

# **Gwydir Valley Irrigators Association Inc.**

458 Frome St, PO Box 1451, Moree NSW 2400

## **Submission to the Department of Primary Industries – Water**

**On**

## **Review of Water Sharing Plan for the Lower Gwydir Groundwater Source**

***By Gwydir Valley Irrigators Association Inc***

***March 2016***

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# 1 Purpose of this submission

This document has been developed by the Gwydir Valley Irrigators Association (GVIA) on behalf of its members as a supplementary submission on the Review of the Lower Gwydir Groundwater Water Sharing Plan and the preparation for development of Water Resource Plan for our region.

This document represents the concerns and views of GVIA's members. However, each member reserves the right to express their own opinion and is entitled to make their own submission.

## 2 About the Association

### 2.1 *Where we are and what we do*

The Gwydir Valley Irrigators Association (GVIA) represents in excess of 250 water entitlement holders in the Gwydir Valley, centred around the town of Moree in North-West New South Wales. Our mission is to build a secure future for its members, the environment and the Gwydir Valley community through irrigated agriculture.

The region is highly dependent on agriculture and in particular irrigated agriculture for economic activity contributing over 40% of Gross Regional Product, employing 20-30% of the population and accounting for almost 90% of exports from the Moree Plains Shire in particular (Cotton Catchment Communities CRC Communities and People Series 2009).

The 2011 Agricultural Census estimates that the total value of agricultural commodities for the Moree Plains region was \$911,951,079 up from \$527,744,851 in the 2005-06 census. This is an estimated 7.83% of NSW's total agricultural production from a 1,040,021Ha principally used for agricultural crops.

GVIA members hold entitlements within the Gwydir regulated and un-regulated surface water areas, in addition to groundwater resources. All of which are managed through water sharing plans, which have been progressively developed since early 2000. Total river water availability for irrigation is 26% of the long term average flows. There is around 575,000ML available to irrigators from regulated entitlement (high security, general security and supplementary water). There is also nearly 30,000ML available from groundwater aquifers. In addition, unregulated water is used for irrigation purposes with the use well below the volumetric licences.

The Gwydir is characterised as having low water reliability with the majority of water held as general security water with a reliability of 36%. Supplementary water entitlement is somewhat more reliable with 55% but accounts for less than a quarter of the total volume. Groundwater reliability is considered 100% although recent usage statistics indicate the three-year rolling average is above the targeted extraction limit and access maybe reduced.

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Environmental water has been held in the Gwydir prior to the first water Sharing Plan and is primarily used to contribute waterbird and fish breeding events and to maintain the condition and extent of the internationally recognised Gwydir Wetlands. Entitlements owned for environmental purposes totals more than 150,000ML, made up of high security (375ML), general security (106,000ML), supplementary water (19,500ML) and an environmental contingency allowance (45,000ML).

The main broad acre irrigated crop is cotton with irrigated wheat, barley and Lucerne also occurring depending on commodity prices the total broad acre irrigated area is approximately 80,000 ha (although recent results indicate this to be around 110,000 ha) but is rarely cropped in one year. In 2010-11 census data indicated the total production value of irrigated cotton was \$623M and is estimated to be worth three times that to the local community using the Cotton Catchment Communities Research Corporation economic multiplier for cotton regions<sup>1</sup>.

Currently there are also pecans, walnuts, oranges and olives being grown within the region covering approximately 1,500 hectares, generating an estimate \$31M with considerable benefits to the local community as a high intensity, permanent crop. There is however, significant and potential for expansion into horticulture and improve high security water utilisation on permanent cropping.

The Gwydir Valley Irrigators Association organisation is voluntary, funded by a cents/megalitre levy on regulated, unregulated and groundwater irrigation entitlement. In 2014/15 the levy was paid on in excess of 93% of the eligible entitlement (excludes entitlement held by the State and Federal Government).

The Association is managed by a committee of 11 irrigators and employs a full-time executive officer and a part-time administrative assistant, as well as hosting a Regional Facilitator funded through Local Land Services and the Cotton Research and Development Corporation.

Much of the activity the association revolves around negotiating with government at a Federal, State and Local level to ensure the rights of irrigators are maintained and respected. While the core activities of the Association are funded entirely through a voluntary levy, the Association does from time to time, undertakes special projects, which can be funded by government.

The GVIA and its members are members of both the National Irrigators Council and the NSW Irrigators Council.

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<sup>1</sup> Social and Economic Analysis of the Moree Community, 2009. Cotton Catchment Communities CRC

## **2.2 Association Contacts**

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## **3 Introduction**

The Gwydir Valley Irrigators Association (GVIA) welcomes the opportunity by the NSW Government to provide comment on the Water Sharing Plan (WSP) for the Lower Gwydir Groundwater Source.

The GVIA as part of its submission into the review of the Water Sharing Plan in October 2015, outlined a number of issues with the lack of preparedness of the Department to communicate and inform stakeholders on the performance of the Plan, as a means to allow them to make informed recommendations as part of the process. As a result, we requested a follow-up meeting with NSW DPI to provide what we believed to be outstanding information to inform the review. This meeting was held in December 2015 and mostly provided stakeholders a more thorough understanding of aquifer performance and status and groundwater modelling improvements.

Following a review of this information, the GVIA has prepared the following submission which reinforces our previous recommendations and builds upon these further. We have also included recommendations regarding further communication, engagement and building confidence in groundwater modelling in the region.

A review of our initial submission outlined we are still waiting for the following information from DPI Water:

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- Understanding of plan performance over the long term, in particular how it has meet the key performance indicators as well as compliance against the long-term extraction limit (not on the three-year rolling average assessment).
- Technical report on the updated groundwater model and the results of it calibration to 2015 data set, including:
  - Analysis of modelled versus actual behaviour of the aquifer.
  - Accuracy of the Estimation of Annual Average Recharge and Sustainable Yield.
- Monitoring of groundwater quality;
- Environmental outcomes in particular, Groundwater Dependant Ecosystems; and

Socio economic analysis of the impact of the plan.

The GVIA and its members are committed to ensuring the future sustainability of our groundwater resource, our livelihoods, the longevity of the industry and our communities depend on this. However we do believe there remain far too many unresolved concerns with the plan and the groundwater model used to inform decision making that we cannot ignore the opportunity to improve our knowledge and improve our planning for the future. We believe there is enough evidence to warrant a remake of this water sharing plan prior to transitioning to a water resource plan.

The GVIA is disappointed by the lack of information available to stakeholders, particularly on the groundwater model and its accuracy, to allow them to us to genuinely participate in this review at this point in time. Whilst engagement on the review has improved (in comparison to our experience in surface water planning), the process remains flawed by the lack of preparation by the Department. Although we do acknowledge a commitment by Department of Primary Industries (DPI) - Water to facilitate a future meeting with groundwater modellers and hydrogeologists from within the Department, the fact that this could not be facilitated prior to this submission date has significantly impeded our ability to provide recommendations.

With this in mind, the GVIA have considered this submission (in part), as an initial discussion paper addressing some of the key questions from the Natural Resources Commission and the DPI Water. With the anticipation of further information to be made available, the GVIA reserves the right to suggest additional rule changes through the provision of additional submissions directly to Government if necessary.

We have also provided recommendations for further work by the NSW Government, to assist stakeholders to make an assessment of the effectiveness and appropriateness of the plan to meet it objectives. We have also made suggestions on how to improve engagement with stakeholders as part of this review and the development of water resource plans in the future.

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In providing a concise list of recommendations below, the GVIA is not offering agreement or support for the balance of the rules or conditions within the Water Sharing Plan but believes that the following 20 recommendations are a starting point for DPI Water to replace the Water Sharing Plan for the Lower Gwydir Groundwater Source. The GVIA believe some of these recommendations should be fast-tracked immediately prior to developing the water resource plan.

The GVIA acknowledges that the NSW Government is compelled to meet legislative requirements of the Murray Darling Basin Plan (MDBP) and that there are limitations to the scale of changes that can be made to NSW Water Sharing Plans. Nonetheless, we ask that the NSW Government honour the commitment to our industry and our communities to transparently review this Plan, test its earlier assumptions and make an objective analysis on its effectiveness despite the constraints of the MDBP.

The fact that we have not had a chance to fully implement and test this plan, prior to the implementation of a new reform agenda, has and will continue to be an issue for the GVIA and its members. We do believe there is scope to improve our knowledge and understanding of the Lower Gwydir Groundwater Source and that decisions are made using best available science. As a result, we believe that a thorough review of this plan without limitation is imperative.

The GVIA will continue to work with the NSW Government to ensure that they continue to provide irrigators with the appropriate level of protection and access to their water right.

### ***Recommendations***

1. The Water Sharing Plan for the Lower Gwydir Groundwater Source is remade prior to alignment with the Basin Plan.
2. Supplementary submissions will be accepted following the release of further information on the performance of the groundwater model and any upgrades or changes.
3. DPI Water is to facilitate an information session regarding an assessment of model and aquifer behaviour.
4. Further engagement with informed stakeholders is made regarding the development of the new groundwater model for the region.
5. All models should be peer reviewed with these reviews made public.
6. Expand the scope of review to thoroughly and objectively test the assumptions and rules within this water sharing plan.
7. Establishment of a working group to assess how the plan has met its objectives and how the strategies and performance indicators have been employed and their effectiveness and identify knowledge gaps.
8. The engagement strategy should focus on preparing information for stakeholders to allow for local input into decision making.

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9. New infrastructure approvals be allowed on a case by case basis to provide irrigators the flexibility in ensuring efficient water use.
10. The Vision, Objectives and Key Performance Indicators for this plan are reviewed in consultation with stakeholders. These are linked to key sections and clauses within the plan to allow for greater clarity around the reasoning behind rules and conditions.
11. The estimate for average annual recharge is updated and the water resource's extraction limit amended accordingly.
12. Removal of planned environmental water allocations from the water sharing plan and the extraction limit increased to 100% of estimated average annual recharge.
13. Basic Landholder Rights estimated is updated.
14. Share components for aquifer licences should be simplified and outlined as the volumetric amount of 28,858ML shares.
15. The extraction limit should be reviewed following amendments to planned environmental water and improved estimates of average annual recharge.
16. The assessment of performance on compliance of extraction is expanded to a five-year rolling average calculation to account for seasonality in this region.
17. Unlimited carryover is allowed to provide irrigators flexibility and to manage their own business risks.
18. The process for determining Available Water Determinations is more clearly defined within the plan to improve transparency and accountability.
19. The requirement to maintain a trade restricted area is reviewed.
20. The risk assessment for the groundwater source and the plan is updated and the plan rules amended accordingly.

## **4 Communication and Engagement**

The GVIA

## **5 Scope of Review**

Whilst we acknowledge the legislative requirements of NSW to pursue accreditation of Water Resource Plans to the Murray Darling Basin Plan, we are awaiting

During water sharing plan development, the GVIA and indeed water users and their communities, were promised that the Government would continue to develop the knowledge based around this water source and that all rules and assumptions would be tested through a legislated review between five and definitely at 10-years of implementation. These reviews were promised with the full knowledge that there were technical limitations at the time of preparation and that new information would become available to improve decision making.

The reduced scope of this review fails to meet this commitment and indeed reinforces a loss of faith in the water reform, which has continued to see reductions in productive water and environmental creep erode irrigator capacity and long-term regional economic viability.

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We therefore, request that the NSW Government expand the scope of this review to thoroughly and objectively test the assumptions that formed the foundation of this water sharing plan, with a view of improving best available science and potentially challenging the Sustainable Diversion Limit for the region.

## **6 The Model**

### **6.1 Performance and confidence**

The GVIA are aware that the MODFLOW groundwater model for the Lower Gwydir groundwater resource has recently been updated and re-calibrated and that previous concerns with the model have been addressed by DPI Water. Whilst DPI Water outlined during the December 2015 meeting the process for upgrading this model, they provided little evidence to support their claim that the model has improved.

Following finalisation of calibration to 2015 data (another request from the December meeting), the GVIA ask that a summary report highlighting the performance outputs of the groundwater model is produced and provided for review. We ask this, to allow industry to compare versions of the model and therefore, build confidence in the applicability of the model as a decision making tool. Suggested outputs for the previous and current versions include:

- Sustainable yield calculations;
- Average annual recharge calculations;
- Simulated versus actual groundwater contours;
- Simulated versus actual usage;
- Representation of calibration climate sequence as part of complete climate sequence (is the calibration period representative of past climate variability); and
- Model accuracy comparisons compared to modelling guidelines.

We also request the opportunity to review the final technical report for the development and calibration of the current groundwater model. We request that the model or at a minimum this report, is peer reviewed for its suitability as a major decision making tool for making planning decisions and assessing compliance of extraction over-time.

The GVIA cannot accept the current version of the model as an improvement in science, until we have had the opportunity to review these reports.

### **6.2 Recharge estimation and sustainable yield**

Of particular interest in the new version of the model is the ability of the model to *more* accurately estimate recharge and therefore, calculate the proposed sustainable level of extraction for the groundwater resource.

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With an improvement in modelling, we believe this new information can be utilised as an opportunity to review and update the extraction limit for the region and challenge the future Sustainable Diversion Limit set by the Basin Plan.

We note that as the NSW Government did not review this rate or undertake additional recharge studies during the life of the plan, as outlined within the plan it is imperative now at the completion of the plan's implementation this is formally reviewed now.

## **7 Account Management Rules and Access Regime**

Since the implementation of the groundwater sharing plan, there is a considerable amount of new knowledge around aquifer behaviour and water usage patterns both actual and modelled that leads to an opportunity to thoroughly assess the plan's account management rules and proposed access regime against achieving sustainable groundwater yield. Noting that sustainable groundwater yield is defined as:

*"The groundwater extraction regime, measured over a specified planning timeframe, that allows acceptable levels of stress and protects dependent economic, social, and environmental values."* Department of Environment and Heritage (2004) Definition and approach to sustainable yield.<sup>2</sup>

The GVIA believes that the plan was overly conservative partly due to a lack of knowledge and hence, a precautionary approach to establishing rules has restricted access below the estimated sustainable yield of the aquifer. This is of particular importance considering that supplementary groundwater entitlements which were used to gradually reduce extraction below sustainable yield are now extinguished, removing a maximum of 14,000 megalitres of possible allocation from production. Yet analysis of groundwater observations over the plan's implementation period has provided little evidence that the groundwater aquifer is showing stress. This is despite the larger volumes of water being available during an extended low surface water period throughout the majority of the implementation period, which suggests that the aquifer has a greater resilience to extraction levels than perceived in 2004 and it has capacity to withstand higher usage patterns, provided recharge is maintained.

This is supported by an assessment of groundwater levels within the region that show little to no decline since the inception of the water sharing plan at most sites with the exception being but one sub-region, which is additionally managed through the trade restricted zone. Remembering the main aim of the plan was to establish and maintain extraction at sustainable level, by providing no further decline in groundwater heights.

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<sup>2</sup> <http://www.environment.gov.au/water/publications/environmental/groundwater/definition-and-approach-sustainable-groundwater-yield>

DPI Water provided an assessment of groundwater levels since 2005 through an average analysis of recovery during 2006-2015 highlighting changes in water levels being either; zero change, 0-2 meters decline and 2-5 meter decline and 5-10 meter decline.

Analysis of all shallow groundwater bores in this way are presented in Figure . Indicating that seven bores had no decline, 18 had the minimum level of decline (0-2 meters) and one bore indicating 2-5 meter decline. 10 bores had insufficient data a quick check of this indicated that this was because....

For deeper aquifer bores presente din Figure XX, where the majority of irrigation production bores exist there were six sites that had no decline, 15 shallow groundwater sites showed the minimum level of decline, three had evidence of between 2-5 meters deline and one bore site had between 5-10 meters decline (there were nine bores with insufficient data).

DPI Water believed that their results indicated a trend that the Northern and Southern margins of the valley were stabilising to increasing, however the central section (where the trade restricted zone exists) is declining<sup>3</sup>.

However, the categorisation of declining levels was too coarse to provide an understanding of the resilience of the aquifer over time. In particular, the method failed to assess the capacity of the bores to recharge and return to pre-WSP levels. Such analysis is required when you accept that drawdown will occur but it's the aquifers ability to respond and maintain sustainable levels in the long-term that is required.

In response, the GVIA with our consultants approached analysis of groundwater levels from a risk approach, focusing on bores that indicated a greater than 5% change in observation level between 2004-2015. Approximately 66% of sites remained within 5% if their benchmark level (the 2004 level).

These third of sites indicating decline greater than 5% were then selected, with those of the 0-2meter category by DPI Water and the trend of the observation data reviewed to assess if levels did return to pre-WSP levels and hence despite some drawdown, the aquifer at this location has maintained its capacity to recharge.

Using this method,

It is important to note that there are XX bores that show decline and poor level of recovery and that all of these are located in the trade restricted zone which was established in XXXX. It is clear that this zone may need further time to be implemented and assessed to address the concentrated area.

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<sup>3</sup> Presentation to Gwydir Valley Irrigators Association, December 2015

As a result, the GVIA believes the following rules have scope for amendment, including:

Extraction limit;

Compliance methodology;

Carryover conditions;

### **7.1 Environmental water provisions**

DPI Water have not provided evidence to date to support or justify the maintenance of the current environmental water provisions within the water sharing plan. We do not consider it appropriate that a volumetric requirement is maintained as part of this plan, over and above the aquifers sustainable yield.

The GVIA recommends the removal of planned environmental water, in particular the provision of 15% of the sustainable yield (currently estimated at 5,700ML) and the allocation of this to productive users. There is no supporting information that suggests Groundwater Dependant Ecosystems require additional allocation over and above that provided by the maintenance of sustainable yield.

We anticipate that any changes to environmental water provisions will result in amendments to the extraction limit of the plan and as such believe that 100% of sustainable yield should be available for allocation.

The GVIA does not recommend a change to the share components but rather a change in Available Water Determinations as a result of a change in the extraction limit being made.

### **7.2 Extraction limit and assessing compliance**

As outlined above, we recommend that the extraction limit be revised to reflect the changes in environmental water provisions.

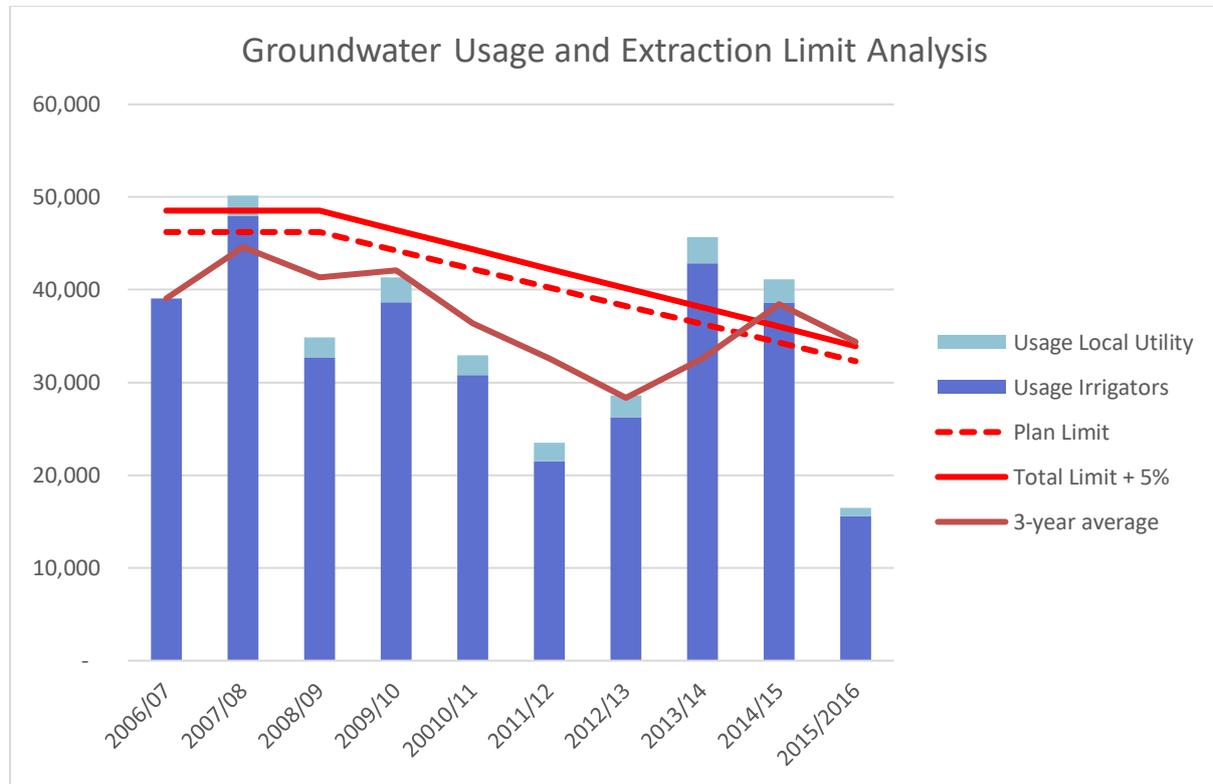
Therefore, the extraction limit should be the sustainable yield of the aquifer and for the lower Gwydir groundwater resource be measured via a long-term extraction regime rather than a volumetric limit assessed on a short timescale. This recognises the dynamic nature of the aquifer and its responsiveness within season and between seasons, depending on climatic cycles which drive usage patterns.

It is clear from groundwater monitoring observations that there is a distinct inverse relationship between surface water availability and groundwater use (See Figure 1). The natural fluctuations in surface water availability, has resulted in groundwater use over the period being well below the allowable limits of the plan, resulting in a 'credit' of 37,000ML of water that was available to users but not accessed throughout the past ten years (Table 1).

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However, despite this credit and the fact that aquifer behaviour does not indicate aquifer stress, the three-year rolling average usage in the Gwydir in 2014/15 and (anticipated) in 2015/16<sup>4</sup> will be greater than the plans extraction limit.

**Figure 1: Groundwater Usage and Extraction Limit Analysis**



**Table 2: Analysis of Water usage**

	Dam %*	Plan Limit	Total Limit + 5%	TOTAL Usage**	3-year average	5-year average	Difference 3 years	Difference 5 years	Overs/unders
<b>2006/07</b>	23	46,230	48,542	39,078	39,078	39,078	9,464	9,464	7,152
<b>2007/08</b>	14	46,230	48,542	50,139	44,608	44,608	3,933	3,933	3,243
<b>2008/09</b>	19	46,230	48,542	34,851	41,356	41,356	7,186	7,186	14,622
<b>2009/10</b>	11	44,238	46,450	41,345	42,112	41,353	4,338	5,097	17,515
<b>2010/11</b>	14	42,246	44,358	32,931	36,376	39,669	7,982	4,689	26,830

<sup>4</sup> Usage calculation in January 2016 indicated that the three year rolling average will exceed extraction by XX ML.

2011/12	51	40,254	42,267	23,488	32,588	36,551	9,679	5,716	43,596
2012/13	100	38,276	40,190	28,633	28,351	32,250	11,839	7,940	53,239
2013/14	74	36,284	38,098	45,685	32,602	34,416	5,496	3,682	43,839
2014/15	33	34,292	36,007	41,104	38,474	34,368	- 2,467	1,638	37,026

\* Percentage capacity of Copeton Dam as of September

\*\* Total usage including aquifer usage, supplementary water and local utility

The GVIA concludes that the compliance assessment process is flawed and therefore should be revised to ensure the long-term extraction regime maintains the sustainable yield of the aquifer rather than focusing on maintaining a volumetric limit over a three-year period.

The GVIA has recommended the consideration of at least a five-year rolling average but upon further consideration believes that an assessment of long-term extraction via other methods, may provide a better system for capturing recharge events and extraction patterns of behaviour over multiple temporal scales. Compliance could be achieved through annual updates of the groundwater model with usage and groundwater observation data and recalculation of long-term extraction.

Using this system will allow for natural, seasonal variation whilst maintaining aquifer integrity via ensuring access is within long-term limits.

### 7.2.1 Carryover

The GVIA also recommend that the carryover limit of 3ML per unit share is removed and that unlimited carryover provisions are allowed. The current limits to carryover do not allow for the most efficient use of this resource by forcing irrigators to abstract and store on the surface, rather than continue to store underground until required. Unlimited carryover will also allow irrigators to manage their own business risk, rather than the plan rules influencing business decisions.

As outlined earlier, there appears to be capacity within the aquifer to sustain higher levels of access and by extending carryover no further allocations are required but producers could have the capacity to better utilise their water when required.

However, to limit sudden drawdown or dewatering, which would decimate the region and the industry, we do propose to maintain an annual use limit of 2ML per unit share.

The GVIA believes that these changes should be modelled as a new scenario once, the groundwater model has been finalised.

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### 7.2.2 Available Water Determinations

Whilst the plan provides for the legal requirements for the NSW Government to make annual Available Water Determinations (AWD), the decision making process remains unclear. The GVIA believe a range of factors should be considered when making changes to Available Water Determinations these include but are not limited to:

- Total available account water;
- Aquifer status;
- Usage reports, both past and forecasts; and
- Antecedent conditions, in particular surface water availability.

The GVIA recommend that a set of principles including the above mentioned points, be developed to guide the process for determining AWD and that this is either clearly defined within the plan or provided as a guiding note, to improve transparency and accountability.

We also recommend that a local customer committee is to be established which could be utilised as a vehicle to improve transparency around AWD but also provide a mechanism to inform customers on groundwater behaviour or discussion groundwater specific issues like compliance.

### 7.2.3 Trade restricted zone

In 2008 a trade restricted zone was established between the towns of Moree and Ashley in response to concerns regarding the drawdown of groundwater levels in the region<sup>Error!</sup>  
Bookmark not defined. and in particular the concerns regarding town water supplies.

A review of current groundwater levels within the region indicates that this restriction has not been in place long enough to manage the small zone of groundwater decline. The GVIA believe that with more time to recover, coupled with the reduction in total water available for extraction with the removal of supplementary entitlements that in at least two-years time, this restriction should be formally reviewed.

We believe that flexibility should remain with the option to remove the restriction if levels begin to show recovery. And therefore, we recommend that this restriction is not included as a fixed rule within the water sharing plan.

## 8 Conclusion

The GVIA welcomes the opportunity to participate in the review of the Water Sharing Plan for the Lower Gwydir Groundwater Source. Whilst we have been disappointed at the lack of information available to inform this review, we acknowledge the commitment by DPI Water to ensure that there is future discussions and that this is an ongoing process as part of the development of water resource plans.

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The GVIA believe we have provided enough evidence within this submission to warrant a remake of this water sharing plan prior to transitioning to a water resource plan. We have as a result provided 19 Recommendations to the NSW Government on areas that requirement amended or further work. A number of these should be actioned as a priority and they include:

Recommendation 2: DPI Water is to facilitate an information session regarding an assessment of model and aquifer behaviour.

Recommendation 3: Further engagement with informed stakeholders is made regarding the development of the new groundwater model for the region.

Recommendation 11: Removal of planned environmental water allocations from the water sharing plan and the extraction limit increased to 100% of estimated average annual recharge.

Recommendation 15: The assessment of performance on compliance of extraction is expanded to a five-year rolling average calculation to account for seasonality in this region.

Recommendation 16: Unlimited carryover is allowed to provide irrigators flexibility and to manage their own business risks.

The GVIA are committed to working with the NSW Government on developing a new water sharing plan and believe there is great opportunity to provide more balance and therefore, economic stimulus to our region as a result of a closer inspection of this plan.

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