

SUBMISSION PAPER

Inquiry into water use efficiency in Australian agriculture

Macquarie River Food and Fibre

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Water Resources

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About MRFF

Macquarie River Food and Fibre represents the interests of over 500 irrigated food and fibre producers in the Macquarie Valley. We exist in support of our members' vision for an efficient, productive and profitable irrigation industry in the Macquarie Valley. Our membership comprises:

- Water Access Licence holders in the Macquarie regulated river system, including both riparian irrigators and the individual members of the valley's off-river irrigation schemes; and
- Aquifer Access Licence holders in the Lower Macquarie Groundwater Sources.

MRFF is supported by a number of associated local businesses and service providers.

MRFF is a member of the NSW and National Irrigators' Councils.

About this Submission

This document has been prepared for the Standing Committee on Agriculture and Water Resources for the Inquiry into water use efficiency in Australian agriculture.

The submission is provided on behalf of irrigated food and fibre producers in the Macquarie Valley however it is noted that our individual members may wish to provide their own submissions.

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1. VALUE OF THE MACQUARIE VALLEY IRRIGATION INDUSTRY

- 1.1 Like most inland regions of NSW, the regional economy and local communities of the Macquarie Valley are heavily reliant on agriculture.
- 1.2 Access to water for irrigation, from both groundwater and surface water resources, is a key contributor to diversity and prosperity of agriculture in the Macquarie Valley.
- 1.3 Agriculture is the biggest employer in the Valley, providing jobs to 11, 435 people, accounting for more than 14% of the working population.
- 1.4 The total value of irrigated production in the valley is A\$274.6 million annually, accounting for one quarter of the valley's total production, from just 1.1% of the total valley's land area.
- 1.5 An efficient, productive and profitable irrigation industry in the Macquarie Valley will:
 - Improve regional diversity and drought preparedness;
 - Increase the contribution of agriculture to our regional economy and local communities;
 - Drive private sector investment in research and development;
 - Ensure investment in our natural resource base; and
 - Attract the next generation of farmers and agricultural service providers
- 1.6 Access to adequate water supplies is also imperative for our towns, stock and domestic uses, and some industrial uses which each play an important role in the ongoing sustainability of our local communities.

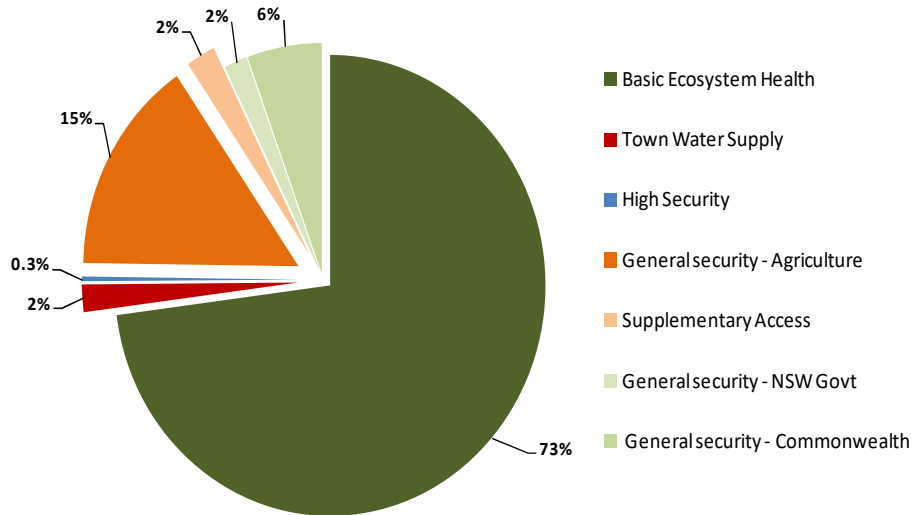
2. INTRODUCTION

Water Resource Distribution in the Macquarie Valley

- 2.1 Water use for productive purposes in the valley is currently limited by the Water Sharing Plan (WSP) for the Macquarie and Cudgegong Regulated Rivers as well as the WSP for the Lower Macquarie Groundwater Sources. Both of these plans were developed via a comprehensive consultation process with the regional community taking into account environmental, social, cultural and economic values.
- 2.2 Despite the WSP for the Macquarie-Cudgegong Regulated Rivers setting aside over 73% of long-term average annual river flows for the environment, the Macquarie has subsequently been a target for further water acquisitions by both the NSW and Commonwealth Governments.

- 2.3 These water recovery programs have reduced the water available for town water supplies, stock and domestic uses, high security industry, and seasonal food and fibre production to **less than 20% of the available resource**.

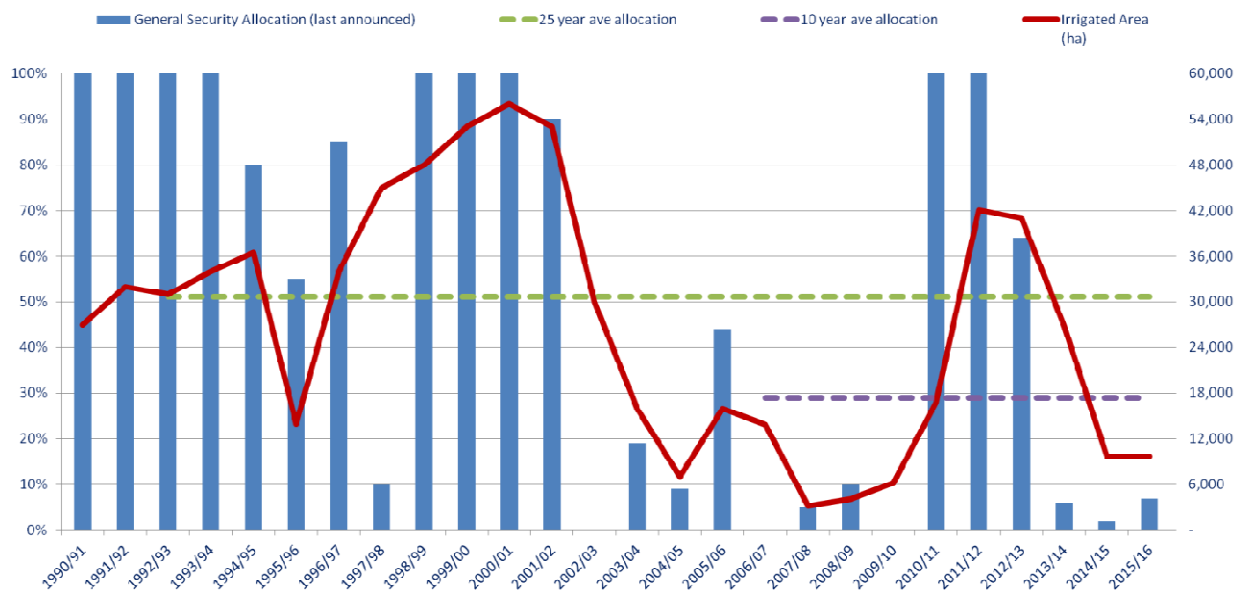
Graph 1 – Resource Distribution in the Macquarie-Cudgegong, long term average flow



Water Reliability

- 2.4 Access to water for irrigation has historically supported a viable irrigation industry which is a key contributor to the diversity and prosperity of agriculture and ancillary industries in the Macquarie Valley. However, this prosperity is intrinsically conditional on a reliable water supply.
- 2.5 Water reliability is a function of the water available for irrigated agriculture divided by the volume of shares issued in that water. The various water reform guises in the Macquarie, since the 1980s, have eroded irrigator's reliability which in turn has impacted on water security.
- 2.6 This combined with a period of below average inflows, over the past 15 years, to the valley's major water storages, has resulted in a marked decline in the level of irrigated agricultural production in recent years. Graph 2 illustrates the new reality that irrigators now have to operate in.

Graph 2 – General Security Allocation and Irrigated Cotton Area (1990 to present)¹



3. MACQUARIE VALLEY CONCERNS

Term of Reference:

- Adequacy and efficacy of current programs in achieving irrigation water use efficiencies.

Ongoing water reform has resulted in over-recovery

- 3.1 One of the greatest frustrations for irrigators in the Macquarie Valley is the seemingly perpetual cycle of water reforms that the valley is subject to.
- 3.2 The first environmental allowance, in the valley, was provided for in 1967 when the construction of Burrendong Dam was completed. Since this time regular reforms which have slowly but surely eroded the reliability of water for all users in the valley (Table 1).
- 3.3 In 2004 the Macquarie-Cudgegong Regulated Rivers Water Source Water Sharing Plan was finalised – following a comprehensive consultation process, with all relevant stakeholders, over a number of years – and set aside an Environmental Water Allowance of 160 Gigalitres (GL) of General Security entitlement. Yet less than a year later, with no time to assess the effectiveness of the plan there were calls for even more water to be returned to the environment.

¹ Compiled by MRFF from various sources – Cotton Area taken from Australian Cottongrower Yearbooks

- 3.4 Since this time the Macquarie Valley has been one of the hardest hit under the latest water reform - the Murray Darling Basin Plan. To date, under the Basin Plan, 83GL have been recovered from the Macquarie Valley, above and beyond the legislated target of 65GL, and dramatically higher than the 20GL originally proposed by the Murray Darling Basin Authority (MDBA) in 2010².
- 3.5 At this point in the Basin reform the state and federal governments hold **42.4%** of the General Security entitlements in the Macquarie-Cudgegong Valley and **over 80%** of long term flows in the Macquarie River are preserved for the environment.

Table 1 – History of water reform in the Macquarie Valley

Uncompensated erosion of reliability	1967	Completion of Burrendong Dam saw first wildlife allocation issued – 18.5 GL
	1986	Environmental allowance increased to 50 GL High Security entitlement
	1996	Environmental allowance increased by 75 GL General Security entitlement Supplementary (Supp) access capped
	2004	<ul style="list-style-type: none"> Commencement of Water Sharing Plan for the Macquarie Cudgegong Reg Rivers Existing environmental allowances converted to 160 GL General Security allowance Supplementary access further restricted to individual licence holders
Market based license recovery	2004-11	NSW Government buyback – 50 GL General Security entitlement + 1.5 GL Supp
	2008-11	Commonwealth buyback - 60 GL General Security entitlement + 2 GL Supplementary
	2010-15	Commonwealth infrastructure investment – 65 GL General Security + 6 GL Supplementary

- 3.6 As a consequence of the current over-recovery that exists in the Macquarie Valley, MRFF is hesitant to support any further irrigation efficiency programs that result in even more water being returned to the environment.
- 3.7 However, MRFF is supportive of programs where efficiency gains and better management practices result in water savings that are preserved for agricultural production.

² Guide to the Proposed Basin Plan – Overview (Vol. 1), Murray-Darling Basin Authority, publication no. 60/10 (2010)

Term of Reference to be addressed:

- How existing expenditure provides value for money for the Commonwealth

Inefficient use of tax payer dollars

- 3.8 Under the current Basin reform the MDBA have identified four Site Specific Flow Indicators (SFIs) in the Macquarie Valley that they aim to achieve with the water that has been recovered. The SFIs in the Macquarie are purely volume based (i.e. a specified volume of water over a specified period of time) and the MDBA claim that they can achieve their desired environmental outcomes by achieving these targets. However, it is important to note that no evidence has been provided by the MDBA to legitimise the SFI targets and whether they will actually lead to the desired environmental outcomes.
- 3.9 Putting the legitimacy of the SFIs aside, it is MRFF's view that the four targets would be achieved with a significantly reduced recovery target, closer to the 20GL originally proposed by the MDBA in 2010. However, the MDBA have never conducted a model run to determine if 20GL is an adequate volume of water, instead a volume of 65GL was legislated based on water that had been purchased prior to the Basin Plan being finalised in 2012.
- 3.10 In late 2016, MRFF commissioned Barma Water Resources (BWR) to undertake an independent technical review and analysis of the Macquarie Valley specific hydrological documentation produced by the MDBA. Without a 20GL scenario ever being considered by the MDBA BWR was able to infer the frequency of achievement of the SFI targets through a linear interpolation of the achievement frequencies using the below scenarios:
- i. the NSW Government recovery volume; and
 - ii. the Macquarie's legislated in-valley recovery target (65GL).
- 3.11 Using this method BWR concluded that a scenario in which only State recovery volumes (~20GL) contributed to the Macquarie SFI targets would result in achieving three out of four of the specified SFIs in the Macquarie Valley. **BWRs analysis indicates that 3 of the 4 Macquarie SFI targets had been met prior to any Commonwealth water recovery under the Basin Plan.**
- 3.12 To date the Federal Government has spent approximately \$440M dollars in the Macquarie Valley on water buy-backs and infrastructure upgrades. However, given that 3 of 4 SFIs in the Macquarie Valley are achieved prior to any Federal Government funds being used, and the remaining SFI is within 5% of being achieved, **MRFF questions if the use of this money is a prudent or efficient use of tax payer funds.**

Inefficient use of environmental water

- 3.13 Another of the MDBA's questionable goals is to deliver water from the regulated Macquarie River to the Barwon-Darling river system. This is despite the fact that the regulated Macquarie River is the least connected of the Northern Valley's to the Barwon-Darling³ and clear evidence, provided by MRFF, on the transmission losses of attempting to direct water through the Macquarie Marshes.
- 3.14 BWR's analysis of the models used by the MDBA, as well as actual gauge data, shows that **less than 16%**⁴ of the end-of-system flows, for the Macquarie-Castlereagh region, come from the regulated Macquarie River (Table 2). Further to this, the amount of water required to achieve this low level of contribution to the Barwon Darling is substantial as illustrated in Graphs 3 and 4 which illustrate the significant transmission losses through the Macquarie River in both a dry and wet sequence.
- 3.15 The significant losses through the Macquarie system are undeniable, even when looking at managed environmental releases in both wet and dry cycles. MRFF believes that inadequate consideration has been given to the social and economic impacts associated with this waste of economic opportunity and questions at what point environmental water holders will be held to the same high standard of water use efficiency that all other license holders are subject to.
- 3.16 The below examples can be quantified by using a conservative economic value of \$600/Megalitre of water. The first example (Graph 3) represents \$192M of lost productivity, while the second example (Graph 4) - during a period of drought - represents a further \$47.1M of lost productivity at the farm gate. This represents a loss of over \$700M to the regional economy and local communities when a three-fold multiplier is applied.

³ Water Sharing Plan for the Barwon-Darling Unregulated and Alluvial Water Sources, Background Document (Page 13), Department of Primary Industries – Office of Water, 2012

⁴ This includes tributary flows in addition to regulated dam releases. Furthermore it is a long term average figure which is generally not representative of actual end of system flows, on a year to year basis, which are highly variable.

Table 2 - Modelled average annual End of System Flows vs. actual gauge data (GL/Yr)

		Macquarie IQQM 2009 Model (Current Development)*	Macquarie IQQM 2014 Model (Current Development)^	Gauge data
Regulated Flows	Macquarie @ Carinda	53.8	38.3	41.2
	Marra Ck @ Billybingbone	11.7	1.4	10.7
	Total (Regulated Inflows)	65.5 (15.6%)	39.7 (11.4%)	51.9 (15.9%)¹
Unregulated Flows	Marthaguy @ Carinda	66.0	21.3	42.6
	Castlereagh at Coonamble	21.2	21.2	27.3 ²
	Bogan at Gongolgon ³	267.2	267.2	204.5
	Total (Unregulated Inflows)	354.4 (84.4%)	309.7 (88.6%)	274.4 (84.1%)
Total (all Inflows)		419.9 (100%)	349.4 (100%)	326.3 (100%)

1 This includes tributary flows in addition to regulated dam releases. Furthermore it is a long term average figure which is generally not representative of actual end of system flows, on a year to year basis, which are highly variable.

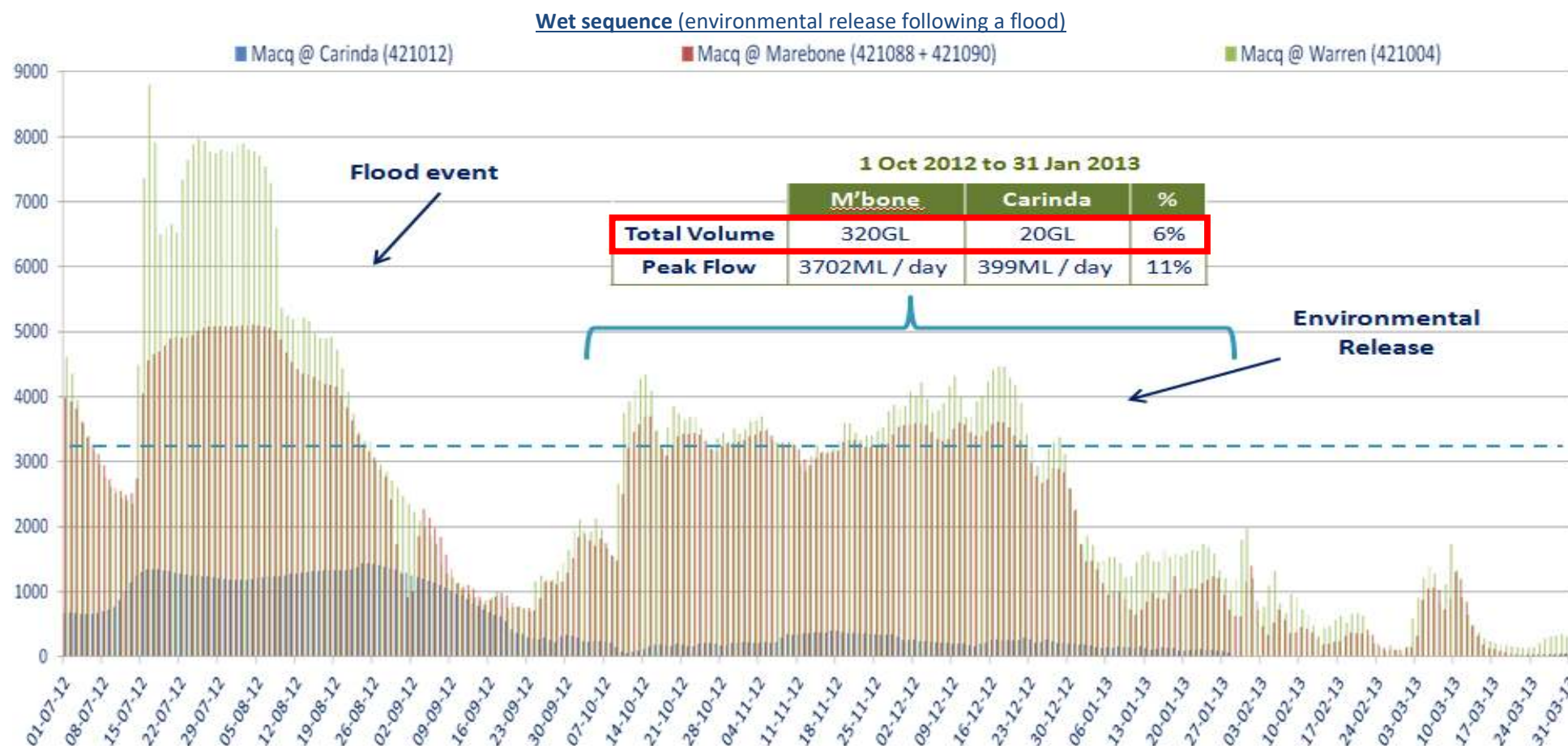
2 Contains a small volume of regulated water from Duck and Guningbar Creeks

3 Observed Flows at Gungahman, Coonamble data not available for common period

* Model used by the MDBA

^ Model not being used by the MDBA

Graph 3 – Discharge Volume (ML/day) at Carinda and Marebone in the Lower Macquarie (October 2012 – January 2013)⁵



Breakout at Marbone - The dotted line indicates the river's channel capacity (~3,200ML/day) at Marebone (towards the end of the regulated system). Once flow rates exceed this volume third party impacts are experienced.

NB: Marebone is upstream of the Macquarie Marshes while the Carinda gauge is downstream of the Macquarie Marshes

⁵ http://realtime.water.nsw.gov.au/water.stm?ppbm=SURFACE_WATER&rs&3&rskm_url (Accessed 22 March 2016)

Graph 4 - Discharge Volume (ML/day) at Carinda and Marebone in the Lower Macquarie (July 2015 – October 2015)⁶



NB: Marebone is upstream of the Macquarie Marshes while the Carinda gauge is downstream of the Macquarie Marshes

⁶ http://realtime.data.water.nsw.gov.au/water.stm?ppbm=SURFACE_WATER&rs&3&rskm_url (Accessed 22 March 2016)

4. RECOMMENDATIONS

Terms of Reference to be addressed:

- possible improvements to programs, their administration and delivery
- other matters, including, but not limited to, maintaining or increasing agricultural production, consideration of environmental flows, and adoption of world's best practice.

Rebalancing government water holdings

- 4.1 The 'no regrets' policy of previous Federal and NSW governments to water buyback in advance of finalisation of the Basin Plan has resulted in the over-recovery of environmental water in the Macquarie regulated river system.
- 4.2 Furthermore, Basin reform has only transferred licence ownership – private to public – it has not changed the relative proportion of water available to licences issued, therefore, it has done nothing to address ongoing issues of reliability for irrigators. Public ownership has only compounded an already oversubscribed system by activating sleeper licences, which were previously traded during dry periods, but are no longer available for trade.
- 4.3 The opportunity exists for water holdings, in excess of environmental requirements, to be surrendered and socialised to all entitlement holders in the Macquarie Valley. Surrendering the over-recovered proportion of environmental water would directly address the issue of over-subscription in the regulated Macquarie system and provide a benefit to all entitlement holders, including the environment, rather than a select few. Additionally, surrendering over-recovered portions of entitlement would help to minimise any artificial movements of water prices in the market.
- 4.4 Given that this solution requires a substantial change in the government approach an interim solution is for the over-recovered volume of water to be leased or traded to the irrigation industry on a temporary basis, thus increasing the productive capacity of the region's agricultural industry within sustainable levels.
- 4.5 Further, trade of government owned water provides the opportunity to generate revenue for Federal and State Governments while at the same time boosting regional productivity.
- 4.6 Trade of water owned by the Federal Government is currently restricted by Section 106 of the *Water Act 2007*. MRFF recommends that the *Water Act 2007* be amended to remove Section 106 and therefore remove the restrictions affecting trade of Federal water.

Reviving the valley's irrigation industry

- 4.7 Opportunity exists to revive irrigated agricultural production to prior levels in the Macquarie Valley through increased access to the region's water resources.
- 4.8 The current level of extraction within the Macquarie-Cudgegong Regulated Rivers water source is well within sustainable levels determined by the MDBA. In fact, under the current scenario only 15% of the Macquarie Rivers flows are available for agricultural production.
- 4.9 Increasing access to the region's water resources while still providing for local environmental water requirements will provide an additional 70,000 Megalitres to the valley's irrigated agricultural industry on a long-term average annual basis.
- 4.10 Utilising sustainable levels of the region's water resources for irrigation will boost the value of agricultural production in the Macquarie Valley by \$42 million per year providing a three-fold benefit to the regional economy and local communities.
- 4.11 Increased access to the region's water resources can be provided through:
- Lease or trade of government water holdings on a temporary or permanent basis, and
 - Enhancements to the region's major water storage infrastructure.

Increasing supply capacity at Burrendong Dam

- 4.12 A unique opportunity exists to expand the supply capacity of the region's major water storage, Burrendong Dam, at no cost to government.
- 4.13 The total storage capacity of Burrendong Dam is 1,678,000 Megalitres with only 1,188,000 Megalitres currently available for bulk water storage. The remaining capacity (490,000 Megalitres) is designated and operated for flood mitigation purposes.
- 4.14 Opportunity exists to review the current operating rules to maximise the potential of the existing storage infrastructure and improve the reliability of access for downstream towns, stock and domestic users, irrigators and environmental water users, while still providing the important flood mitigation role.
- 4.15 The review of the current operating rules for Burrendong Dam should take account of recent dam safety upgrade works, and advancements in forecasting and gauging technology since the completion of the dam in 1967.
- 4.16 Increasing supply capacity at Burrendong Dam should also be considered in conjunction with:

- Installing weather radar services in central and western NSW,
- Upgrading storage, river and stream gauging networks, and
- Constructing re-regulating capacity, or enroute storage, in the Macquarie river system.

Installing weather radar services in central and western NSW

- 4.17 An efficient agricultural industry requires access to timely, relevant and accurate information to fully inform production decisions.
- 4.18 Improved access to weather radar services is imperative for agricultural producers in central and western NSW who currently operate in a 'black spot' with inadequate coverage from existing radar stations at Moree, Gunnedah, Wagga Wagga and Sydney.
- 4.19 A comprehensive and consolidate case for installing a weather radar service in central and western NSW was commissioned by the Orana Regional Organisation of Councils (OROC) in 2012.
- 4.20 The GHD report (available [here](#)) highlights that in contrast to regions in Australia with similar demographics, industry, geography and weather patterns, the area covered by the Orana Region Organisation of Councils (OROC) is very poorly served by current Bureau of Meteorology (BOM) weather radar.
- 4.21 The report goes on to conclude that the public good economic, social and environmental benefits of a weather radar, as well as stakeholder support and equity considerations for the OROC Region, far outweigh the \$2.5 million capital cost of installing a weather radar facility.
- 4.22 MRFF recommends that this priority regional project be funded through the temporary or permanent sale of government water holdings.

Upgrading storage, river and stream gauging networks

- 4.23 Access to timely, relevant and accurate information for water storage and river heights is another key requirement for efficient management of the region's water resources.
- 4.24 A number of moderate to major flood events in the region since 2010 have highlighted deficiencies in the current storage, river and stream gauging systems, which are yet to be addressed.

- 4.25 In particular, there is confusion with real-time information (provided by the NSW Department of Primary Industries - Water), and river predictions and flood warnings (provided by the Bureau of Meteorology) made available from different sources. As well as confusion, costly delays are experienced as a result of conveying information between the various players, which also includes WaterNSW and the NSW State Emergency Services.
- 4.26 MRFF recommends streamlined provision of timely and accurate information to river dependent communities and industries in the future, which could be achieved by contracting arrangements between the relevant agencies.
- 4.27 Further, MRFF recommends extension of the river gauging network on the Macquarie River and its tributaries and effluents to more accurately measure and predict flow events.

Constructing an en-route storage in the Macquarie river system

- 4.28 A range of options have been considered for increasing storage and delivery efficiency in the Macquarie regulated rivers for the benefit of water users and the environment.
- 4.29 A report commission by State Water Corporation in 2009 considered possible water savings in the Lachlan, Gwydir and Macquarie river systems.
- 4.30 The SKM report (available [here](#)) found that constructing an en-route storage in the Macquarie River system would greatly assist in reducing system delivery losses, with water savings offsetting the costs of constructing the storage structure.
- 4.31 Advancing this project will require support and possible joint funding from the irrigation industry, Local Government, and Federal and NSW Government water holders and regulators.

Accounting in the Flood Mitigation Zone of Burrendong Dam

- 4.32 Significant rain across the Macquarie-Cudgegong catchment over winter and spring last year resulted in Burrendong Dam entering the Flood Mitigation Zone (FMZ) (i.e. above 100% of storage capacity) on 4 September 2016.
- 4.33 While Burrendong Dam remains in the FMZ controlled releases are managed by WaterNSW, however, the rate of these releases is largely requested by representatives from the NSW Office of Environment and Heritage (OEH) to assist in the achievement of environmental outcomes.
- 4.34 MRFF believe there is an issue of inequity as the requested volumes of water are not deducted from any of the environmental water accounts (planned or held). However, in contrast any

water orders made by other high security or general security entitlement holders are deducted from water accounts.

- 4.35 While controlled releases from the dam, when in the FMZ, are consulted on via the local Flood Mitigation Zone Reference Panel (FMZRP) there is a distinct advantage provided to environmental stakeholders, who also hold general security entitlement, as they essentially have access to 'free' water while the dam remains in the FMZ.
- 4.36 MRFF request that changes are made to the current WSP rules so that all accounts are managed equally while Burrendong Dam is in the FMZ and that no advantage is provided to a particular stakeholder group or licence holder.

5. FURTHER INFORMATION

MRFF thanks the Standing Committee for the opportunity to provide a submission on the Inquiry into water use efficiency in Australian Agriculture.

Please get in touch if you require further information or clarification on any of the comments in this submission.

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