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NSW Water Valuation Consultancy

Final Report

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A Marsden Jacob Report

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1. Executive summary

Marsden Jacob was engaged by the NSW Natural Resources Access Regulator (NRAR) to develop valuations for water entitlements used in NSW and to provide guidance on the economic contribution of water to the NSW economy.

1.1 NSW water entitlements

Water entitlements are a form of property right over the use of water. In NSW, water entitlements broadly fall into two categories, basic landholder rights and water access licences.

Management of New South Wales water resources relies on a range of legislation, initiatives and cooperative arrangements with the Commonwealth and other state governments. The key piece of legislation for water management in NSW is the *Water Management Act 2000* (the Act). The NRAR ensures water is used lawfully and that all communities and the environment get a fair share.

The NSW Government has introduced a robust metering framework to improve the standard and coverage of non-urban water meters across NSW. A key part of this framework is the NSW Non-Urban Water Metering Policy. Under this policy, licensed water users are required to install compliant metering equipment on works that meet the metering thresholds by their roll-out date.

This project focuses on the valuation of water access licences because works solely used to take water under basic landholder rights are exempt from the metering rules. An access licence provides the holder with the ongoing right to access a share of a specified water source. During the water year, water is distributed or 'allocated' against access licences by the NSW government in response to factors such as changes in rainfall and water storage.

1.2 Project focus

In September 2021, Marsden Jacob undertook a project for NRAR that valued water used in NSW and developed valuations of the economic contribution of this water and water based production to local, regional and NSW economies.

This project extends upon the September 2021 project. In particular, this extension project comprised:

1. Valuing additional water access licences that were excluded from the 2021 project:
 - a. Water used as stock and domestic water
 - b. Water used for town and urban water utilities
2. Estimates were developed for the economic contribution water to local, regional and NSW economies.
3. Updating the 2021 project results with more recent data, to ensure the 2021 project and this extension are consistently based.

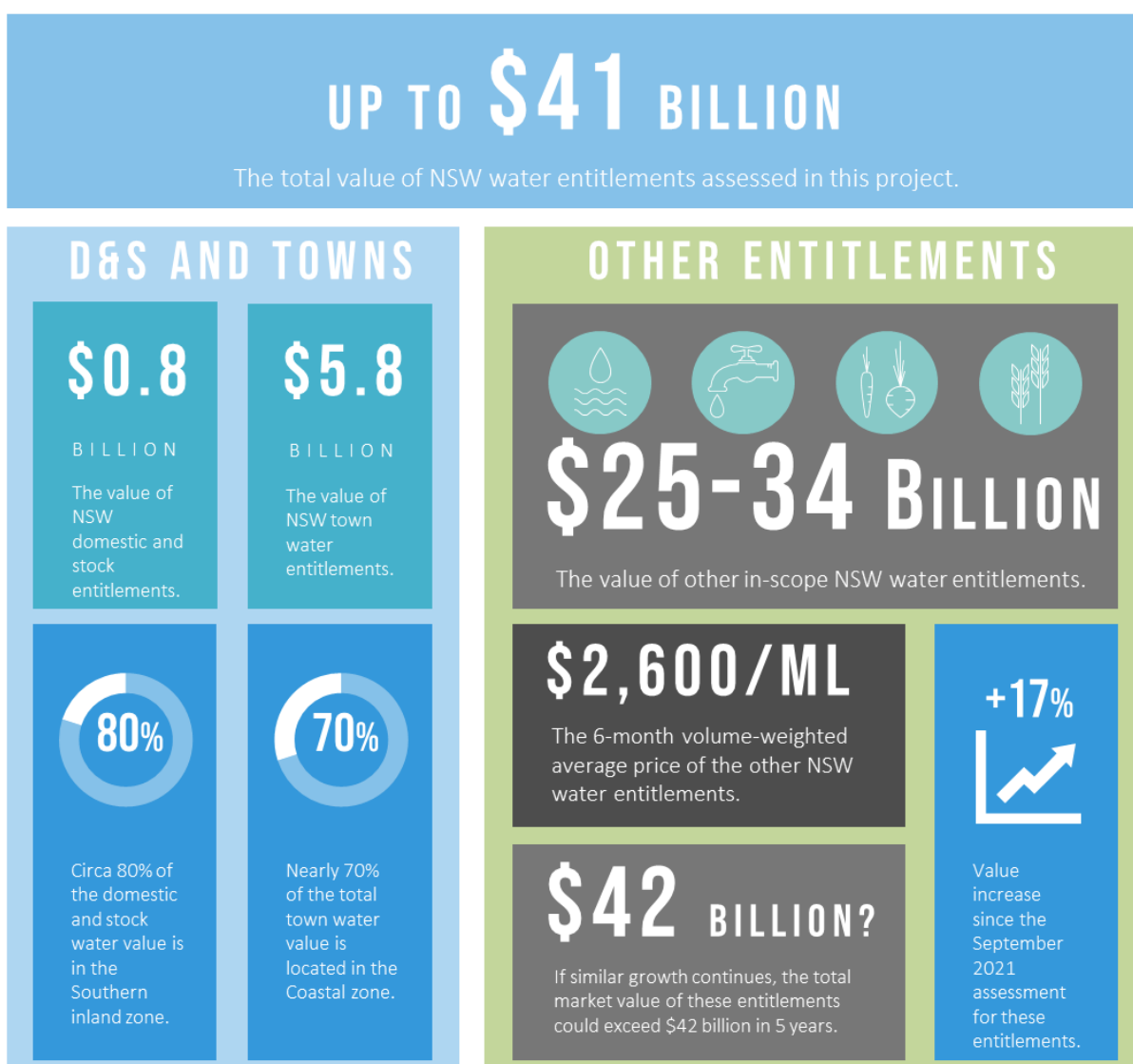
Marsden Jacob understands that the information will be used by NRAR to contextualise its compliance activities relative to the water asset value and the economic returns of its use to NSW and its communities.

1.3 Summary findings

The summary findings are as follows:

- **14,400 GL:** The total volume of water entitlements on issue (that are in scope) is almost 14,400 gigalitres. Figure 1 presents the NSW water entitlement value results assessed for this report.

Figure 1: Summary of the NSW water entitlement values



- **Annual irrigated production value \$3-4.5 billion:** On a Gross Value of Irrigated Agricultural Production (GVIAP) basis alone, the water entitlements are supporting production valued at between at between \$2.9 to \$4.4 billion per annum, or a five-year average of \$3.7 billion. However, the GVIAP is not picking up dryland operations where water is used for the animal production

(instead of irrigating pasture crops). Moreover, outside of agriculture, water entitlements are also being used to support various industrial production activities such as mining. For these reasons, the annual total production value supported by the NSW water entitlements is much greater than \$3.7 billion, evidenced by the fact that the total production value of the NSW mining industry alone was \$26.3 billion in 2019-20¹.

- **Irrigated production is a key revenue source for many regional economies.** The regional contribution of water extends well beyond economic outcomes (including supporting cultural values and recreational activities). Quantifying the impact is difficult. Using an illustrative flow-on multiplier of 1.5 suggests that for GVIAP of \$3.7 billion, the total direct and flow-on impact from irrigated agricultural production alone (that is supported by water access entitlements across the state) would be \$5.55 billion.
- **Town water underpins the whole NSW economy.** The production value of the town water entitlements is hard to assess because of data limitations. However, to emphasise the importance of these water assets, it can be mentioned that the NSW Gross State Product (GSP) in 2022 is estimated at \$697.4 billion². Whilst the GSP is not an ideal proxy for the economic outcome from the town water entitlements, it reflects the reality that water resources are critical input.

¹ Source: <https://www.resourcesregulator.nsw.gov.au/sites/default/files/2022-11/mining-industry-infographics-snapshot-may-2021.pdf>

² Source: <https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-state-accounts/latest-release>

2. Introduction

Marsden Jacob has been engaged by the New South Wales (NSW) Natural Resources Access Regulator (NRAR) to develop valuations for water resources that are used in NSW and to provide guidance on the economic contribution of water-based production.

2.1 Project scope

In September 2021, Marsden Jacob undertook a project for NRAR that valued water used in NSW and developed valuations of the economic contribution of this water and water based production to local, regional and NSW economies.

This project extends upon the September 2021 project. In particular, this extension project comprised:

1. Valuing additional water entitlements that were excluded from the 2021 project:
 - a. Water used as stock and domestic water
 - b. Water used for town and urban water utilities
2. Estimates were developed for the economic contribution water to the NSW economy.
3. Updating the 2021 project results with more recent data, to ensure the 2021 project and this extension are consistently based.

2.2 Project approach

The objective of this project was to develop an even more comprehensive understanding of the value of the water assets regulated by NRAR and their contribution to the local, regional and NSW economies. This includes the production value arising from this water and the proportionate contribution of this water-based production activity to regional economies across NSW.

The project focuses on five key areas.

1. **Estimating the value of the stock and domestic and town/urban water.** Valuations are provided by the region, consistent with the September 2021 report.
2. **Estimating the value of water based on production value.** This task uses producer surplus measures or similar forms of margin analysis for the production for which the above-mentioned water is an input. Valuations are provided by the region, consistent with the September 2021 report.
3. **Estimating the value of broader economic activity related to water-based industry.** This task estimates the value of this water-based production's economic contribution to their respective local, regional and NSW economies, taking into account economic benefits to the broader community rather than just benefits to the individual water users.
4. **Estimating the returns to NSW Government from irrigation water.**
5. **Updating the September 2021 analysis.**

3. NSW water entitlements and their management

This section provides an introduction to water entitlements in NSW and governing legislation and regulations.

3.1 Water entitlements – legislative framework overview

Management of New South Wales water resources relies on a range of legislation, initiatives and cooperative arrangements with the Commonwealth and other state governments.

The key piece of Commonwealth legislation relating to water is the Commonwealth *Water Act 2007*. Schedule 1 of the Act contains the Murray-Darling Basin Agreement, to which the NSW Government is party. The Commonwealth *Basin Plan 2012* was adopted under the *Water Act 2007*. Water resource plans are a key requirement of the Basin Plan 2012.

Operating in compliance with the Commonwealth legislation, the key piece of legislation for water management in NSW is the *Water Management Act 2000* (the Act).

The Act governs water sharing, licensing, approvals and water trading when a water sharing plan (WSP) has been enacted for a particular area and specific water sources within that area.

Table 1 summarises some of the NSW water management framework features that underpin the value of the water assets.

Table 1: Overview of the NSW water management framework

NSW water management framework
<p>1. The Act</p> <p>The <i>Water Management Act 2000</i> governs water sharing, licensing, approvals and water trading in NSW when a water sharing plan has been enacted for the particular area and the specific water source. Under the Act, there are separate regulatory arrangements for access licences, use approvals, works approvals, controlled activity approvals and aquifer interference approvals. Among other things, the Act further defines categories of access licences and different dealing types in NSW.</p>
<p>2. The regulations</p> <p>The key regulation made under the <i>Water Management Act 2000</i> is the <i>Water Management (General) Regulation 2018</i>. The regulation specifies important procedural and technical matters related to the administration of the Act. For example, it prescribes additional categories of access licences and further declares which types of access licences are specific purpose access licences.</p>
<p>3. Access Licence Dealings Principles Order</p> <p>The <i>Access Licence Dealings Principles Order 2004</i> provides detail and clarity on dealings permitted under the <i>Water Management Act</i> and in relevant water sharing plans. For instance, it outlines the principles for specific types of access licence dealings, such as the tradability of specific purpose access licences (both allocation and entitlement trades).</p>
<p>4. Water sharing plans (referred to as ‘management plans’)</p> <p>The main tools in the Act for managing the state’s water resources are water sharing plans (WSP). The plans</p>

NSW water management framework

are used, for example, to set out the rules for the sharing of water in the particular water source between water users and the environment and rules for the trading of water in the particular water source.

5. Water resource plans (referred to as 'management plans')

Water resource plans are developed to meet requirements set out by the federal Basin Plan 2012. The entire NSW portion of the Murray–Darling Basin is already covered by statutory water sharing plans made under NSW legislation. The NSW water sharing plans will remain the primary legal framework governing how water is accessed and shared. Water resource plans build on those arrangements to deliver requirements under the Basin Plan.

6. Policies

Various policies clarify the requirements for specific activities under the NSW water legislation framework. They include the following:

- **NSW non-urban water metering framework:** Licensed water users are required to install compliant metering equipment on works that meet the metering thresholds by their rollout date.
- **NSW Aquifer Interference Policy:** This policy clarifies the requirements for obtaining water licences for aquifer interference activities under NSW water legislation and sets minimal impact considerations for assessing those activities. The recharge component of MAR is considered to be an aquifer interference activity.

3.2 NSW water entitlement types

Water entitlements are a form of property right over the use of water. In NSW, water entitlements broadly fall into two categories, basic landholder rights and water access licences.

This project focuses on the valuation of water access licences because works solely used to take water under basic landholder rights are exempt from the metering rules. An access licence provides the holder with the ongoing right to access a share of a specified water source. During the water year, water is distributed or 'allocated' against access licences by the NSW government in response to factors such as changes in rainfall and water storage.

Entitlements belong to two main resource types, surface and groundwater. Regulated surface water systems have their water controlled by infrastructure (i.e. water storage), which stores and releases water. In unregulated surface water systems, water supply is not enhanced by releases of stored water and is typically run-of-river water. Groundwater refers to the water below the land surface. It is stored in fractured rocks, porous rocks and soils called aquifers or groundwater systems.

In the current NSW framework, water entitlements are primarily governed by the Act and the Water Management (General) Regulation 2018 in areas where WSPs operate. There are various prescribed access licence categories for surface and groundwater sources. The entitlement type will affect the following aspects (including but not limited to):

- **The ability to trade water:** Certain licence categories are ineligible for trading, or there may be specific restrictions on trading (as determined in the Access Licence Dealings Principles Order 2004 and water sharing plans).
- **The order of allocation between licence categories:** WSPs specify the amount of water that is available for extraction from a water source under a long-term average annual extraction limit.

The available water within this extraction limit is then shared between water access licences based on the WSP rules.

For example, regulated surface water entitlements have different reliabilities, which define the priority of allocating water for water entitlements.

Domestic and stock and town water access licences have the highest priority. After them, other higher reliability entitlements (such as high security access licences) may receive a full 100% water allocation during all but the most severe droughts, whereas lower reliability entitlements (such as general security access licences) only receive allocation if there is enough water available in storages after higher reliability allocations have been made.

- **Setting priorities between licence categories:** Both the Act and the regulations determine the order of use among licence categories. The priority can be in relation to when a licence holder can extract water or when they can take water during periods when the supply of water is insufficient to satisfy all water requirements. WSPs can also provide locally for different rules of priority for each of those situations.
- **The ability to carry water over:** Certain licence categories are ineligible for carrying unused water over from one water year to another (as determined in water sharing plans).

In the September 2021 report, specific purpose access licences (SPAL) were not considered at all. SPALs are issued for a specified purpose (for instance, stock and domestic, or local water utility use), and are generally not tradable separate to land. In this report, specific SPALs are included; Table 2 and Table 3 list the domestic and stock and town water entitlement types that have been included in the analyses for this report.

Table 2: NSW domestic and stock water entitlement types

Licence category	Resource type
Domestic and stock	Groundwater
Domestic and stock [domestic]	Groundwater
Domestic and stock [stock]	Groundwater
Domestic and stock	Regulated surface water
Domestic and stock [domestic]	Regulated surface water
Domestic and stock [stock]	Regulated surface water
Domestic and stock	Unregulated surface water
Domestic and stock [domestic]	Unregulated surface water
Domestic and stock [stock]	Unregulated surface water

Table 3: NSW town water entitlement types

Licence category	Resource type
Aquifer [town water supply]	Groundwater
Domestic and stock [town water supply]	Groundwater
Local water utility	Groundwater
Major utility [urban water]	Groundwater

Licence category	Resource type
Local water utility	Regulated surface water
Regulated river (high security) [town water supply]	Regulated surface water
Domestic and stock [town water supply]	Unregulated surface water
Local water utility	Unregulated surface water
Major utility [urban water]	Unregulated surface water
Unregulated river (regulated supply - local water utility)	Unregulated surface water
Unregulated river [town water supply]	Unregulated surface water

Table 4 lists the entitlement types that were included in the September 2021 report (and their values are updated in this report).

Table 4: NSW water entitlement types

Licence category	Resource type
Aquifer	Groundwater
Aquifer (general security)	Groundwater
Aquifer (high security)	Groundwater
Coleambally Irrigation (conveyance)	Regulated surface water
Murrumbidgee Irrigation (conveyance)	Regulated surface water
Regulated river (conveyance)	Regulated surface water
Regulated river (general security A)	Regulated surface water
Regulated river (general security B)	Regulated surface water
Regulated river (general security)	Regulated surface water
Regulated river (high security)	Regulated surface water
Supplementary water	Regulated surface water
Supplementary water (Lowbidgee)	Regulated surface water
Unregulated river	Unregulated surface water
Unregulated river (A class)	Unregulated surface water
Unregulated river (B class)	Unregulated surface water
Unregulated river (C class)	Unregulated surface water
Unregulated river (high flow)	Unregulated surface water
Unregulated river (special additional high flow)	Unregulated surface water

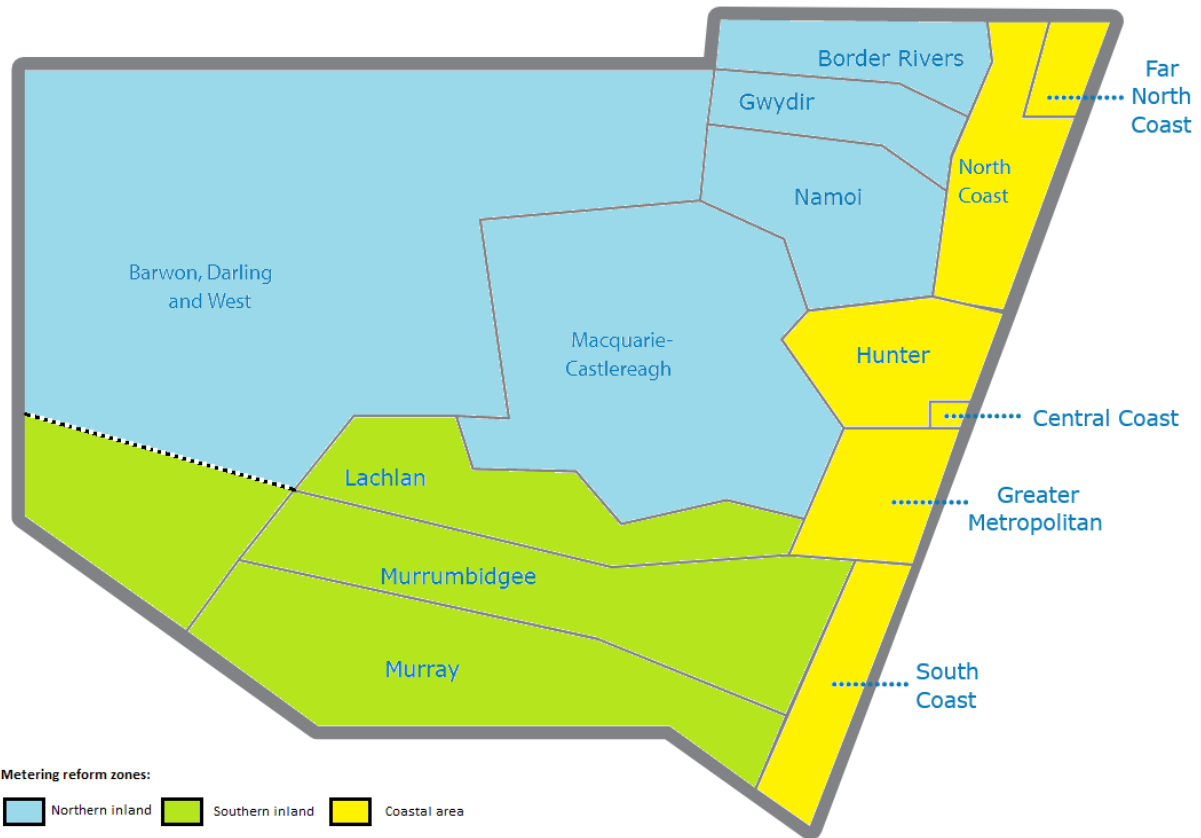
3.3 NSW water zones and regions

For this report, all NSW water sources and entitlements have been grouped into zones and regions. The zones refer to the stages and rollout dates of the non-urban water metering framework. The regions refer to the catchment areas or individual WSP areas that have been determined by the NSW Government.

Figure 2 presents NSW water zones and regions. We note that the Barwon, Darling and West region extends into both Northern and Southern inland zones. Whilst most of the water sources within that

region are located in the Northern inland zone, a few are located in the south, accordingly they are attributed to the Southern inland zone in the analysis.

Figure 2: NSW water zones and regions



Source: Adapted from DPIE, available at: <https://www.industry.nsw.gov.au/water/plans-programs/water-sharing-plans/status>

4. What is the value of the water entitlements?

Water access entitlements are tradable commodities that are witnessing value growth. This section discusses the value of water entitlements on issue across NSW.

4.1 Key findings

The total value of NSW water entitlements that were assessed in this project is between \$31 and \$41 billion, comprising:

- Tradeable (predominantly irrigation and environmental) entitlements: \$25-\$34 billion
- Town water entitlements: \$5.8 billion
- Domestic and stock entitlements: \$0.8 billion

At the state level, the six-month volume-weighted average price (VWAP) of tradeable entitlements is around \$2,600 per ML. The 5-year VWAP is around \$2,000 per ML – this demonstrates how the values have increased over time across NSW.

Value increases have been underpinned by:

- continuing demand for water from horticulture (such as fruit and nuts) and viticulture for higher reliability and groundwater entitlements, especially during dry years
- strong demand for water from cotton producers for general security entitlements, especially during years when there has been more water available
- strong demand from high value crops (blueberries, for example) in areas where water markets have only started to mature (such as Coastal NSW)

To estimate the total value of the NSW water entitlements, the total volume of entitlements on issue was multiplied by the estimated market value per licence category. Regarding tradeable and domestic and stock entitlements, the most valuable water assets are located in the Southern inland zone and the Murray and Murrumbidgee regions. In contrast, the most valuable town water assets are in the Coastal area zone and the Greater Metropolitan region.

4.2 Valuation methodology and sources

Marsden Jacob has used three valuation methods to value the in-scope NSW water entitlements (see Table 5).

Table 5: Applicable valuation methodologies per licence category

Entitlement type	Valuation methodology		
	Price premium approach	Producer surplus approach	Water market evidence
Stock and domestic	✓	✓	
Town water	✓		
All other in scope			✓

4.2.1 Method 1: Water market evidence

Where water market values exist for entitlements, they have been used in this analysis to value water entitlements that are separately tradable from land.

To update the estimated value of the tradeable water entitlements, they were valued by reference to water market trades. Specifically, market trade data from the last six water years (five full years and the first half of the ongoing 2022/23 season) was assembled for each water source and entitlement type (as per Table 4) subject to the metering reform.

To prepare and analyse the underpinning valuation data, the following analytical steps were then undertaken:

- Entitlements on issue data was assembled from the NSW Water Register to develop a definitive list of all water types and held volumes in the desired water areas
- Trade data from 1 July 2017 onwards was compiled from the following sources:
 - NSW Water Register
 - Bureau of Meteorology Water Information Dashboard
 - Marsden Jacob [Waterflow™](#)
 - NSW Government's [Controlled Allocations](#) outcomes³
- Both 71M (transfer of access licence) and 71Q (assignment of share component) trades were included
- Trade data was pre-cleaned by removing \$0 trades and other obvious outliers, such as trade values greater than \$15,000/ML
- Trade data was then thoroughly cleaned to remove other outliers by reviewing each trade individually by water source. This work was underpinned by our deep understanding of entitlement values across the state as we have undertaken prior work in nearly all NSW surface and groundwater catchments.
- Water sources with less than four, non-outlier, commercial trades (per licence category) over the analysis period were excluded
- As a result of the cleaning process, a dataset of 5,172 trades was used to calculate market values for each entitlement type per water source. Specifically, volume-weighted average prices (VWAP) were calculated for six month, one and five year timeframes. In our experience, the benefit of using VWAPs is that this will remove the 'small parcel bias' that is

³ Available here: <https://www.industry.nsw.gov.au/water/allocations-availability/controlled>

often observed in the water market (meaning that small parcels of 1-2MLs can be traded either with a significant discount or premium, depending on the water source). Providing a range of values ensures that both recent values and the price trends over the longer term were captured.

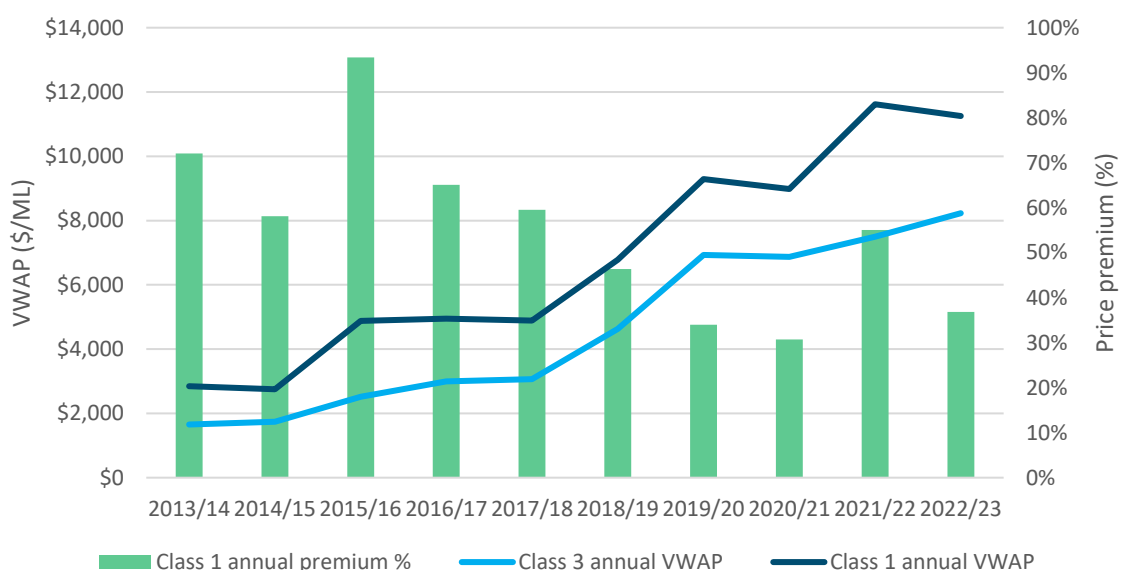
4.2.2 Method 2: Price premium approach

Stock and domestic and town water entitlements allow the holder to take and use water for domestic consumption and non-intensive stock watering. Town water entitlements are held by towns to supply urban water customers (such as households, businesses, utility and amenity services)

Both Stock and domestic and town water entitlements have very high water security in terms of announced allocations. Hence, their price, theoretically if they were tradeable, should be at or above the other available entitlement types in the area, noting that other water entitlements (such as high security entitlements) have more flexible usage parameters because they can be used for a wide range of purposes whereas town water, and stock and domestic entitlements cannot be used to irrigate land for cropping purposes. Despite this usage constraint we find that if the market price for other, such as aquifer of high security, entitlements in the region is known, the market value of stock and domestic and/or town water is estimated by applying a reliability based price premium.

In the price premium approach, we have used the market price differential from the South Australian River Murray (SA Murray) as a proxy market. In SA Murray, former stock and domestic entitlements (Class 1) are tradable entitlements, and have been transacted at a higher price compared to 'regular' Class 3 (high security irrigation) entitlements because they provide greater water security during extreme dry periods. Using historical SA Murray water market data, an indicative price premium factor can be established. As can be seen from Figure 3, the annual Class 1 price premium over Class 3 has had a downward trend over the last ten years, but Class 1 water trades for a price premium of least 30% over Class 3.

Figure 3: SA Murray Class 1 and Class 3 entitlement price comparison overlayed with the annual Class 1 price premium over Class 3



Source: Marsden Jacob analysis based on SA water register data

We acknowledge that all stock and domestic and most of the town water entitlements are not tradeable in NSW, but if they were, this analysis assumes that it would be reasonable for a similar price divergence to occur for NSW entitlements as has happened in SA.

In NSW, domestic and stock and town water entitlements generally have the same reliability characteristic in the water sharing plans for surface water – both are prioritised over other entitlement types. Our high-level review of the announced allocation history in the NSW regulated river water sources confirmed that the reliability difference between the domestic and stock and town water entitlements and the high security entitlements is similar to the difference between SA Murray Class 1 and Class 3. Hence, when using this method to value regulated domestic and stock and town water entitlements we have used a price premium factor of 1.3, meaning that we assume these entitlements to be 30% more expensive compared to the corresponding high security entitlement values in the same water source or region.

For the unregulated river entitlements, the reliability difference between the domestic and stock and town water entitlements and the ‘normal’ unregulated entitlements isn’t as clear because the reliability of accessing water is based on location or licence-specific flow and other conditions. These entitlements normally get a full 100% announced allocation every year, but the ability to actually divert water is determined by the access conditions. Our review of the main water sources and individual licences for unregulated domestic and stock and town water concluded that the reliability premium is slightly lower compared to regulated water sources. Therefore, for the unregulated domestic and stock entitlements, we have used a price premium factor of 1.15 whereas for unregulated town water entitlements the assumed price premium factor is 1.2.

In contrast, our review of the reliability (per announced allocation history) of the stock and domestic and town water groundwater entitlements indicates that there is no difference between them and

other aquifer access licences. Hence, we have not applied a price premium at all for them but assume that their value aligns with the other groundwater entitlements in the same water source or region. Table 6 sets out the price premium factors used for the analyses in this report.

Table 6: Price premium factors per resource type and licence category

Resource Type	Domestic and Stock	Town Water
Regulated	1.3	1.3
Unregulated	1.15	1.2
Groundwater	1	1

Entitlements on issue data was assembled from the NSW Water Register to develop a definitive list of all water types and held volumes for NSW domestic and stock and town water. Subsequently, the value of these entitlements was estimated by multiplying the entitlement on issue volumes with the corresponding market based values (from Method 3) and the price premium factors at Table 6.

4.2.3 Method 3: Producer surplus and avoided cost

The producer surplus method was used to value stock and domestic water entitlements.

The producer surplus value outcome differs on a regional and property specific basis, but this level of disaggregation was not possible in this project. Instead, the value of stock and domestic water was estimated using dairy cattle gross margins for three broad zones (southern, northern and whole of NSW). The producer surplus margins are based on margin budgets sourced from the NSW Department of Planning and Environment, supplemented with margin budgets sourced from other jurisdictions.

Gross margins per ML can be used for proxies of future cash flows. These cash flows are discounted by using the cost of capital to give their present values. The sum of all future cash flows is the net present value (NPV). NPV represents the current value of the long-term benefits from the cash flows, which can equate to the present economic value of the entitlement.

Table 7: Estimated net present values (\$/ML) for dairy cattle production, by zone

Zone	NPV (\$/ML)
Coastal area	\$7,830
Northern inland	\$6,860
Southern inland	\$8,810

It was also considered whether the avoided cost method could be used for town water entitlements. Ideally, the benefit would be measured based on the incremental benefits associated with avoided restrictions and augmentations, but we note that such data is not available for this on a town-by-town basis.

Instead, it was considered whether using ‘average avoided cost’ estimates would be suitable to value the town water assets. These estimates would have been based on the cost of alternative water supply options based on previous analysis undertaken by Marsden Jacob. Avoided cost values take into consideration options such as augmenting river storages, accessing alternative ground or surface water, implementing water efficiency measures or building localised desalination plants.

However, our view is that using such a method would result in highly inflated and thus unrealistic values for the NSW town water assets as the avoided cost values represent shortfall economic values. The results would also be unreliable, as the characteristics of the town water assets vary greatly. Hence, it would be beyond the scope of this project to attribute an alternative water supply option for each town water entitlement in an accurate manner. Another complexity in this relation is to find proxy values for the 'raw water' in the storage or underground instead of treated water values.

As a result, in the absence of market values from the water market, we concluded that while they may be conservative, the price premium approach produces a better means of valuing town water entitlements.

4.3 Market values of tradeable (predominantly irrigation and environmental) entitlements

The updated market value analysis results are presented in Table 8, which presents the total entitlements on issue (EOI) and VWAPs aggregated on the whole of state, zone, and region level.

The analysis shows that across NSW, water values have increased both over the last five years and continued to increase across all three main zones when comparing the average prices over the last year and the last six months.

Table 8: Entitlements on issue (ML) and 5-year, 1-year, and 6-month VWAPs (\$/ML), by zone, region and state

Region	Total EOI	5-year VWAP	1-year VWAP	6-month VWAP	Central estimate
Coastal area					
Central Coast	18,431	\$2,667	\$4,667	\$10,000	\$3,839
Far North Coast	104,625	\$807	\$1,035	\$1,349	\$1,633
Greater Metropolitan	235,297	\$1,101	\$1,735	\$3,085	\$2,701
Hunter	494,123	\$1,846	\$1,456	\$1,513	\$1,517
North Coast	152,405	\$975	\$1,049	\$628	\$1,752
South Coast	65,351	\$562	\$958	\$500	\$660
Sub-total	1,070,231	\$1,311	\$1,419	\$1,970	
Northern inland					
Barwon, Darling and West	250,912	\$1,097	\$925	\$1,338	\$1,032
Border Rivers	492,083	\$1,979	\$2,510	\$2,548	\$2,777
Gwydir	804,306	\$2,302	\$3,662	\$4,572	\$3,445
Lachlan ⁴	15,915	\$1,157	\$1,964	\$2,000	\$2,000
Macquarie-Castlereagh	1,095,048	\$1,361	\$2,089	\$2,357	\$2,161

⁴ Although Lachlan is located in the Southern inland zone, two water sources (Orange Basalt and Young Granite Groundwater Sources) are managed under a WSP (NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020) which belongs to the Northern inland zone per Attachment D of the NSW Non-Urban Metering Policy (available here: https://www.industry.nsw.gov.au/data/assets/pdf_file/0017/312335/nsw-non-urban-water-metering-policy.pdf)

Region	Total EOI	5-year VWAP	1-year VWAP	6-month VWAP	Central estimate
Murrumbidgee ⁵	3,494	\$946	\$3,155	n.a.	\$3,200
Namoi	865,686	\$2,237	\$2,999	\$2,954	\$2,693
Sub-total	3,527,443	\$1,961	\$2,636	\$2,869	
Southern inland					
Barwon, Darling and West	340,665	\$1,716	\$1,595	\$1,100	\$593
Lachlan	995,093	\$1,510	\$2,423	\$1,781	\$2,016
Murray	2,674,812	\$2,217	\$2,397	\$2,767	\$2,967
Murrumbidgee	4,001,885	\$2,391	\$2,771	\$2,459	\$3,236
Sub-total	8,012,455	\$2,097	\$2,542	\$2,565	
NSW Total	12,610,130	\$2,010	\$2,488	\$2,596	

To estimate the total value of the NSW water entitlements, the total volume of entitlements on issue was multiplied by the estimated market value per licence category (central estimate in Table 8 represents an aggregation of the estimated market values of all entitlement types per region). The latter was informed by the market data analysis, and supplemented by proxy values where trade evidence was considered insufficient, skewed (for example, when trade values of a single water source are overrepresented when VWAPs are aggregated on a region level) or outdated⁶.

Updated estimated total market values of NSW water entitlements by zone and region are presented in Table 9 and Table 10. Based on the analysis, the current total market value is over \$34.2 billion. The most valuable water assets continue to be located in the Southern inland zone and the Murray and Murrumbidgee regions.

For comparison, we also provided a lower bound estimate on the market value by using the 5-year VWAP prices instead of current market prices. The lower bound estimate is \$25.2 billion.

Table 9: Estimated total market value (\$ million) of water entitlements, by zone

Zone	Lower bound estimate based on 5-year VWAP	Best estimate market value
Coastal area	\$1,478.3	\$1,936.6
Northern inland	\$6,656.7	\$9,136.8
Southern inland	\$17,100.9	\$23,094.9
NSW Total	\$25,236.0	\$34,168.3

⁵ Although Murrumbidgee is located in the Southern inland zone, a single water source (Yass Catchment Groundwater Source) is managed under a WSP (NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020) which belongs to the Northern inland zone per Attachment D of the NSW Non-Urban Metering Policy (available here: https://www.industry.nsw.gov.au/data/assets/pdf_file/0017/312335/nsw-non-urban-water-metering-policy.pdf)

⁶ Based on our experience and analysis conducted for this report, a proportion of NSW water sources and entitlement types do not have sufficient trade data to have statistically valid values. This is often the case for unregulated and groundwater entitlements. Where necessary, we have used proxy values based on a) values in the neighbouring catchments for the same entitlement type or b) values for the same entitlement type in other catchments that have broadly the same characteristics as the region in question.

Table 10: Estimated total market value (\$ million) of water entitlements, by WSP region

Region	Lower bound based on 5-year VWAP	Best estimated market value
Barwon, Darling and West	\$487.4	\$460.8
Border Rivers	\$1,068.0	\$1,366.7
Central Coast	\$37.8	\$70.7
Far North Coast	\$90.0	\$170.8
Greater Metropolitan	\$373.2	\$635.5
Gwydir	\$1,944.8	\$2,771.0
Hunter	\$766.6	\$749.5
Lachlan	\$1,495.3	\$2,038.3
Macquarie-Castlereagh	\$1,465.9	\$2,366.2
Murray	\$5,616.7	\$7,937.1
Murrumbidgee	\$9,767.0	\$12,960.6
Namoi	\$1,912.6	\$2,331.0
North Coast	\$171.3	\$267.0
South Coast	\$39.5	\$43.1
NSW Total	\$25,236.0	\$34,168.3

We note that the total value of \$34.2 billion includes all entitlements, including those held by the Commonwealth and state environmental water holders. In reality, not all of this water is available for production. However, we considered it appropriate to include all entitlements in the estimate as it provides a beneficial context in terms of the total value of the water resources NRAR is protecting, highlighting the importance of the compliance work to be undertaken by the NRAR.

These values have generally witnessed sustained growth

As was seen in Table 8, water entitlements values have increased significantly over the last five years. The increase has continued since our previous assessment in September 2021. At the time, the total NSW value was estimated to be \$29.2 billion. The updated estimate of \$34.2 billion suggests that the value in aggregate has increased by 17% (Table 11).

Table 11: Estimated total market value (\$ million) of water entitlements compared to September 2021 estimates, by zone

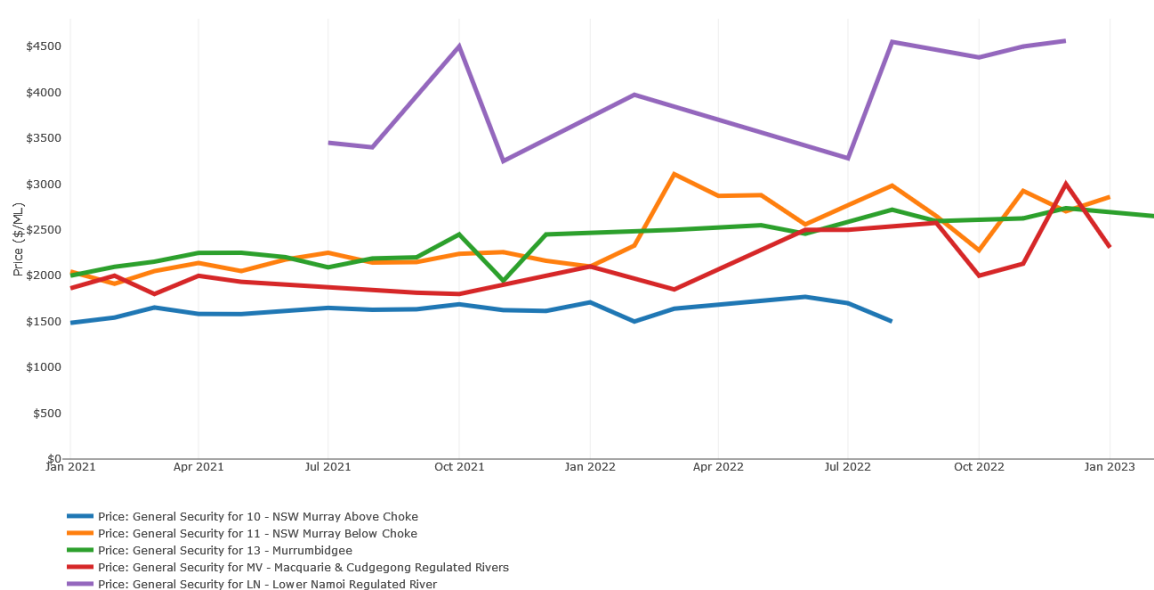
Zone	September 2021 estimate	Updated estimate	Change (%)
Coastal area	\$2,192.2	\$1,936.6	-12%
Northern inland	\$7,875.2	\$9,136.8	16%
Southern inland	\$19,145.0	\$23,094.9	21%
NSW Total	\$29,212.4	\$34,168.3	17%

Of note, only the values in the Coastal area have decreased since the last assessment, whereas for the inland zones the values have increased. This may stem from the characteristic differences between these areas, along with the impacts of high rainfall and flooding along the coastal zone, which may have reduced demand for water entitlements. The demand for regulated water in the

inland zones has been strong, and prices have continued to rise. In comparison, in the Coastal area there is much less regulated water in existence, and the water market is more immature in general (explaining market volatility).

The bulk of the entitlements on issue in the inland catchments are general security entitlements. The continued strengthening of the prices for these entitlements has been the greatest contributor to the total value increase. As an example, Figure 4 presents the general security entitlement prices in the NSW Murray, Murrumbidgee, Lower Namoi and Macquarie over the last two water years, showing steady growth.

Figure 4: NSW Murray, Murrumbidgee, Lower Namoi, and Macquarie general security entitlement prices, 2021 to 2023



Source: Marsden Jacob Waterflow™

4.4 Town water entitlement values

The market value analysis, based on the price premium approach, for the NSW town water entitlements is presented in Table 12, which presents the total entitlements on issue (EOI) and total values on the whole of state, zone, and region level.

The analysis concludes that across NSW, town water is conservatively valued at approximately \$5.8 billion using the price premium approach. The largest volumes, and nearly 70% of the value, are located in the Coastal area. Of the individual areas, the Greater Metropolitan region holds the most town water entitlements on issue and the most valuable town water assets.⁷

⁷ This value reflects the underlying value of the water entitlements. It does not reflect the value associated with the many water capital assets that are associated with town water supplies, such as the water delivery, treatment and storage infrastructure.

While these values are significant, they are nonetheless considered to be conservative because if these resources were not available, then significantly higher cost water would need to be sourced to meet town water demand.

Table 12: Town water entitlements on issue (ML) and total value by zone, region and state

Region	Total EOI	Estimated total value
Coastal area		
Central Coast	107,370	\$446,145,500
Far North Coast	55,175	\$128,431,410
Greater Metropolitan	1,040,696	\$3,079,381,497
Hunter	47,518	\$108,961,430
North Coast	109,464	\$219,314,300
South Coast	17,680	\$12,462,945
Sub-total	1,377,903	\$3,994,697,082
Northern inland		
Barwon, Darling and West	6,727	\$3,943,500
Border Rivers	4,309	\$13,279,775
Gwydir	12,093	\$78,799,904
Lachlan ⁸	250	\$375,000
Macquarie-Castlereagh	74,024	\$192,127,007
Murrumbidgee ⁹	259	\$776,550
Namoi	39,365	\$269,854,504
Sub-total	137,027	\$559,156,240
Southern inland		
Barwon, Darling and West	6,722	\$4,681,350
Lachlan	34,330	\$126,763,950
Murray	47,847	\$542,513,657
Murrumbidgee	76,687	\$563,284,059
Sub-total	165,586	\$1,237,243,016
NSW Total	1,680,515	\$5,791,096,339

4.5 Stock and domestic entitlement values

The market value analysis for the NSW domestic and stock water entitlements is presented in Table 13, which details the total entitlements on issue (EOI) and total values on the whole of state, zone, and region level, using two different valuation approaches.

⁸ Although Lachlan is located in the Southern inland zone, the Orange Basalt Groundwater Source (where there is a local water utility licence) is managed under a WSP (NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020) which belongs to the Northern inland zone per Attachment D of the NSW Non-Urban Metering Policy (available here: https://www.industry.nsw.gov.au/data/assets/pdf_file/0017/312335/nsw-non-urban-water-metering-policy.pdf)

⁹ Although Murrumbidgee is located in the Southern inland zone, a single water source (Yass Catchment Groundwater Source, where there are various town water entitlements) is managed under a WSP (NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020) which belongs to the Northern inland zone per Attachment D of the NSW Non-Urban Metering Policy (available here: https://www.industry.nsw.gov.au/data/assets/pdf_file/0017/312335/nsw-non-urban-water-metering-policy.pdf)

The analysis concludes that across NSW, domestic and stock water is valued at approximately \$770 million using the price premium approach and approximately \$765 million using the producer surplus approach (which uses the gross margin estimates presented in section 4.2). For both valuation approaches, the vast majority of the total value is located in the Southern inland zone and the Murray and Murrumbidgee regions because this is where most of the entitlements on issue are located.

Table 13: Domestic and stock water entitlements on issue (ML) and total value by zone, region and state, per valuation approach

Region	Total EOI	Estimated total value	
		Price premium approach	Producer surplus approach
Coastal area			
Central Coast	214	\$859,338	\$1,674,978
Far North Coast	802	\$1,829,732	\$6,277,254
Greater Metropolitan	1,588	\$4,503,126	\$12,429,276
Hunter	2,954	\$12,757,689	\$23,120,958
North Coast	816	\$1,875,650	\$6,386,832
South Coast	793	\$614,304	\$6,206,811
Sub-total	7,166	\$22,439,838	\$56,096,109
Northern inland			
Barwon, Darling and West	2,425	\$3,486,474	\$16,628,225
Border Rivers	1,326	\$11,153,789	\$9,092,382
Gwydir	3,740	\$34,652,782	\$25,645,180
Macquarie-Castlereagh	7,598	\$38,858,063	\$52,099,486
Namoi	3,701	\$25,371,290	\$25,377,757
Sub-total	18,789	\$113,522,397	\$128,843,030
Southern inland			
Barwon, Darling and West	43	\$24,438	\$379,045
Lachlan	13,600	\$76,799,760	\$119,884,000
Murray	17,710	\$203,885,868	\$156,113,650
Murrumbidgee	34,436	\$352,973,764	\$303,553,340
Sub-total	65,788	\$633,683,830	\$579,930,035
NSW Total	91,742	\$769,646,065	\$764,869,174

It is noteworthy that the two estimates produced by different valuation approaches align well with each other. The producer surplus method assumes that all domestic and stock water is used for cattle production. In reality, a proportion of the water is used for pure domestic purposes, and a proportion is completely unused. Despite this, as the two methods provide almost identical results, it was thus concluded that these figures provide a strong indication of the domestic and stock water values in NSW.

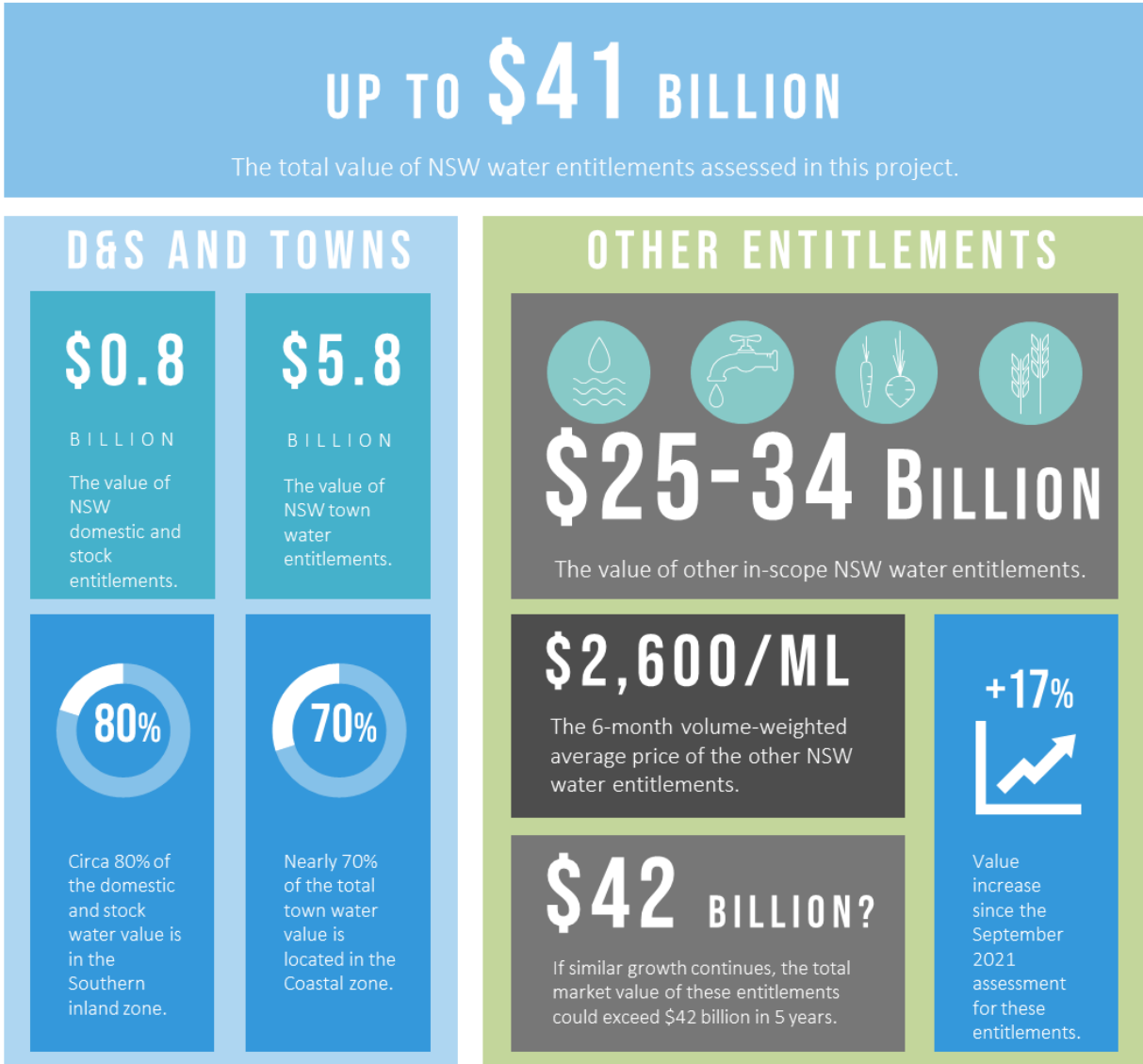
4.6 Summary

The analysis concludes that across NSW, town water is conservatively valued at \$5.8 billion, whereas domestic and stock water is valued at approximately \$770 million. For all the other in-scope entitlements, the total value of the entitlements is estimated to be around \$25-34 billion.

The value of the other entitlements has increased 17% since the September 2021 assessment, demonstrating how the values have continued to increase across NSW. Should a similar growth in entitlement values continue, it means that the total market value of the other entitlements could be more than \$42 billion in 5 years. However, we note that there are natural threshold limits imposed by the realities of farm business profitability (such as the value of the output vs. price of water as an input) that ultimately govern the room for further growth in entitlement values.

Figure 5 summarises the NSW water entitlement value results assessed for this report.

Figure 5: Summary of the NSW water entitlement values



5. How much production is supported by water entitlements?

This section provides an overview of the value of production that water entitlements are supporting across NSW.

5.1 Key findings

Based on the new and updated analysis undertaken for this project, the annual production value that is being supported by water entitlements across NSW is valued in the billions of dollars and increasing.

On a gross value of irrigated agricultural production (GVIAP) basis, the water entitlements are supporting production valued at between \$2.9 to \$4.4 billion per annum, or a five-year average of \$3.7 billion. In general, the value of agricultural production continues to increase per megalitre of water, with irrigators seeking to maximise the rent through both improved production yield and by transitioning from lower to higher-value production.

However, the GVIAP is not picking up dryland operations where water is used for animal production (instead of irrigating pasture crops). Whilst it is difficult to quantify, we estimate that the potential livestock production supported by domestic and stock water entitlements is in excess of \$170 million per annum.

Water entitlements are also being used to support various other agricultural and industrial production activities such as mining, processing, and manufacturing. Hence, the annual total production value supported by the NSW water entitlements is much greater than \$3.7 billion, evidenced by the fact that the total production value of the NSW mining industry alone was \$26.3 billion in 2019-20.

The production value of the town water entitlements is difficult to assess because of data limitations. To emphasise the importance of these water assets it can be mentioned that the NSW Gross State Product (GSP) in 2022 is estimated at \$697.4 billion. Whilst the GSP is not an ideal proxy for the economic outcome from the town water entitlements, it illustrates the magnitude of the economic outcomes that are underpinned by water resources across NSW.

5.2 Methodology and sources

The following methods are used in this section to consider the value of production from in-scope NSW water entitlements:

- **Method 1:** Gross value of irrigated agricultural production (GVIAP), used for all the entitlements included in the September 2021 valuation

- **Method 2:** Gross value of agricultural production (GVP), used to supplement the gaps in the GVIAP data
- **Method 3:** Gross value of other industries, such as extractive industries, benefitting from water entitlements, used to supplement the total production estimates, which would otherwise be conservative.

5.2.1 Method 1: GVIAP

The gross value of irrigated agricultural production (GVIAP) method¹⁰ is used to consider the value of irrigated production from the NSW water entitlements.

GVIAP reflects to the gross value of agricultural commodities that are produced with the assistance of irrigation. The gross value of commodities produced is the value placed on recorded production at the wholesale prices realised in the marketplace. This definition of GVIAP does not refer to the value that irrigation adds to production, i.e. the 'net effect' that irrigation has on production. GVIAP is the value that can be most directly attributed to the NSW water entitlements.

The Australian Bureau of Statistics (ABS) estimates the GVIAP yearly based on production, commodity prices, and water use data derived from ABS' Rural Environment and Agricultural Commodities Survey (REACS) and non-ABS sources, including marketing authorities and industry bodies.

5.2.2 Method 2: GVP

Most of the irrigated commodities included in the GVIAP statistics are irrigated through the application of water directly onto the commodity itself or the soil in which it is grown. The exception relates to livestock, which includes dairy, meat cattle, sheep and other livestock. For example, the GVIAP of 'dairy' simply refers to all dairy production (i.e. milk) from dairy cattle that grazed on irrigated pastures or crops. ABS notes⁸ that the estimates of GVIAP for dairy and other livestock production should be hence used with caution because, in this case, the irrigation is not applied directly to the commodity, rather it is applied to a pasture or crop, which is then eaten by the animal from which the commodity is derived.

The obvious gap in the GVIAP methodology is that it only covers pasture-fed livestock production and is not picking up dryland operations where water is used for the animals' drinking purposes (instead of irrigating pasture crops). In Marsden Jacob's experience, many farmers are using domestic and stock water to support their sheep and cattle production and also other types of dryland farming across NSW.

Because of the above-mentioned data limitations in relation to GVIAP, it is necessary to look at the GVP values in NSW, which include both irrigated and dryland farming operations. Annually, GVP is measured as a unit volume of each commodity produced by the respective commodity unit price achieved at the farm gate or in the wholesale market.

The challenge with the GVP method is to isolate the value created by domestic and stock water entitlements from the data. Dryland operations are underpinned by the annual rainfall that supports

¹⁰ <https://www.abs.gov.au/methodologies/water-account-australia-methodology/2020-21>

pasture growth, whereas water entitlements (surface and groundwater) are enabling inputs as they provide water to the farm animals for drinking which may be used throughout production cycle, but the water can especially deliver value during droughts. However, a considerable proportion of the water that is supporting broadacre production is sourced from basic landholder rights (BLR)¹¹, captured overland flows and captured rainfall events all of which were not valued in this project.

5.2.3 Method 3: Other industries

We note that when considering the NSW water users more broadly, the above methods are likely to produce conservative estimates. This is because water entitlements are also being used to support various industrial production activities such as mining, process, and even some manufacturing. The output values associated with these industries are not included in the GVIAP or GVP values.

Although it is not within the scope of this project to conduct detailed analysis, we have included high level information on the NSW mining and manufacturing industries and their production value as an example.

5.3 Value of irrigated production

When the ABS calculates GVIAP, it is based on each irrigated 'commodity group' produced by agricultural businesses. That is, GVIAP is generally not calculated for individual commodities but for groups of 'like' commodities according to irrigated commodity groupings on the agricultural censuses and survey forms. The irrigated commodity groups vary slightly on the survey form from year to year. For instance, the commodity groups presented in the 2020-21 publication were:

- rice
- cereals for grain and seed
- cotton
- sugar cane
- nurseries, cut flowers and cultivated turf
- other broadacre crops
- hay
- vegetables
- fruit and nuts (excluding grapes)

¹¹ Under the Water Management Act 2000 (WMA), landholders can take water under basic landholder rights. Owners or occupiers of land which overlies an aquifer can take water for domestic consumption or stock watering.

- Domestic consumption means the use of water for normal household purposes in domestic premises which are situated on the land.

- Stock watering means the watering of stock animals being raised on the land. It does not include raising stock animals on an intensive commercial basis where the animals are housed or kept in feedlots or buildings.

Source: <https://www.waternsw.com.au/customer-services/water-licensing/basic-landholder-rights>

- grapes
- dairy production (excluding dairy cattle for beef production)
- production from meat cattle
- production from sheep and other livestock.

Over the period, 2016-17 to 2020-21 the GVIAP ranged from \$2.9 to \$4.4 billion (Table 14).

Table 14: GVIAP, NSW Total (\$)

	2016-17	2017-18	2018-19	2019-20	2020-21
GVIAP	3,652,402,650	4,358,182,706	3,577,255,422	2,895,420,264	4,138,931,679

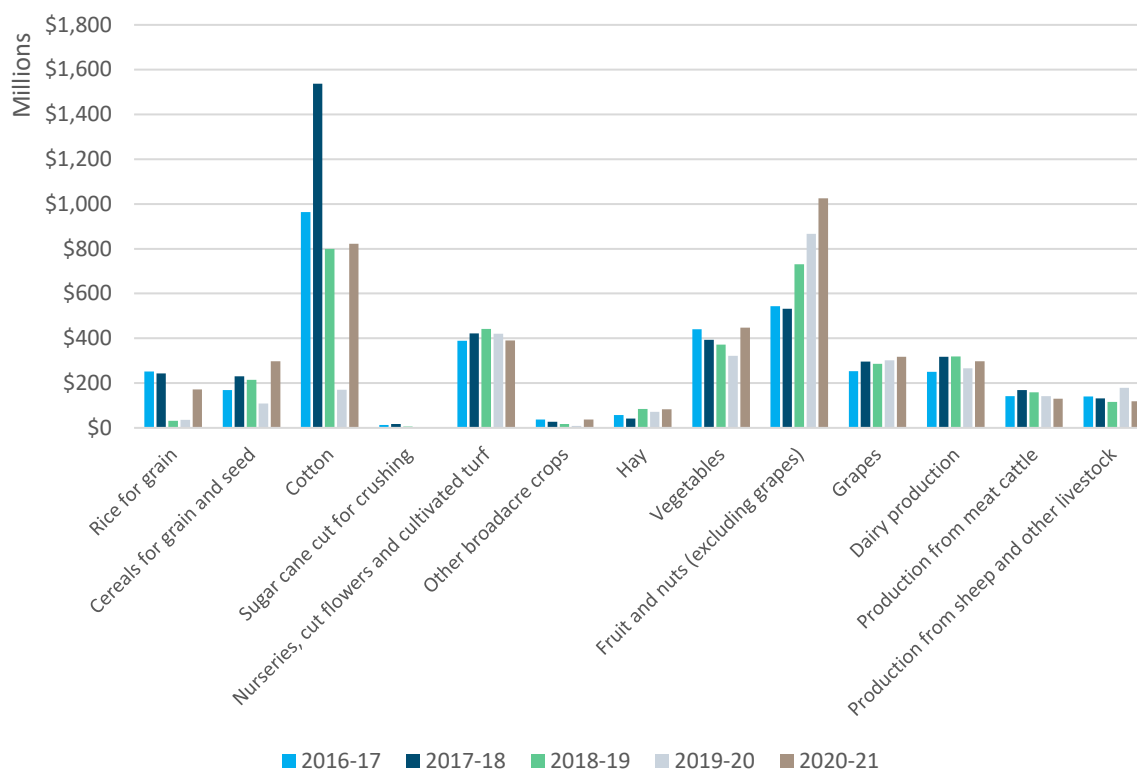
Source: ABS, Water Account, Australia, 2020-21

GVIAP by commodity group

Many different commodities rely on irrigation water. Of these, annual crops tend to be more volatile because they scale up and down depending on water availability (e.g., cotton, rice, cereals). In contrast, perennial crops are more stable because they cannot scale production (e.g. horticulture and viticulture).

The GVIAP is thus relatively volatile because it is a function of water availability. Figure 6 shows that the key reason for the decline in GVIAP in 2018-20 was a reduction in water availability that resulted in reduced production of cotton, rice and cereals. In aggregate, cereals, cotton and rice production fell by nearly \$1.7 billion dollars from 2018 to 2020. Conversely, as water availability increased, the production increased nearly by \$1 billion from 2020 to 2021 (see Figure 6).

Figure 6: GVIAP by commodity group, NSW



Source: ABS, Water Account, Australia, 2020-21

The ABS Water Account¹² confirms that the estimated volume of water used by the NSW agricultural sector increased by more than 125% from 2020 to 2021 due to wetter conditions and recovering dam storage levels:

- 2,960 GL (2018-19)
- 1,547 GL (2019-20)
- 3,505 GL (2020-21)

Despite annual volatility in water availability, the trend over the last ten years has been that the value of production continues to increase per megalitre of water, with irrigators seeking to maximise the rent through improved production yield and transitioning from lower to higher-value production. Horticultural industries are also increasing across NSW. There is significant growth in almond and other fruit plantings in the southern Murray-Darling Basin, whereas in the coastal regions, growth in fruit and macadamia nut plantations remains strong. This can be seen in Figure 6, where the NSW production value of fruit and nuts has nearly doubled from 2017 to 2021.

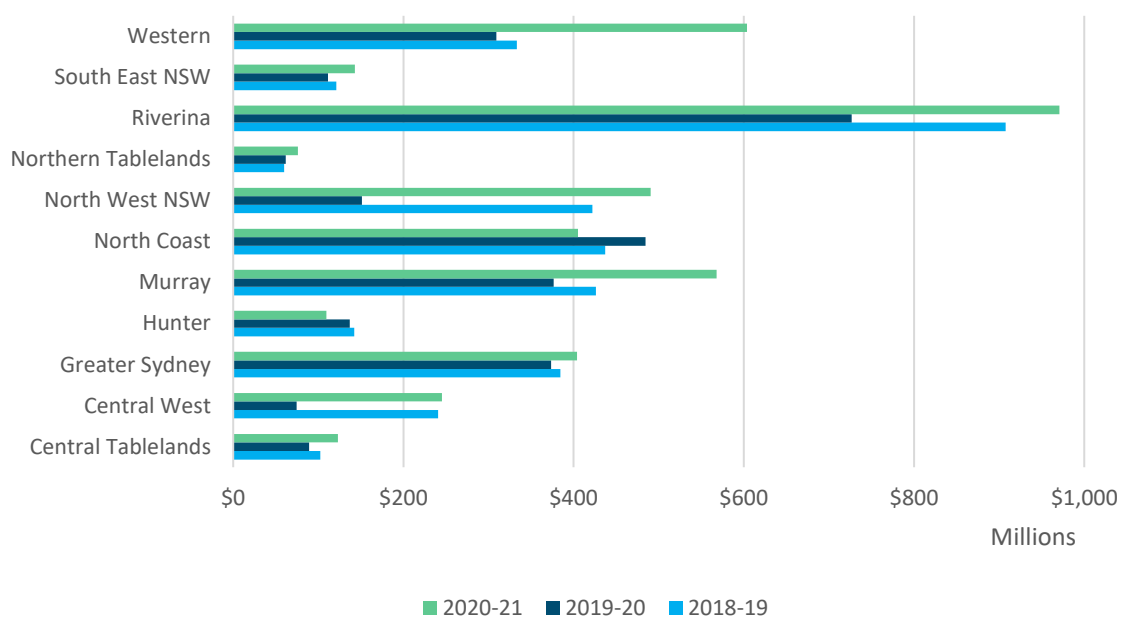
This shows that the composition of the horticultural plantings has changed significantly over time. Wine grapes and citrus now represent a smaller proportion of total plantings as these industries restructured in response to market pressures. On the other hand, large greenfield developments of almonds and, to a lesser extent, olives have emerged and grown in scale.

¹² <https://www.abs.gov.au/statistics/environment/environmental-management/water-account-australia/2020-21>

GVIAP by region

The analysis of GVIAP by region confirms that the regions within the Murray-Darling Basin are generally the biggest (e.g., Riverina, North West, Western and Murray). But the irrigation production in the coastal regions, while small, remains significant, ranging from \$140 million in South East NSW to \$405 million in North Coast NSW (see Figure 7).

Figure 7: GVIAP by region



Source: ABS, Water Account, Australia, 2020-21

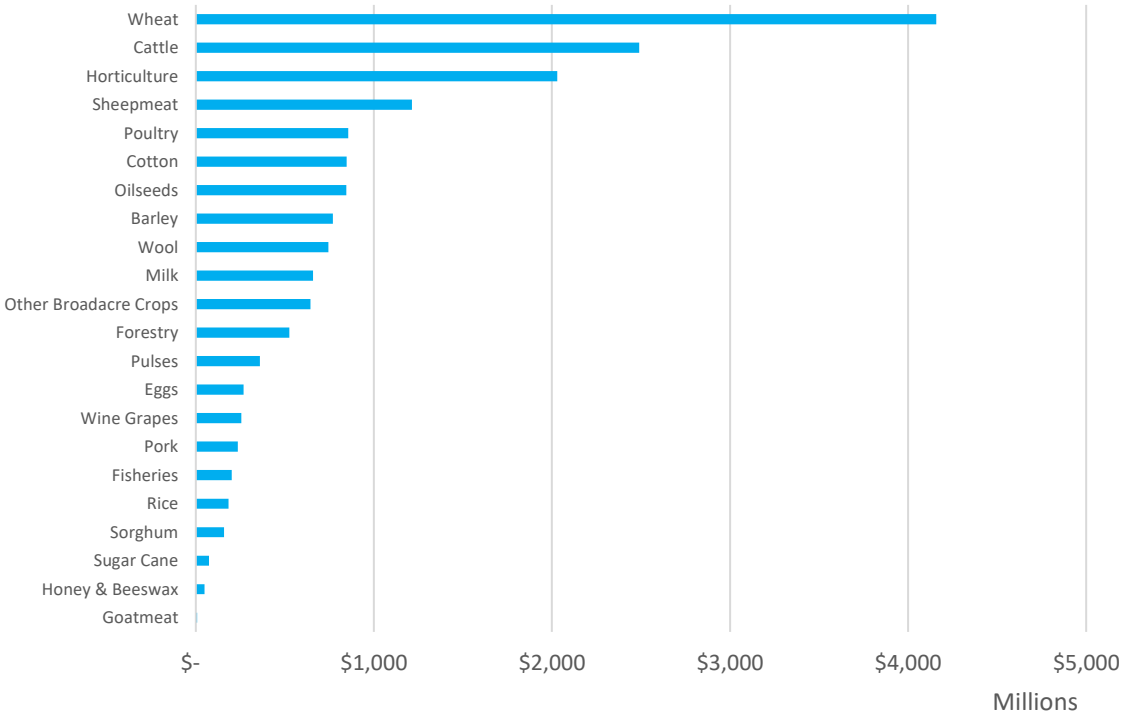
5.4 Gross value of production

Where the GVIAP is around \$4 billion, the gross value of production (GVP) is considerably higher, but the value can be volatile as in drought periods production levels can decline significantly when compared to periods that follow higher rainfall levels.

Illustrating this, the NSW primary industries sector achieved a significant recovery from the substantial challenges of the past three years to reach a record level of GVP estimated at \$17.6 billion in 2020-21.¹³ This was especially underpinned by a record winter crop across the state (Figure 8) that resulted in an increase in GVP by 41% on 2018-19 levels.

¹³ <https://www.dpi.nsw.gov.au/about-us/publications/pdi/2021>

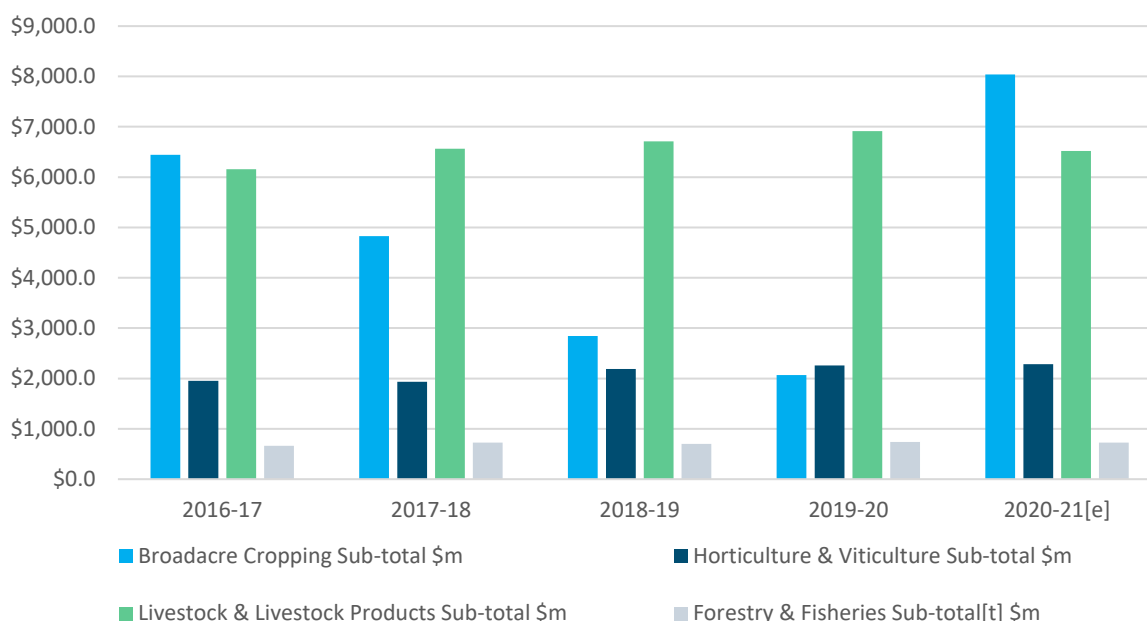
Figure 8: NSW primary industries output estimates 2020-21, by commodity



Source: <https://www.dpi.nsw.gov.au/about-us/publications/pdi/2021>

Of the individual commodity groups, livestock production supported production totalling \$6 to 6.9 billion between 2016 and 2021. This is the commodity group supported by domestic and stock water. However, isolating the value created by domestic and stock water entitlements from the GVP data is challenging. It is also likely that a proportion of the livestock GVP value is supported by other water entitlements used by, for instance, commercial operators, whose production output is not recognised in the GVIAP data (if they do not irrigate pastures or any other crops, but use water for other purposes).

Figure 9: NSW primary industries output estimates 2016-21, by commodity groups



Source: <https://www.dpi.nsw.gov.au/about-us/publications/pdi/2021/statistics-tables>

While it is not possible to precisely estimate, when the volume of domestic and stock water entitlements (that is estimated to be available for production per annum) is multiplied by producer revenue values (per megalitre based on average consumption by sheep and cattle), we find that potential livestock production supported by these entitlements exceeds \$170 million.

Table 15: Potential production values in NSW, by zone and category

Region	Category	Value (\$ million)
Coastal area	Domestic and stock	\$13
Northern Inland	Domestic and stock	\$35
Southern Inland	Domestic and stock	\$122
NSW Total	Domestic and stock	\$171

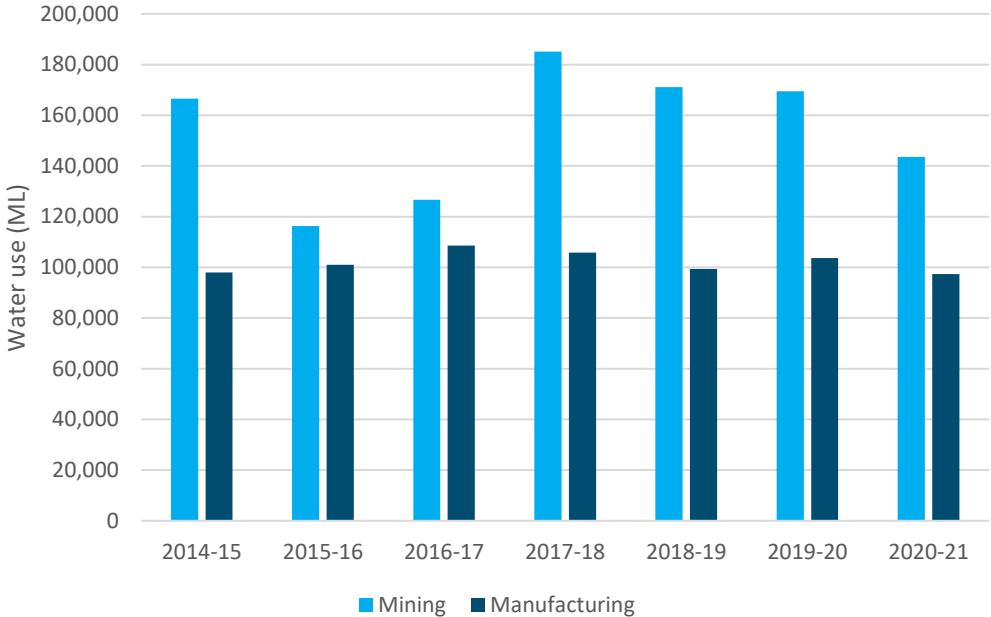
As mentioned, we have not assessed the production value of the town water entitlements because of data limitations. However, to emphasise the importance of these water assets, it should be noted that the NSW Gross State Product (GSP) in 2022 is estimated at \$697.4 billion¹⁴. Whilst the GSP is a poor proxy for the economic outcome from the town water entitlements, it reflects the reality that without water, the towns either wouldn't exist or would need to be sourcing water from other sources, which typically would be considerably more expensive.

5.5 Minerals and manufacturing industries

A number of other industries also rely on water entitlements. For instance, based on ABS data up to 180 GL of water has been annually used for mining purposes in NSW, whereas the manufacturing industry steadily uses around 100 GL per annum (Figure 10).

¹⁴ Source: <https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-state-accounts/latest-release>

Figure 10: NSW mining and manufacturing water use in 2014-21



Source: <https://www.abs.gov.au/statistics/environment/environmental-management/water-account-australia/latest-release>

The value of production that water resources is supporting is substantial, with the total production value of the NSW mining industry being \$26.3 billion in 2019-20¹⁵, whereas manufacturing businesses generate \$33 billion¹⁶.

It should be noted that whilst nearly all mining operations require water, this is not necessarily the case for manufacturing. Regardless, it is clear that water entitlements are being used to support various industrial production activities that generate billions of dollars of output across NSW.

¹⁵ Source: <https://www.resourcesregulator.nsw.gov.au/sites/default/files/2022-11/mining-industry-infographics-snapshot-may-2021.pdf>

¹⁶ Source: <https://www.business.nsw.gov.au/industry-sectors/industry-opportunities/advanced-manufacturing/economic-value-sector-overview>

6. Water is a critical input to regional communities

The contribution of water to regional economies extends beyond the farm gate. This section provides an overview of the contribution that water makes to regional economies.

6.1 Introduction

Water scarcity is a persistent issue in Australia, given the relatively dry and variable climate and the emergence of climate change. As has been detailed in the preceding chapters, water access entitlements are a valuable commodity, particularly from an economic perspective for the irrigated agriculture sector, which accounts for around three-quarters of total use.

The value of water access entitlements extends well beyond the direct users. More broadly, water access entitlements and water resources provide a range of consequential public and private benefits, including flow-on benefits for regional economies, environmental outcomes, cultural outcomes for Aboriginal and Torres Strait Islander people, and economic and social outcomes for recreational and commercial fishers and the tourism industry.

Although more difficult to quantify, these values nonetheless need to be recognised when considering the value of water to regional communities.

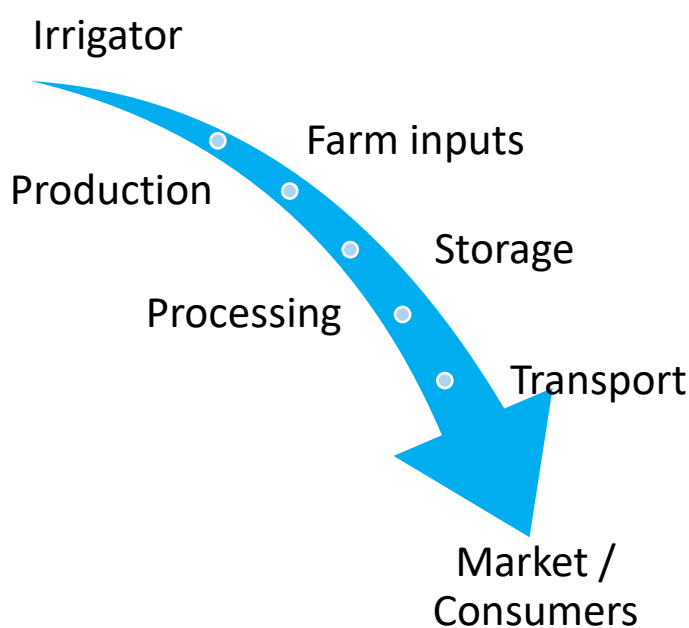
6.2 Value generation in the economy

The impact of irrigated agricultural activities extends beyond the farm gate because agricultural activities source many production inputs from the local area, and inputs for irrigated agriculture tend to be significantly higher than for dryland agriculture.

For instance, the supply chain for irrigated agriculture encompasses (Figure 11):

1. inputs to production, such as labour, fertilisers, chemicals, seed, fuel, capital equipment;
2. storage of the farmed product;
3. processing and transformation;
4. transport; and
5. markets and consumers.

Figure 11: Supply chain, irrigated agriculture



From a farm-specific perspective, the purchases of inputs to support agricultural production generates flow-on economic benefits for the rest of the regional economy. These flow-on effects are of two types:

1. **Production-induced flow-on impacts** – where agricultural input purchases (e.g. fertiliser, chemicals, machinery repairs) generate economic activity in other regional businesses (e.g. farm suppliers, mechanics);
2. **Consumption-induced flow-on impacts** – where the earnings and wages of farm owners and their employees are spent in local businesses (e.g. groceries, clothing, other services).

As discussed in section 5.3, the gross value of irrigated agricultural production averaged \$3.7 billion over the last five years. Illustrating the intensity of irrigation when compared to broadacre production, irrigation land comprises only a small proportion of agricultural land (less than 10%), but the value of irrigated production equates to around 30% of all agricultural production.

However, it is difficult to quantitatively value the flow-on production and consumption-induced impacts accurately.

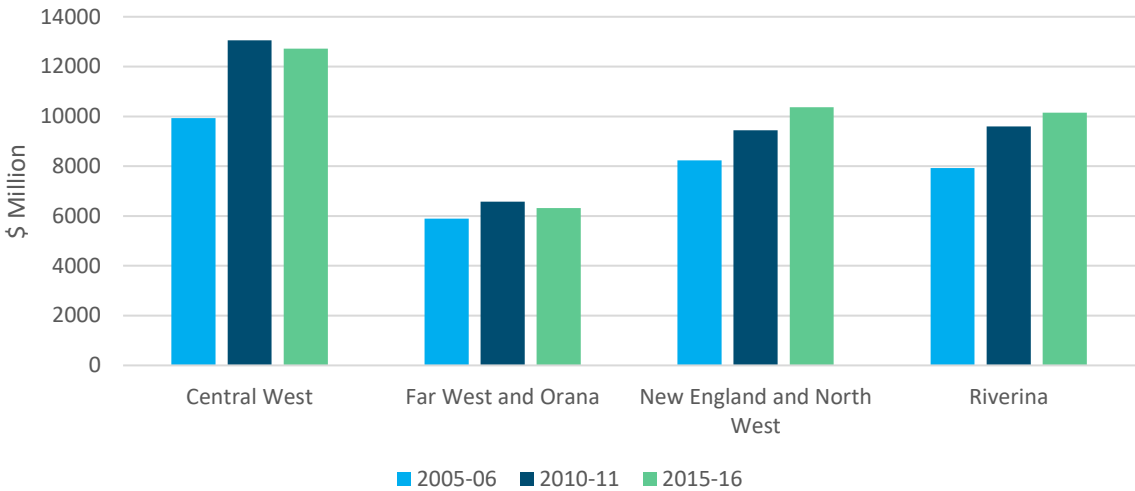
Business turnover impacts

One way to do this is to compare the economic outcomes in drought and non-drought years, noting that the impacts of drought may also be a consequence of a downturn in dryland cropping in addition to the decline in irrigation production.

Analysis by Regional Australia focused on Northern Inland NSW, found that when you compare drought and non-drought years, business turnover in non-drought years on a per megalitre of water basis is significantly higher than in non-drought years.¹⁷

This relationship can also be seen more broadly across the state. For example, Figure 12 shows that the incremental difference between a drought year (2005-06, midst of the millennium drought) and a wetter year (2010-11 or 2015-16) is considerably greater than the total GVIAP for the region, highlighting that the flow-on benefits to the regional economy from irrigated agriculture are significant.

Figure 12: Gross regional product, 2005-06, 2010-11 and 2015-16



Source: Australian Government Department of Industry Innovation and Science, *Industry Insights*, 2018

Flow-on multipliers

Another way of considering the regional and broader economic contribution is by using multipliers. In this study, we have not developed specific multipliers for NSW regions. Instead, we have considered the multipliers developed for other projects that considered the flow-on costs and benefits of irrigated agricultural investment.

RIRDC (2017)¹⁸ estimated the regional multiplier for agriculture to be 1.5 and the national multiplier to be 2.69. ACIL Tasman (2009)¹⁹ used input-output analysis to derive multipliers for the purpose of an assessment titled *Regional economic effects of irrigation efficiency projects*. This study used a regional multiplier of 1.43 and a national multiplier of 2.58. Centre for Agricultural and Regional Economics (2008), in a study on the Economic Structure of the Cotton Regions and the Economic

¹⁷ RDA NSW, *Economic Impact of Water – Northern Inland NSW*

¹⁸¹⁸ <https://www.parliament.nsw.gov.au/lcdocs/other/11389/Tabled%20document%20-%20Regional%20Economic%20Multiplier%20Impact,%20Potential%20Pollinator%20Defecits%20across%20Crops%20-%20Mr%20Stephen%20Targett.pdf>

¹⁹ <https://www.pc.gov.au/inquiries/completed/murray-darling-water-recovery/submissions/subdr060-attachment1.pdf>

Impact of the Cotton Industry estimated the total flow-on regional multipliers for cotton production in the Narrabri and Moree regions to be 1.666 and 1.754, respectively.²⁰

There is no one correct estimate of the impact, and a range of factors will influence the actual socio-economic outcomes over time. However, when using an illustrative multiplier of 1.5, this suggests that if GVIAP were \$3.7 billion, then the flow-on regional impact would be \$1.85 billion, equating to a total direct and flow-on impact of \$5.55 billion from irrigated agricultural production that is supported by water access entitlements across the state.

6.3 Summary

In addition to the direct production value that water access entitlements are supporting across the state (valued annually at around \$3.7 billion for irrigated agriculture alone), water access entitlements and water resources more broadly are supporting a range of consequential public and private benefits. These benefits include:

- Flow-on benefits to regional economies valued at \$1.75 billion, based on a regional multiplier of 1.5.
- Environmental outcomes that governments are spending billions of dollars to preserve and improve
- Cultural outcomes for Aboriginal and Torres Strait Islander people
- Economic and social outcomes for recreational fishers (\$3.4 billion of economic activity), commercial fishers, and the tourism industry.

Although many of these values are challenging to quantify in a dollar sense, these values nonetheless need to be recognised when considering the value of water to regional communities, and the importance of metering reforms to be effectively implemented to help ensure that these values are protected and not eroded by water access entitlement users.

²⁰ http://www.insidecotton.com/jspui/bitstream/1/445/2/Roy_Powell_Cotton_Economies_Final.pdf

7. Revenue returns to the NSW Government from irrigated production

Lastly, we note that the work of NRAR supports the overall budget position of the NSW Government.

7.1 Irrigator payments to the NSW Government

Water entitlements that are held and used by producers of irrigated agriculture underpin revenue returns to the NSW Government and, thus, the overall budget outcome. Some of these are paid directly to the NSW Government, such as:

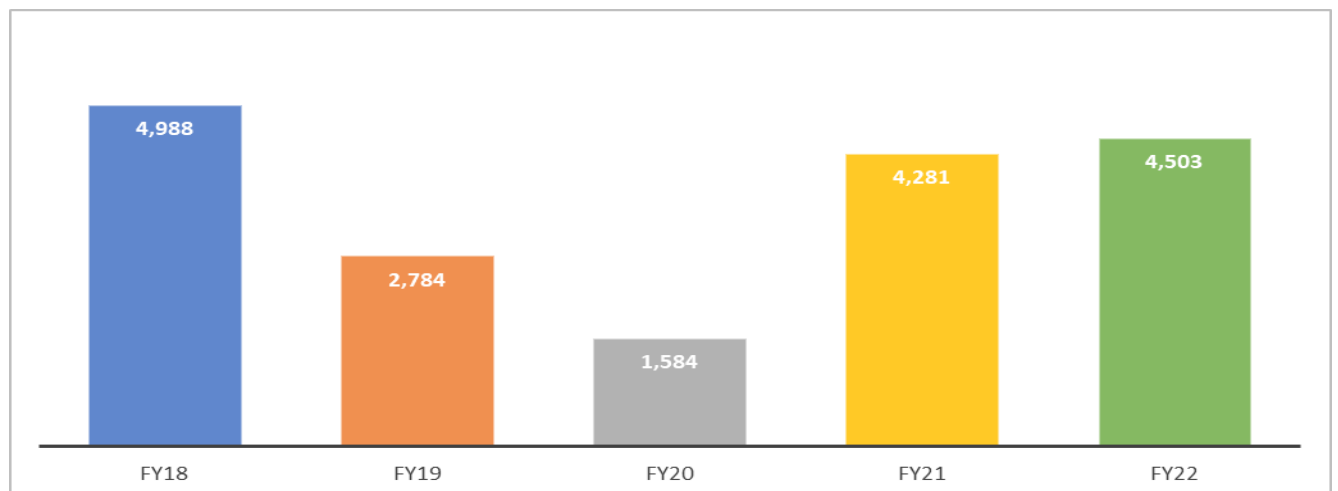
- Revenue from rural water sales for services provided by WaterNSW
- Revenue from water management charges for services provided by the Water Administration Ministerial Corporation
- Revenue from taxes and duties, such as payroll tax, land tax, transfer duty (previously known as stamp duty) payable to Revenue NSW

WaterNSW

The Independent Pricing and Regulatory Tribunal of NSW (IPART) sets the prices that can be charged by WaterNSW. Over the past five financial years, water sales to rural valleys across NSW (by WaterNSW) ranged from 1,584 to 4,988 GL, see Figure 13.

Revenue from water sales was \$65.8 million in 2021-22, which was 5.2 percent higher than the previous year following increased water sales as water availability increased following drought breaking rain.

Figure 13: Rural valleys water sales volumes (GL)



Source: WaterNSW, Annual Report 2021-22

Table 16: Revenue from water supply and delivery

	2022	2021
	\$'000	\$'000
Regulated – Rural	65,749	45,586
Regulated and unregulated - other	21,902	29,004
Other revenue from water supply	2,513	3,499

Water Administration Ministerial Council

The Independent Pricing and Regulatory Tribunal of NSW (IPART) sets the prices that can be charged for water management services delivered on behalf of the Water Administration Ministerial Corporation (WAMC). Fees and charges are adjusted each year for inflation.

Three types of fees and charges are levied for WAMC services in NSW:

- Water management charges recover part of the cost of water management services
- Consent transaction fees recover part of the cost of processing your applications
- Metering and water take assessment charges recover part of the cost of determining and recording your water usage.

The total revenue from these sources is set out in Table 17.

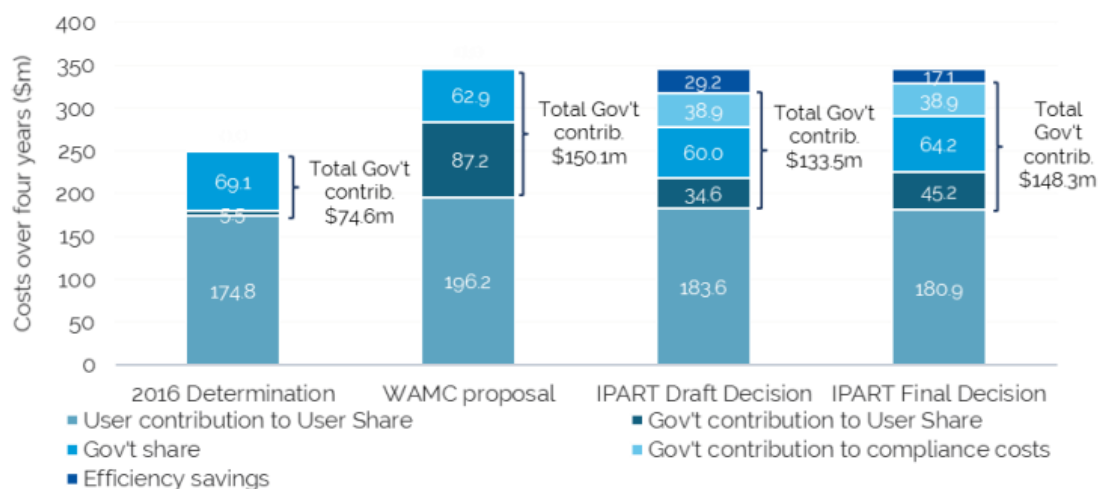
Table 17: Revenue, Department of Planning and Environment (consolidated)

	2022	2021
	\$'000	\$'000
Water management fees	48,064	44,177

Source: Department of Planning and Environment, [Annual Report 2021-22](#)

Effective measurement of water take is critical, because as noted below the recent determination anticipated that the NSW Government will need to fund a revenue shortfall (see Figure 14).

Figure 14: Water user and NSW Government contributions (\$m, \$2020-21)



Source: IPART, *Review of prices for the Water Administration Ministerial Corporation*, 2021

Irrigation producers are also a source of tax and duty revenues, such as payroll tax, land tax, transfer duty payable to Revenue NSW. Marsden Jacob has undertaken a review of range of sources to attempt to estimate the possible revenue from duties and taxes that are attributable to irrigation producers, but unfortunately this level of differentiation is not possible based on budget papers, Revenue NSW reporting or ABS reporting.

But illustrating the critical importance of good data and information to underpin revenue outcomes, we note that water licences, just like other forms of property, can be transferred from one individual or entity to another. Although Section 36 of the *Duties Act 1997* (NSW) provided for the abolition of stamp duty on transfers of statutory licenses and permissions that occur after 1 July 2016, it is still important that parties involved in a transfer do so correctly.

For instance, it is not uncommon for a water licence to be transferred along with dutiable property, namely land. Where this occurs, it is important that the consideration provided for the transfer of a water licence reflects the market value of the licence. In essence, the consideration for a water licence should not be inflated to decrease the value of land that may also be transferred in the same transaction because doing so would lead to underpayment of stamp duty on the land.

7.2 Irrigator payments to the Australian Government

Water entitlements that are held and used by producers of irrigated agriculture underpin revenue returns to the Australian Government, that in turn support transfers from the Australian to the NSW Government, including:

- Capital gains tax
- Company tax
- Income taxes
- Goods and services tax

The Australian Government budget papers do not provide adequate disaggregation of the data to attribute the amount of revenue that is attributable to irrigated production. However, we do note that these revenue sources are very important to the NSW Government, with the NSW Budget papers identifying that:

- GST revenue (including “no worse off” payments) is expected to be \$25.5 billion in 2022-23.
- revenue from National Agreements is forecast to total \$12.5 billion in 2022-23.
- revenue from Federation Funding Agreements is expected to be \$3.5 billion in 2022-23.

We note that farmers can access a range of tax-beneficial arrangements, such as the Farm Management Deposit (FMD) scheme, which permits farmers (with no more than \$100,000 non-primary production income) to defer their income tax liability. To smooth out their income tax liability primary producers can also elect to pay tax at a tax rate based on their average income earned over the previous five income years. This provides a concession because, on balance, the saving from paying less tax in high-income years outweighs additional tax paid in low-income years.

Nonetheless, some of this revenue will result from taxation payments from both irrigated and broadacre agricultural producers. It has not been possible, based on the information in the budget papers, to estimate the amount of tax that is paid by irrigators.

8. Conclusions

The total value of NSW water entitlements assessed in this project is between \$31 and \$41 billion, comprising:

- Tradeable (predominantly irrigation and environmental) entitlements: \$25-\$34 billion
- Town water entitlements: \$5.8 billion
- Domestic and stock entitlements: \$0.8 billion

At the state level, the six-month volume-weighted average price (VWAP) of tradeable entitlements is around \$2,600 per ML. The 5-year VWAP is around \$2,000 per ML, demonstrating how the values have increased over time across NSW.

On a GVIAP basis alone, the water entitlements support production valued at between \$2.9 to \$4.4 billion per annum, or a five-year average of \$3.7 billion. However, the GVIAP is not capturing dryland operations where water is used for animal production (instead of irrigating pasture crops). Outside of agriculture, water entitlements also support various industrial production activities such as mining. For these reasons, the annual total production value supported by the NSW water entitlements is much greater than \$3.7 billion.

The economic value of the town water entitlements is hard to assess because of data limitations and a lack of literature on valuing water entitlements separate from the water infrastructure. However, to emphasise these water assets' importance, it should be noted that the NSW Gross State Product (GSP) in 2022 was estimated at \$697.4 billion. Whilst the GSP is not an ideal proxy for the economic outcome from the town water entitlements, it illustrates the magnitude of the economic outcomes that are underpinned by water resources across NSW.


Irrigated production is a key revenue source for many regional economies. The regional contribution of water extends well beyond economic outcomes (including supporting cultural values and recreational activities). Again precisely quantifying the regional value is difficult. Using an illustrative flow-on multiplier of 1.5 suggests that for GVIAP of \$3.7 billion, the total direct and flow-on impact from irrigated agricultural production alone (that is supported by water access entitlements across the state) would be \$5.55 billion.


The Natural Resources Access Regulator (NRAR) ensures water is used lawfully and that all communities and the environment get a fair share. Water entitlements held and used by producers such as irrigated agriculture, mining, town water utilities and manufacturing underpin economic outcomes across the state and revenue outcomes for both the NSW and Australian Governments (through taxes and charges). The monitoring, compliance and education work undertaken by the NSW Natural Resource Access Regulator supports the integrity of markets by helping ensure that water resources are used in accordance with water laws in NSW.

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