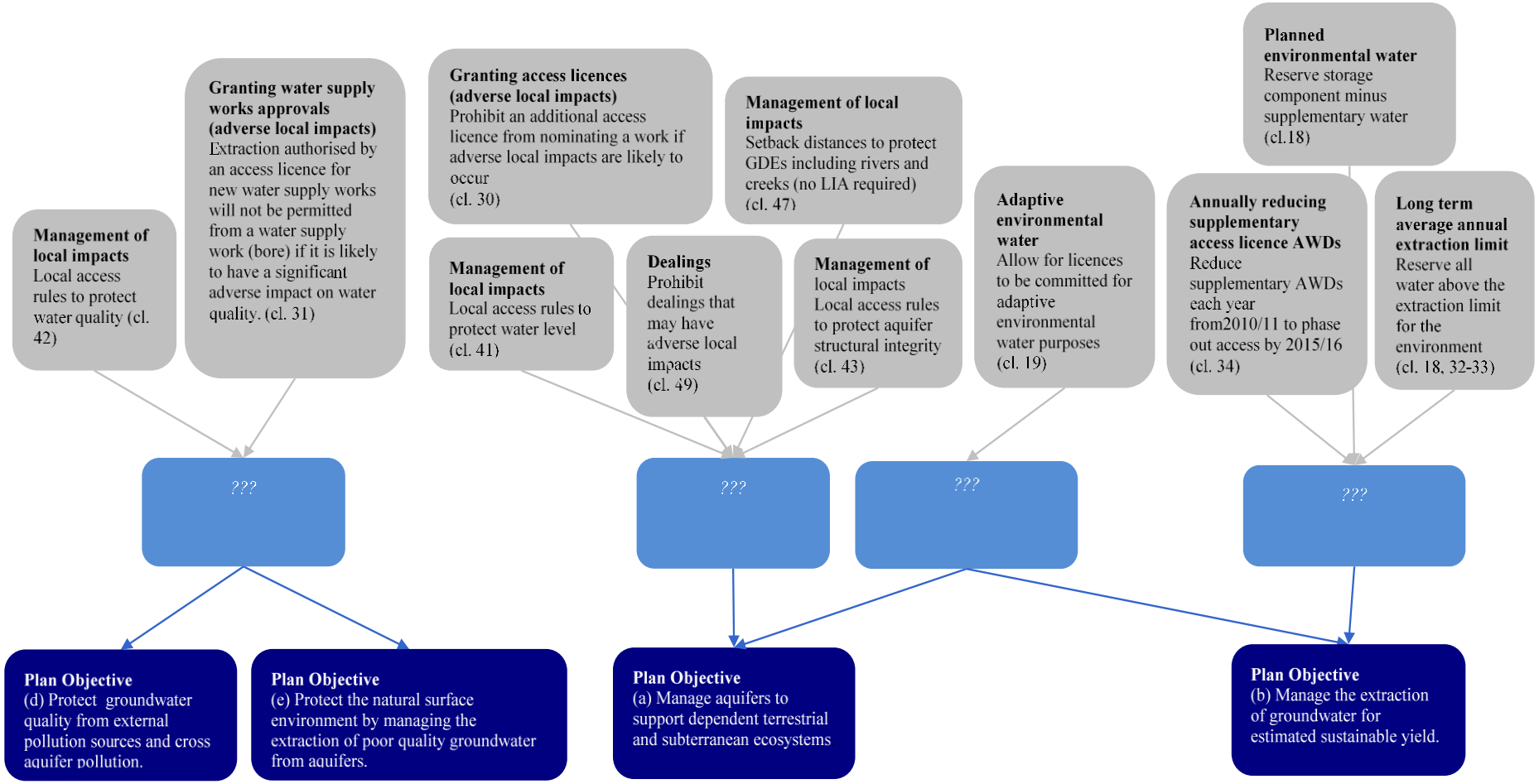

Figure 20: Lower Murray Groundwater WSP – Environmental internal logic relationship diagram

Note '???'= not specified