Highlighted questions from the transcript:

The CHAIR: *Do you have available projections as to what you think the economic growth numbers will be for the regional organisation of councils [ROC]?*

Mr MURRAY: *I could take that one on notice.*

The CHAIR: *I should have said would you be able to give us some sort of indication. You can take that on notice.*

Response

I refer members to the attached report prepared by the Regional Australia Institute for the Namoi Joint Organisation of Councils and titled Shaping the Future in the Namoi

Shaping-the-Future-in-the-Namoi-Report-FINAL-20150914.pdf

The Executive Summary of the report states

> Collectively, if all of the Future Factors' upside potential identified in this project is fully harnessed, the Regional Australia Institute (RAI) estimates that the economy of the Namoi could expand by an additional $900 million by 20301, on top of the roughly $2 billion in potential economic growth the region is already likely to experience by this time2. After extensive analysis of social, demographic and economic data, surveying key stakeholders in the region and consulting with local leaders, the RAI has identified the six Future Factors that are likely to have the greatest plausible effects on the future of the Namoi region.
>
> The six Future Factors identified for the Namoi region are:
>
> - National and global cycles in commodity markets;
> - Maximising innovation in agricultural production;
> - Seeking international investment, on the right terms;
> - Engaging the Namoi in major overseas markets;
> - Urbanisation; and
> - Leveraging regional/brand marketing to attract people to live and work in the Namoi.

The Hon. MICK VEITCH: *Have any of the organisations you are involved with formally challenged IPART on the methodology and formulas; have they actually made a submission stating "This is wrong"?*

Mr MURRAY: *Yes, I understand Tamworth Regional Council has done that on a number of occasions and has been quite active. Our Director of Water and Waste, who would probably normally be part of a submission, has pretty much given up. He has been pushing this wheelbarrow for the 13 years that I have been on council with basically zero success so he was reluctant to put in further submissions. He does not believe there is anything to be gained from it.*

The CHAIR: *Are those challenges available?*

Mr MURRAY: *They certainly would be, Mr Chair.*

The CHAIR: *Could they be made available on notice?*

Mr MURRAY: *Yes.*

Response

Tamworth Regional Council has challenged the approach used by IPART and the Australian Competition and Consumer Commission and sought assistance from various NSW Governments in relation to the high price of raw water in the Peel Valley on many occasions. See examples below;

Letter to the NSW Minister for Lands and

Letter to Barnaby Joyce regarding fixec

Council submission to IPART following the r

Council Submission to IPART - Review of pri

Council s submission to IPART and the rev

Submission on IPART s draft determination

Counicl s submission on the ACCC s review

18082014150353-0001.pdf

Letter to Member for New England seeking

Letter the Member for Tamworth seeking

Submission on Annual Review of Re

Council s submission on the ACCC s draft

Letter to Kevin Anderson requesting

Council s response to IPART s Draft Determ

Council s response to IPART regarding NSW

Council s response to IPART regarding Stat

Letter David Campbell September

Letter ~ the Tamworth Region to i

Letter to Tony Windsor - Review of I

Letter to John Anderson - Review of

Letter to Ian Slack Smith - Review of New

Letter National Water Commission - I

Letter to P Draper Review - Review of N

Letter Independent Pricing and Regulator

Letter - IPART - Review of Bulk Water

Submission to Independent Pricing a

The Hon. MICK VEITCH: *One of the inputs in the determination is expenditure of the costs by the various government departments, predominantly DPI and Water. Do you get an opportunity in the IPART determination process to drill down into the department's numbers to challenge those?*

Mr MURRAY: *I don't believe so, but I would have to take that answer on notice.*

Response

From a staff perspective it is considered Tamworth Regional Council is given ample opportunity to examine and question numbers presented to IPART by the various NSW Government departments during the 4 yearly pricing review process.

The Hon. PENNY SHARPE: *How many ratepayers would have had to foot the bill for that cost? You can take that question on notice.*

Mr MURRAY: *I can take that on notice, but I am thinking it is around 20,000 to 30,000 water users.*

Response

In Tamworth City in 2015-16 there were 17,262 individual connections, both residential and commercial, to the reticulated water supply system, who collectively consumed 8,004 Megalitres of treated water

The Hon. PAUL GREEN: *It seems unfair that up here a pie might cost $54 but down in Lachlan or Murrumbidgee it might cost $2, although it is the same product. What are some opportunities for new water, rather than all this other stuff we are talking about? Do you have any comments on new water?*

Mr MURRAY*: I absolutely do. I think that therein lies a significant part of the solution. The council has invested around $200,000. We engaged a consultancy group, Hunter Water—their current name is Hunter H2O—to do some water viability investigation for the future with regard to the city and the long-term water security of the city. Four options were considered in that report—and that is a report that could be made available to the Committee, if you wish.*

The Hon. PAUL GREEN: *Yes, if you could provide that.*

185847 2015 Tamworth Bulk Water - Long Term Options Review (FINAL).pdf

The CHAIR: *Could you supply us on notice with any work that your council has done as to what you believe the economic future could be if somebody—the State Government or Federal Government—could solve your water problem?*

Mr MURRAY: *Absolutely.*

Response

I would refer members to the report referred to earlier titled – Shaping the future in the Namoi

The Hon. MICK VEITCH: *As well as looking at water usage we are also trying to find innovative ways of storing water. It has been put to us that not all aquifers have this potential. We are looking at a project this afternoon with Orange City Council. There are a lot of variables in this, such as geology. Has there been any mapping of the aquifers in this part of the State?*

Mr MURRAY: *Yes, there has been a fair bit of work. If I could take that on notice and bring forward some relevant information. We have done some very preliminary work on that.*

The Hon. MICK VEITCH: *I am happy for you to do that, thank you.*

Response

Members are referred to a presentation prepared by the NSW Land and Water Commissioner Mr. Jock Laurie, see copy attached, which includes information about the Gunnedah Basin.

PUB17 219
Gunnedah Groundwa

Further information can also be found on other basins within the Namoi Councils area on the NSW Land And Water Commissioner's website

http://www.industry.nsw.gov.au/about/our-business/statutory-officers-and-independent-appointments/land-and-water-commissioner

Finally NSW DPI – Water are undertaking the NSW Groundwater Baseline Porject. Further information on this project can be obtained from the above website.

The Hon. PENNY SHARPE: *I know how much work councils do in looking at future* *proofing their communities and I congratulate you on that. You have indicated you have done a lot of work. Have you done any work based on scenarios that show less rainfall in the future as a result of climate change? And if you have any of the modelling on that I would really appreciate it.*

The CHAIR: *Good question.*

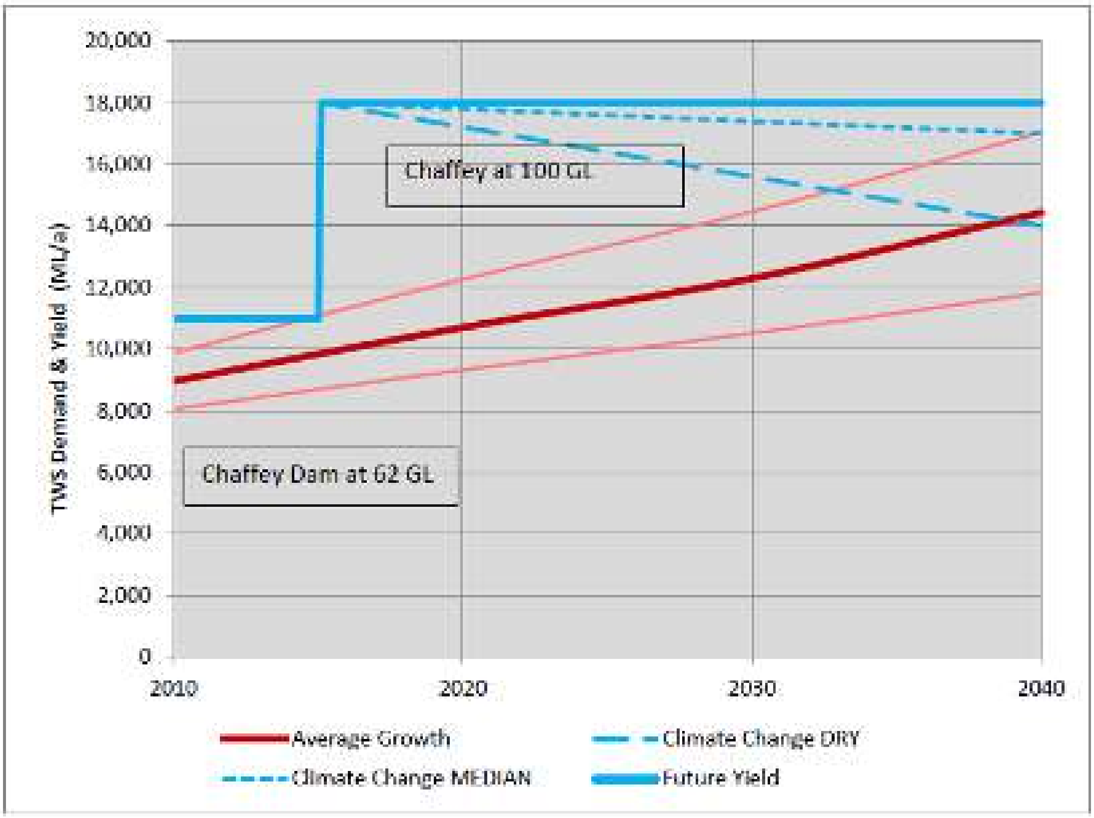
The Hon. PENNY SHARPE: *You do not have to answer now. I would really appreciate you giving that to the Committee.*

Mr MURRAY: *The simple answer is we have collected some data on that. And the short answer is—and I am happy to bring the longer answer—the modelling suggests in this part of the State the rainfall will be similar. But it will be different in higher intensity events. That supports the council's argument for trying to get a bigger storage.*

The Hon. PENNY SHARPE: *Incredibly useful, because it is different and we need to be looking at those partners. Thank you.*

Response

I refer members to the attached report prepared by Hunter Water Australia for Tamworth Regional Council and titled Tamworth Water Supply, Future Yield and Demand Scenarios. The report contains the following chart, which depicts the change in yield from all sources used to supply raw water to Tamworth (blue lines) and the effect on this yield by two climate change scenarios – Climate Change Median and Climate Change Dry. Further details can be found in the report.



159794 2012 TRC Future Yield Demand

REGIONAL AUSTRALIA INSTITUTE

PATHFINDER INITIATIVE

Navigating opportunities for growth

SHAPING THE FUTURE IN THE NAMOI

Report

Namoi Joint Organisation of Councils, Regional Australia Institute

September 2015

FOR THE GOOD OF AUSTRALIA

Level 2, 53 Blackall Street
Barton ACT 2600

02 6260 3733
info@regionalaustrlia.org.au
www.regionalaustralia.org.au

The Regional Australia Institute's Pathfinder Initiative combines the knowledge and experience of local leaders and stakeholders with RAI's analytical capability and unparalleled access to the best available information on regions.

This allied approach allows a collective focus on the drivers shaping a region's future – its 'future factors' – over the next 10-15 years. Pathfinder Initiatives look beyond the symptoms of change affecting a region to identify underpinning causes, how they can be addressed as well as new and emerging opportunities for regions to secure future prosperity.

The RAI works with local leaders to understand how these future factors will shape the region's future, and what practical actions can be undertaken to realise the full potential of the community.

For more information go to www.regionalaustralia.org.au/pathfinder

EXECUTIVE SUMMARY

Collectively, if all of the Future Factors' upside potential identified in this project is fully harnessed, the Regional Australia Institute (RAI) estimates that the economy of the Namoi could expand by an additional $900 million by 2030[1], on top of the roughly $2 billion in potential economic growth the region is already likely to experience by this time[2].

After extensive analysis of social, demographic and economic data, surveying key stakeholders in the region and consulting with local leaders, the RAI has identified the six Future Factors that are likely to have the greatest plausible effects on the future of the Namoi region.

The six Future Factors identified for the Namoi region are:

- National and global cycles in commodity markets;
- Maximising innovation in agricultural production;
- Seeking international investment, on the right terms;
- Engaging the Namoi in major overseas markets;
- Urbanisation; and
- Leveraging regional/brand marketing to attract people to live and work in the Namoi.

Chart 1 describes the individual potential effect that each of these Future Factors could have on the Namoi region.

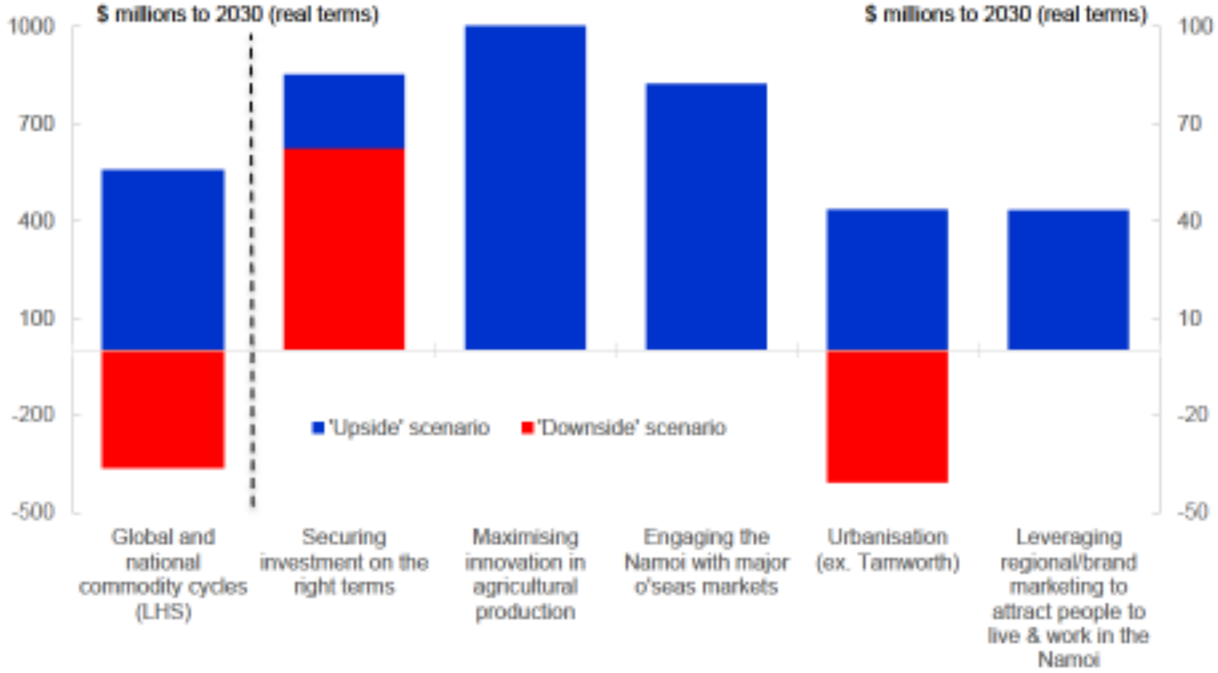
Chart 1 also highlights the value in focusing on a handful of Future Factors that are likely to have the greatest impact on the future of the region. Maximising innovation in agricultural production, for example, has twice the effect of leveraging regional/brand marketing to attract people to live and work in the region.

Expanding efforts beyond more than these handful of Future Factors quickly diminishes the value of this collaboration to the region.

Some of these Future Factors also present potential downside risks to the region. These downsides could detract close to $400 million from economic activity in the Namoi by 2030, though a pro-active approach to Future Factors represents the best way to managing this downside risk.

[1] All dollar figures quoted in this report are in real (inflation-adjusted) gross value added terms – that is, the value of output produced in the Namoi region, minus the intermediate consumption required to achieve this output.
[2] See 'State of Play in the Namoi', for further detail.

Chart 1 – Cumulative impact of Future Factors on the Namoi's economy (to 2030)



The collective potential benefits of these Future Factors for the Namoi are considerable. Each Future Factor will have different impacts on different Local Government Areas (LGAs). For example, agriculture-focused Future Factors naturally have a greater effect in LGAs where this industry dominates.

Using this information, the Namoi Joint Organisation of Councils (JOC) can now engage in a focused approach to shaping the region's future. For the external Future Factors of global and national commodity cycles and urbanisation, a 'light-touch' approach from the Namoi JOC in disseminating information about these trends will support better response within the region.

Leveraging regional/brand marketing to attract people to live and work in the Namoi, and securing investment on the right terms are areas where the Namoi JOC can take direct and targeted action to shape future outcomes.

Maximising innovation in agricultural productivity and engaging the Namoi with major overseas markets requires a facilitative approach by the Namoi JOC, focused on interactions between key stakeholders. Some practical strategies to commence activity in each area suggested are contained in this report.

TABLE OF CONTENTS

INTRODUCTION

This project enables the Namoi Joint Organisation of Councils (JOC) to define its role in leading the future development of the region. The project provides leaders in the Namoi with a clear understanding of the factors that will have the greatest influence on the future of the region – the 'Future Factors' for the Namoi – and how the region can act to shape a positive future.

Change is inevitable in the Namoi as markets, local industry and the population changes over time. Some Future Factors are beyond the control of local leaders, and their impacts will be felt regardless of local action. Other Future Factors require leadership and collaboration within the Namoi to see their potential fully realised.

Shifting focus to the drivers of this change and how they can be proactively influenced is crucial to making the most of the opportunities that the future presents. Collaboration within the Namoi JOC, proactive engagement with external stakeholders such as investors, overseas markets and other levels of government as well as the Namoi JOC facilitating change from within the region will be important in realising the full potential of the Namoi.

This report has three components. The first is to describe the most important drivers of the future of the Namoi from the hundreds of possible choices that could be made – the identification of the Future Factors. The second is to give Namoi JOC a means of articulating the importance of these factors to the future of the region – the scenario modelling results. The third is a strategy for the JOC to assume a leadership position and begin to act for the future of the region.

PATHFINDER INITIATIVE

Navigating opportunities for growth

The Pathfinder initiative combines the knowledge and experience of local leaders and stakeholders with RAI's analytical capability, and unparalleled access to the best available information on regions. This allied approach allows us to focus on the drivers of what's shaping a region's future – its "future factors" – over the next 10-15 years. These 'future factors' look past the symptoms of change that affect a region, and examine what drives these changes. The RAI works with local leaders to understand how these future factors will shape the region's future, and what practical actions can be undertaken to realise the full potential of the community.

STATE OF PLAY IN THE NAMOI

The Namoi region is one of Australia's oldest and most productive agricultural regions, and has been the forefront of agricultural development. The region has also benefitted from its deposits of energy resources at various times throughout its history. The region has built upon this foundation with the LGAs within the Namoi providing diversity to the local economy, including a substantial manufacturing, construction and logistics presence – as well as a strong foundation in services, particularly in the 'social' services. Employment in education and healthcare now form a significant portion of the region's labour force which will continue to grow.

As much as the region has built on its foundation of primary production to diversify the regional economy, so too is their great diversity amongst the economies of the Namoi region. Naturally, with this internal diversity comes an array of different challenges and opportunities within the region. For example, within the Namoi region there are LGAs whose economies are highly connected to the national economy such as Tamworth, and LGAs whose economic performance is likely to continue apace regardless of developments in the wider economic landscape, such as Moree Plains.

The future of the region is expected to be broadly positive. Around $2 billion of potential economic growth, and jobs growth of 18,000 persons could plausibly be expected to occur in the region by 2030 if the status quo is maintained and macroeconomic conditions are favourable (charts 2 and 3). It is against these baseline figures that the scenario modelling in this document is compared. Expanding the potential of the region beyond this and shaping growth so it best supports the existing communities will require moving beyond the status quo. The JOC as an organisation formed by each Local Government and supported by the State Government is well positioned to lead this process.

Chart 2 – Output projections for the Namoi, by industry

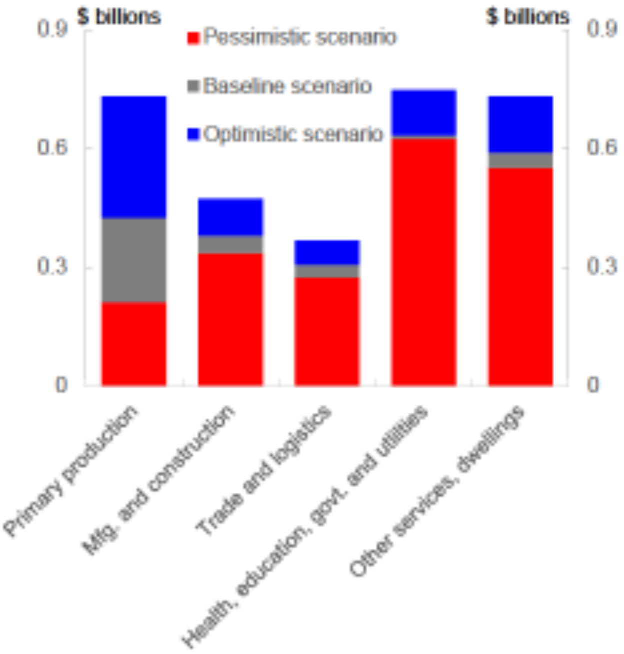
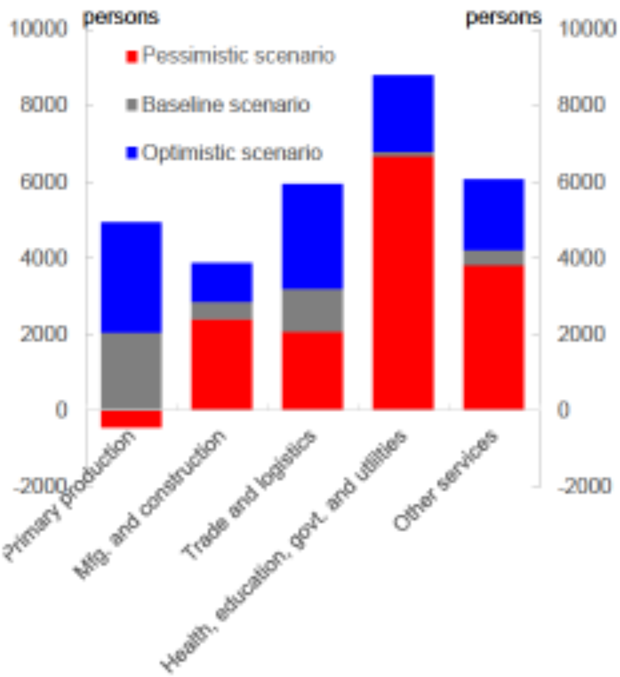


Chart 3 – Employment projections for the Namoi, by industry



Source: PricewaterhouseCoopers

FUTURE FACTORS AND SCENARIO MODELLING

A diversity of views on the potential drivers of change in the region exist within the region. Through an initial survey and workshop, the RAI identified a range of views spanning potential drivers as far afield as the effect of commodity prices and export demand on the region, to localised drivers such as the tourism potential of the region and internal market opportunities.

The RAI has complemented these local insights with economic, demographic and social analysis of the Namoi, including the relative performance of each of its component LGAs. Together, local perspectives and the objective analysis yielded the handful of the most influential factors outlined in this report - the Namoi Future Factors.

This section of the report details the specifics of each of the Future Factors that the RAI has identified for the Namoi region for the next 15 years. It also describes the potential economic impact that each of these Future Factors could have on the region, if fully realised. Each Future Factor is described separately from one another, though there are greater complementarities between some Future Factors than others. The Future Factors outlined in this report are grouped together in the following way:

National and global commodity cycles, and maximising innovation in agricultural production;

Commodity cycles, including the weather and international markets, impact the agricultural and resources industries in the region are an external Future Factor. This Future Factor will have both positive and negative interactions with every other Future Factor and is beyond the control of the region. It must be understood and engaged with actively but it can't be controlled.

Maximising innovation in agricultural production is the way in which the region can respond to and shape the influence of external commodity cycles on the local economy.

Securing investment on the right terms, and engaging the Namoi with major overseas markets.

Investment on the right terms and engaging the Namoi with major overseas markets have the strongest, direct complementary interaction between any two Future Factors listed in this report.

By becoming increasingly visible to international investors, and increasingly skilled in cultivating market relationships, these two Future Factors can have much higher upsides than estimated in this report.

Urbanisation, and leveraging regional/brand marketing to attract people to live and work in the Namoi;

Urbanisation is a global phenomenon that will continue to shape the Namoi region.

However, if the Namoi can proactively attract people to live and work in the region, the negative effects of urbanisation can be mitigated to a degree.

FUTURE FACTORS – DISTRIBUTION ACROSS THE NAMOI

The following matrix highlights the Future Factors by their relative important for each LGA within the Namoi JOC, and the size of the opportunity which these most impactful Future Factors represent for each community ('baseline' refers to 2030 economic output in gross value added terms, without Future Factors being realised):

	Gunnedah (baseline = $200m)	Gwydir (baseline = $71m)	Liverpool Plains (baseline = $120m)	Moree Plains (baseline = $100m)	Narrabri (baseline = $280m)	Tamworth (baseline = $1.2b)	Walcha (baseline = $53m)
Nat. & global cycles in comm. mkts.	Up to $45 million	Up to $41 million	Up to $42 million	Up to $215 million	Up to $109 million	Up to $77 million	Up to $24 million
Max. innov. in ag. production	Up to $13 million	Up to $16 million	Up to $6 million	Up to $41 million	Up to $21 million	Up to $5 million	Up to $1 million
Seeking intn'l. investment, on the right terms	Up to $15 million	Up to $15 million	Up to $10 million	Up to $44 million	Up to $30 million	Up to $14 million	Up to $15 million
Engaging the Namoi in major o/s mkts.	Up to $13 million	Up to $4 million	Up to $13 million	Up to $9 million	Up to $13 million	Up to $24 million	Up to $4 million
Urbanisation	Variable	Variable	Variable	Variable	Variable	Variable	Variable
Leveraging regional/brand marketing	Up to $11 million	Up to $4 million	Up to $2 million	Up to $6 million	Up to $19 million	Up to $19 million	Up to $4 million

Green = Future Factor with greatest relative impact in this LGA

Gold = Future Factor with medium relative impact in this LGA

Orange = Future Factor with lower relative impact in this LGA

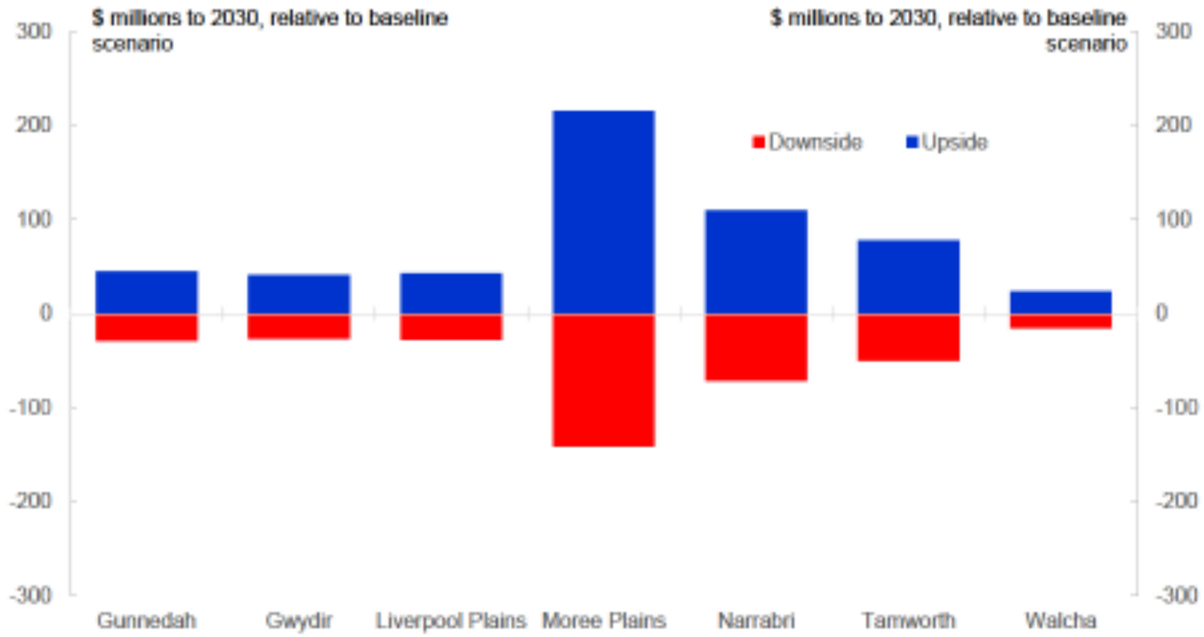
FUTURE FACTOR – NATIONAL AND GLOBAL CYCLES IN COMMODITY MARKETS

The future of the Namoi region over the next few decades is going to be heavily dependent on national and global cycles in the prices of agricultural, mineral and energy commodities, climate variability and international economic developments. This external factor needs to be managed by leaders, businesses and the community.

The scenarios presented in this report are taken directly from the RAI's *Regional Economic Projections Framework*, for each LGA in the Namoi region under a range of different macroeconomic scenarios (Chart 4). The downside scenario represents losses in economic output compared to the baseline scenario in the *Regional Economic Projections Framework*, if conditions in commodity markets are unfavourable. The upside scenario is the reverse. Positive effects for the region could be as much as $560 million, while downsides could amount to $360 million by 2030.

Specific prices of commodities will have an important influence on the future of the region. However, these projections should not be considered as 'point forecasts' of a set of parameters for commodity prices. Rather, they are designed to provide a perspective on the *range* of likely impacts on the region under some broad conditions. As such, their use in creating a strategic plan of action for the Namoi, and for individual LGAs should be used with the appropriate caution – decision makers should be prepared to experience a wide range of possible futures stemming from this factor, that are beyond their control.

Chart 4 – The projected impact of national and global commodity cycles on the Namoi region



Ensuring the other Future Factors in this report are fully realiSed is the best way to respond to this volatility that cannot be controlled. Monitoring this Future Factor, and ensuring the region responds flexibly to change will also be important.

FUTURE FACTOR – MAXIMISING INNOVATION IN AGRICULTURAL PRODUCTION

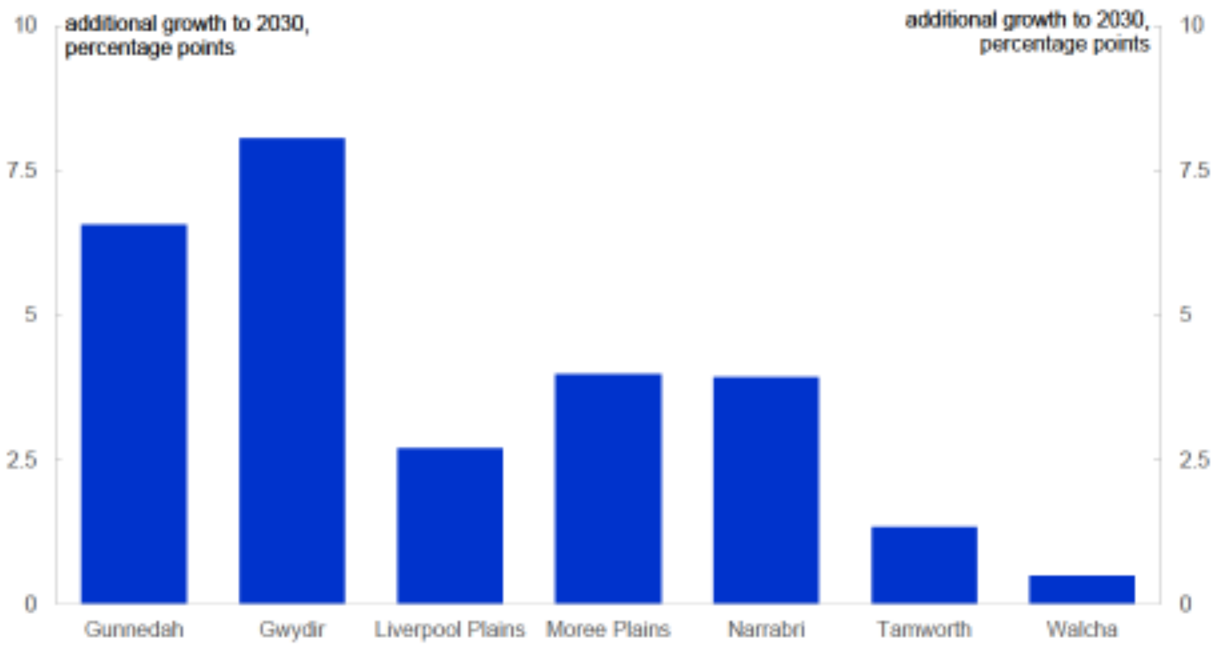
The agriculture industry has always been central to the economy of the Namoi region. The productivity of this important sector of the Namoi's economy remains crucial to the region's future. Australia-wide, agricultural output per worker has been rising. Part of this has been a result of falling employment in this industry, but measured productivity in agricultural production has also improved.

Productivity gains often accrue as a result of intensive pressure and competition for resources. This is true in the Namoi. Factors like reduced water availability, climatic factors and most importantly, direct competition for resources from the mining industry have actually helped improve agricultural productivity.

The estimates in Chart 5 represent the cumulative effects out to 2030 of plausibly maximising agricultural productivity, under each of the scenarios in the RAI's *Regional Economic Projections Framework*. Based on this methodology, the RAI derived the following estimates of increased economic growth in each of the LGAs in the Namoi region. Variations occur as a result of differences in the size of agricultural output in each LGA, as well as variability in productivity. The collective benefits for the Namoi as a whole, for this Future Factor, could be as much as $100 million by 2030.

In practice, it is entirely plausible that this Future Factor could generate new industries and opportunities in the region. Necessarily, it would likely increase the rate of the adoption of technology in the sector as well. While this may have some negative consequences for employment in the industry, a proactive approach to this Future Factor would allow the region to be ahead of this inevitable change.

Chart 5 – Impact of maximising agricultural innovation in the Namoi, by LGA



A certain proportion of the potential gains from this Future Factor are likely to be realised without any intervention at all by local leaders – as productivity growth is usually an organic process, accelerated by competition, or some other form of stress on producers.

However, there is a role for local leaders to play in maximising the potential benefits of this Future Factor. Local leaders can facilitate improved collaborations between producers, R&D providers and agricultural services providers to increase their collective productivity.

While it is undoubtedly the remit of the region's R&D providers to improve agricultural productivity – their remit is not confined to the Namoi. Moreover, it is also important to acknowledge that R&D is not the only source of productivity improvement – a substantial portion of productivity improvement in any industry can often be traced back to collaboration and sharing of basic ideas. The reason for typically higher levels of productivity observed in densely populated economic regions is primarily the result of 'network-effects', and this work efforts would help to increase these effects in the Namoi.

In the Namoi, local leaders can play a role in encouraging these collaborations that might not otherwise occur, due to a lack of density and interaction between stakeholders in this space.

FUTURE FACTOR – SECURING INTERNATIONAL INVESTMENT ON THE RIGHT TERMS

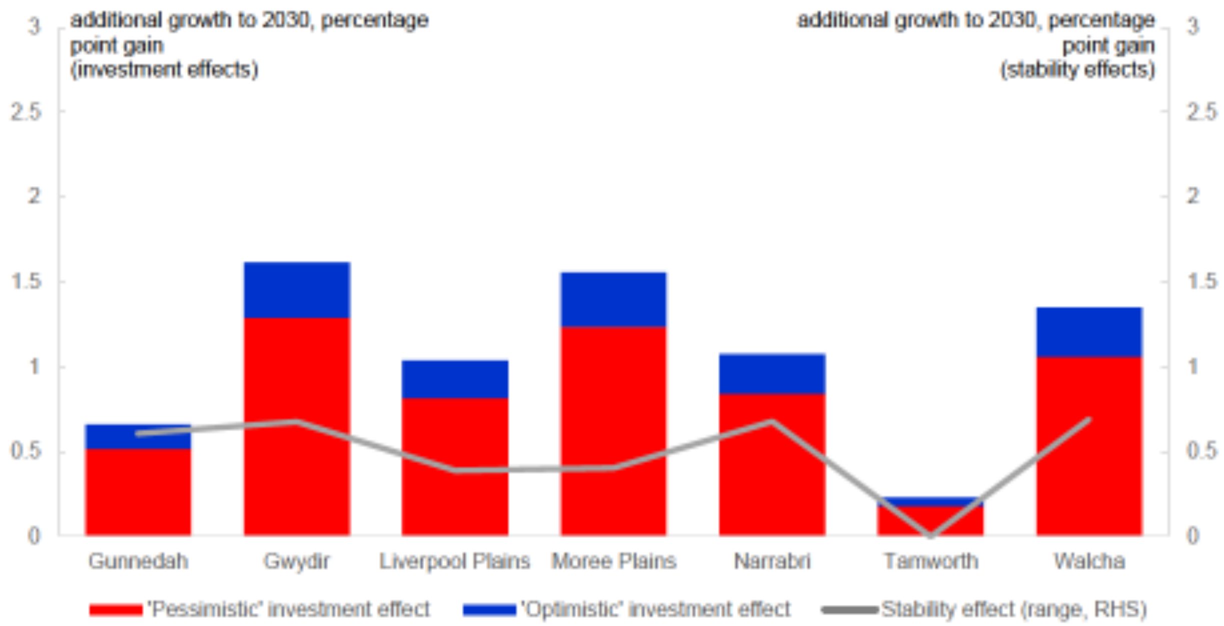
Investment flows are fundamentally important to the viability of an economy of any size – from the national economy, to the smallest economic unit. As vital as investment is for economic growth in general, a wide literature shows that foreign investment in particular is associated with high flow-on benefits to the communities in which this investment occurs.

In analysing the possible effects on the Namoi region, the RAI considered the impacts of 'direct' foreign investment on the region. The Namoi is a particularly attractive destination for foreign direct investment, given the prevalence of primary producers in agriculture and mining in the area, which have a strong track record of attracting this form of foreign investment.

To secure investment on the right terms it is important to ensure that benefits accrue to the region, as well as to the investor. In this case, there are first- and second-order benefits that the region stands to gain. Productivity gains from receiving foreign investment are the initial effect, and the potentially stabilising effect on the local economy that foreign ownership could have on the labour market is the second.

The first-order benefits to securing foreign investment in a portion of local industries are quite small in comparison to the potential second-order benefits of the stability that this kind of investment might bring to the local labour market. Collectively, the region could gain as much as $85 million from securing investment on the right terms. Chart 6 describes the distribution of the benefits of this Future Factor across the LGAs of the Namoi.

Chart 6 – The projected impact of seeking investment on the right terms in the Namoi region



Note: Tamworth is at the top of the stability/growth relationship, and can't gain additional benefit.

In order to fully realise the potential of this Future Factor, it is important that local businesses are encouraged to learn from, and adopt new ideas and practices that flow from foreign investment in the region. But more importantly, local leaders should encourage changes in the labour market, such that becomes more flexible and more stable.

For example, by attracting investment into the region and securing commitments to provide education and training, and to change business practices to take advantage of different ownership structures, the labour market in the Namoi could become stabler – by increasing the skill and hence 'transferability' of labour – securing prosperity for the region as a whole.

Local leaders could encourage networking between local producers to specifically determine how to maximise the benefits flowing from foreign investors needs for their own businesses. This could allow the labour market *as a whole* to become more agile, having the effect of smoothing variations that are associated with lower economic growth outcomes. This also represents an opportunity for Namoi JOC to work proactively with other levels of government, and approach them with an agenda for change determined from within the region designed to benefit all parties.

FUTURE FACTOR – ENGAGING THE NAMOI IN MAJOR OVERSEAS MARKETS

Of the six Future Factors identified in this report, the effect of engaging the Namoi with major overseas markets is the most difficult to quantify – but the upsides to achieving it are considerable. The estimates for this Future Factor in this report should be considered as the *minimum* upside for the region.

The changing nature of the global economy and Australia's place in it means that the opportunities of the future lie in Asia. Australia's experience in doing business in this part of the world falls short of what our geographic proximity to this growing market would suggest.

There are existing State government programs to help businesses and regions tap in to these markets – whose business culture typically requires the formation of relationships over an extended period of time. Without this sort of assistance, fulfilling this requirement of successfully doing business in Asia can be an impossible hurdle for many regional businesses to overcome.

This Future Factor is about overcoming those hurdles and becoming deeply engaged in overseas markets, and could be worth upwards of $80 million to the Namoi region.

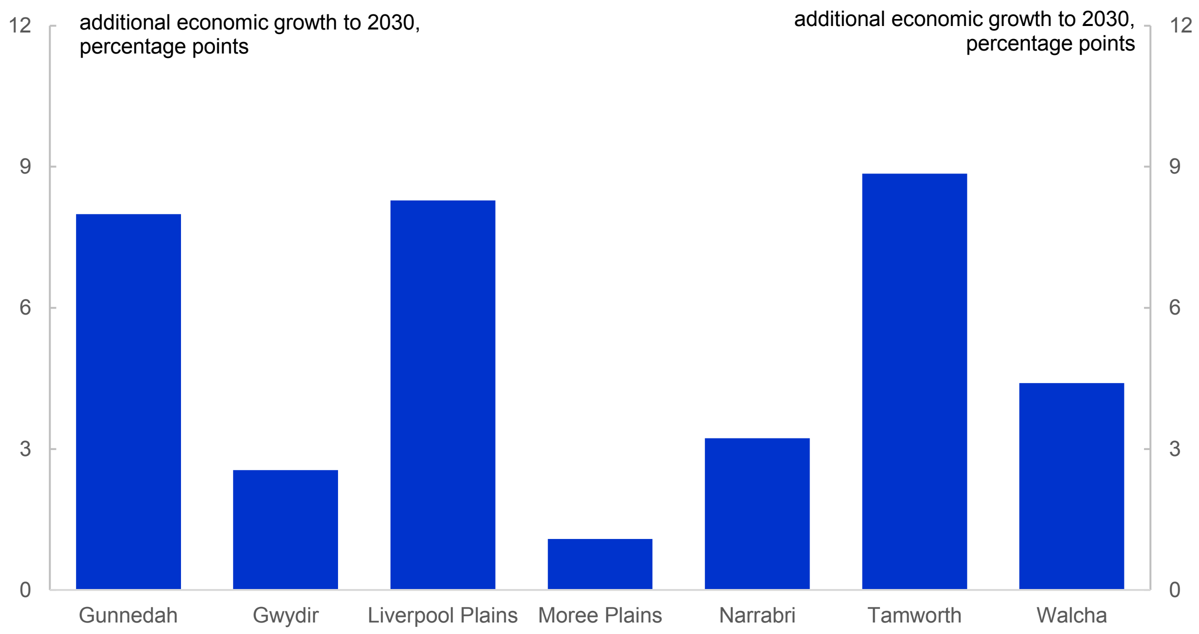
The benefits of successfully realising this Future Factor are difficult to measure, but the RAI has identified the potential first-order benefits of taking the first steps toward fully realizing the potential of this Future Factor.

The nearby Hunter region in NSW secured foreign investment from China, in a new manufacturing plant to the value of around $6 million, which itself generated 200 jobs in the area. The Hunter region secured this investment under the auspices of the NSW Government's *NSW Economic Development Framework*, in a program administered by the NSW Department of Trade & Investment, Regional and Infrastructure Services.

This program is designed specifically to put regions in touch with overseas investors and foster these relationships. To clarify – this Future Factor is not about investment – it is about using the available tools to build engagement in major overseas markets. In this example, investment is a vehicle for achieving this. The experience of securing one such relationship via investment. Circulating the learnings about engaging with overseas markets are circulated amongst the business community in a region should make the success of future efforts more likely.

Chart 7 describes the RAI's conservative evaluation of the possible benefits to each LGA of securing a similarly-sized investment split across the entire Namoi region.

Chart 7 – The projected impact of engaging the Namoi with major overseas markets



Even with these extremely conservative estimates, additional activity across the Namoi region had an expected value for individual LGAs ranging from around $4 million to almost $25 million. Again, these estimates should be considered as indicative of the *minimum* potential upside that this Future Factor could have for the region.

The best way for local leaders to fully realise the potential of this Future Factor is twofold. Firstly, securing investment on the right terms for the Namoi will improve the experience of regional businesses in general in directly operating in Asian markets. Success begets success, and the second stage in realising the potential of this Future Factor is to highlight these successful investor relationships. This will go a long way to securing the help of the State government to build and maintain *new* relationships in the biggest markets in this part of the world.

It is important to acknowledge that realising this Future Factor in practice will also require the Namoi JOC to manage attitudes and perceptions about the value of this effort. Realistically, increasing collaboration between LGAs in targeting and sharing information in regard to their overseas engagement efforts will have a large impact in reducing the need for individual JOC members to 'cover the same ground'.

FUTURE FACTOR - URBANISATION

Trends toward urbanisation are not just a Future Factor for the Namoi region. All over the world larger communities are tending to remain stable or become ever-larger at the expense of population decline in smaller communities.

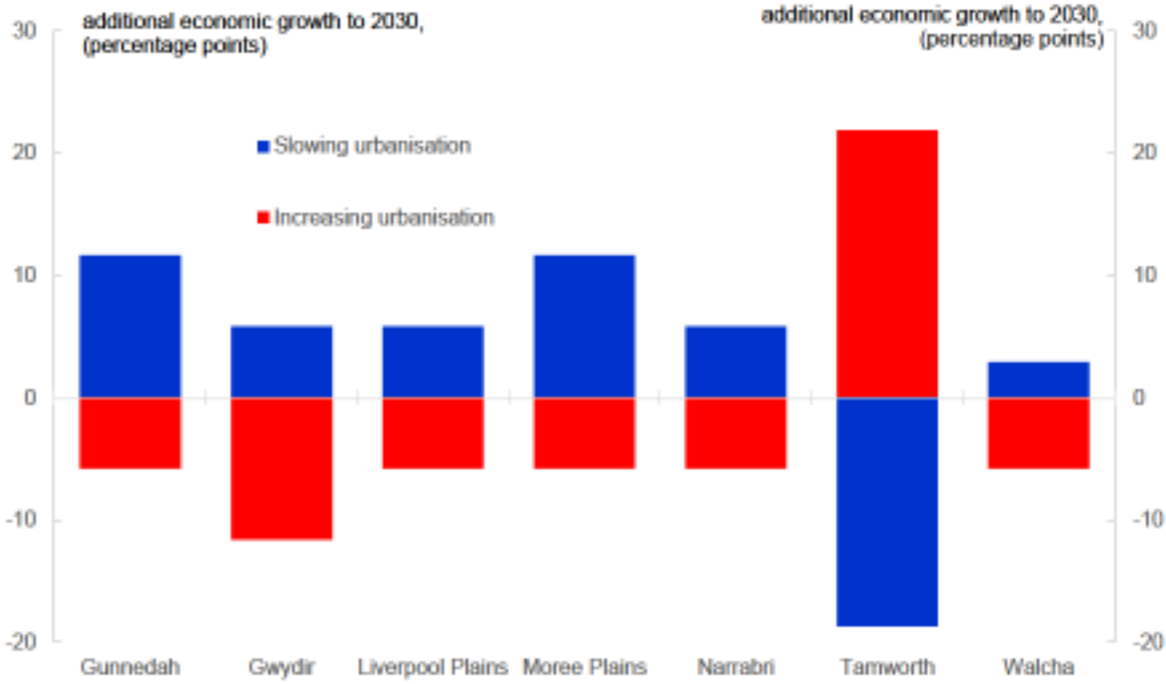
The *net* effect for economic growth in the entire region of variations in this Future Factor is expected to be small – the effects of urbanisation will be significant in the region, but they are already factored in to our baseline projections for the Namoi.

However, as a region with LGAs of varying size throughout, it is inevitable that this Future Factor will have negative consequences for some LGAs. Indeed, as a key external Future Factor for the region, urbanisation's effects can be far reaching – including altering internal market opportunities in some LGAs, and the existing industry base.

But it also presents new opportunities – for example, while this factor may increase the 'transience' of the workforce, who may not reside in a particular LGA for 7 days a week, this also represents an opportunity to expand the networks and connectivity of the LGA in question. Realising such benefits will require management from local leaders to create their desired future for the region, in the face of this trend.

The RAI has taken population growth trends over the past decade in the region, and examined plausible variations in urbanisation trends *within* the Namoi – it does not assume changes in urbanisation dynamics from outside the Namoi. The results in this report are based on trends in urbanisation slowing, or speeding up in the Namoi, relative to our baseline forecasts. Chart 8 describes the distribution of the benefits of this Future Factor across the LGAs of the Namoi.

Chart 8 – The projected impact of urbanisation, by LGA in the Namoi region



The best way to maximise the benefits of this Future Factor across the Namoi is to encourage migration to the region as a whole – that is, leveraging regional/brand marketing to encourage people to live and work in the Namoi. This may not significantly alter the pattern of urbanisation in the Namoi, but could help offset the downsides experienced in some LGAs.

FUTURE FACTOR – LEVERAGING REGIONAL/BRAND MARKETING TO ATTRACT PEOPLE TO LIVE AND WORK IN THE NAMOI

The Namoi is not a typical region from the perspective regional branding, and therefore has unique opportunities to leverage this point of difference.

The rationale for this comes from acknowledging that some level of attrition is inevitable (and indeed, related to urbanisation), and rather than trying to combat the 'pull' factors that drive much of this attrition, the region instead can better-calibrate its own 'pull-factor' to moderate the effect of this attrition by attracting new residents to the area. Naturally, this could also generate new opportunities and industries in the region.

Practically all regional communities in Australia have a tourism and brand marketing strategy. However, the value propositions within these strategies often fail to capture outsider perceptions – leading to a lack of differentiation in practice between many regions in the brand marketing space, and incomplete targeting of potential visitors[3]. This makes taking the next step – attracting visitors to stay, live and work in the region even more difficult.

However, the Namoi is unique amongst inland communities, in that it has a proven, recognised brand presence – meaning the value proposition of the Namoi is acknowledged from *outside* of the region, most notably through the association of Tamworth with music (though this doesn't preclude other communities in the Namoi from benefitting from this Future Factor). The rarity of an inland destination meeting this criteria therefore distinguishes the Namoi from similarly competitive coastal regions.

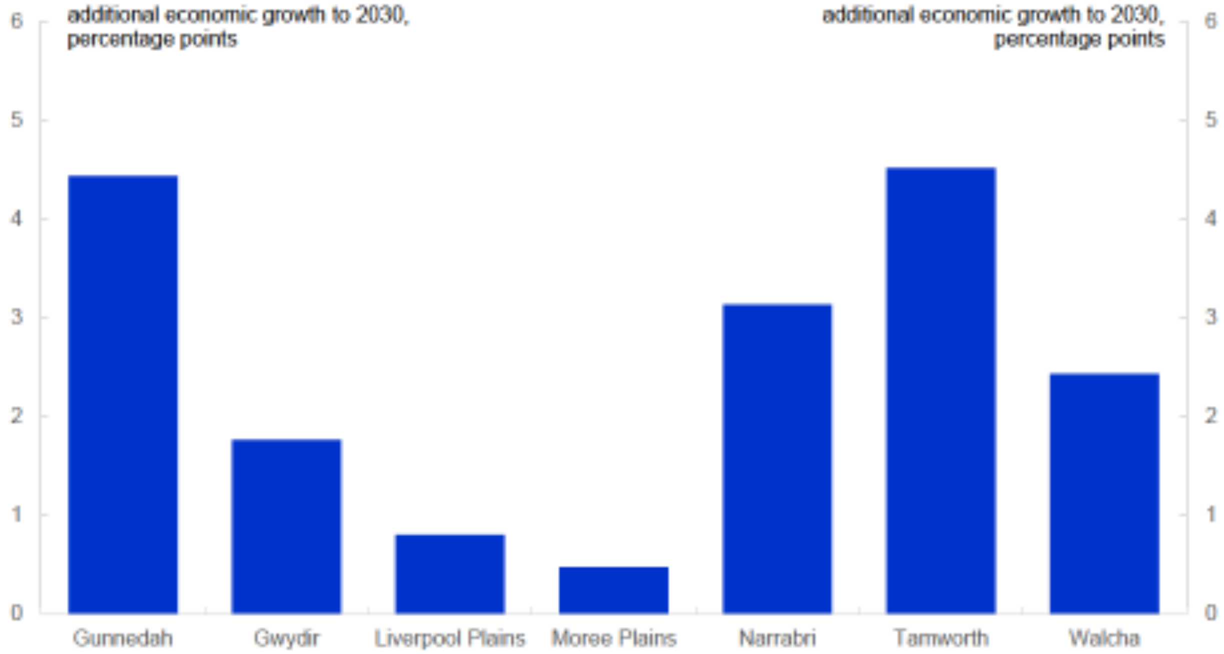
The collective economic diversity of the region also means that there are a range of job opportunities available to potential migrants to the area. This is critical to the success of a region's ability to leverage regional/brand marketing to generate jobs in a region – the availability of employment is the single most important determinant in generating migration to a region.

For the Namoi as a whole, the potential benefits are upwards of $43 million by 2030. The distribution of this combined benefit across each LGA in the region varies as a result of economic size, diversity and population trends. The measured benefits of successfully realising this Future Factor are considered independently of retention strategies.

For example, Tamworth, as a *Regional City* under the RAI's *Foundations of Regional Australia* analysis, is likely to generate around $49,000 of extra economic growth per year, per person added to the population. This effect is slightly smaller in the remaining LGAs in the Namoi. Chart 9 outlines the range of growth potential that this represents for each LGA in the Namoi.

[3] See Vargo and Lusch, 2004, *Evolving to a New Dominant Logic for Marketing*, for an example of this underlying logic.

Chart 9 – Impact of leveraging regional/brand marketing to generate jobs in the Namoi, by LGA



In order to realise the full potential of this Future Factor, the existing brand presence of the Namoi should be closely aligned with the employment opportunities in the region. In practice, this would involve researching the alignment between visitors to the region and the requirements of the local labour market, to determine the most effective value proposition to attract increased visitor numbers and the opportunity to convince people to live and work in the area.

Other factors in the Namoi's value proposition are likely to be relevant from the perspective of migrants to the region are the *diversity* of available jobs, social and wellbeing-related services, connectivity of the region to the rest of Australia and cost of living factors.

MOVING TO ACTION

Leadership by the Namoi JOC will be central to realising the full potential of the Future Factors described in this report. However, the strategy and role of the Namoi JOC will differ:

- Factors requiring a **light-touch approach** from the Namoi JOC;
  Urbanisation and the impact of national and global commodity cycles are trends 'external' to the Namoi. The challenge for the region is how well it understands these trends and responds to their influence over time.

  The Namoi JOC can play a leadership role by building an understanding of how these Future Factors impact the region and monitoring their impacts over time.

- Factors requiring the Namoi JOC to take **direct action in leading change**;
  Namoi JOC is in the best position to develop a regional strategy to attract people to live in the Namoi.

  Namoi JOC is also best placed to engage the region with major overseas markets by liaising with other levels of government and international markets themselves to attract investment interest.

- Factors requiring the Namoi JOC to **facilitate change** that will allow other stakeholders to realise their full potential.
  Securing investment on the right terms, and maximising innovation in agricultural production requires action by local leaders in business and the community. The Namoi JOC can motivate and enable business and the community to find the right ways to embrace these opportunities.

Light touch strategies – increasing the rate at which the regions absorbs information about external change

The goal of the JOC's light touch strategies should be to improve the rate at which relevant information about population and commodity trends is absorbed by key stakeholders.

Developing a system to better inform the region can achieve this goal. Under this approach the JOC would monitor key market and population trends and regularly disseminate this information throughout the region. Collaboration with relevant NSW Departments on information gathering and sharing could make this a relatively low cost activity for the JOC.

The JOC would also facilitate collaboration between local Chambers of Commerce, producers in key industries and service providers in the region to compare perspectives about the effect that commodity cycles and population trends are having on the region. This information is generally fragmented across a region and provides an effective real time view of economic changes and local expectations about the future.

Formalising this process of information collection and dissemination could greatly improve the rate at which relevant information is absorbed by key stakeholders and result in a meaningful impact in terms of regional responsiveness to these external factors.

Direct action strategies – marketing to new residents and investors

The Namoi JOC will be best placed to take direct action in leading change in marketing the region to new residents and investors.

An approach to attracting new residents should be based upon:

- developing an objective understanding of who is moving to the region and why (this may require compilation of existing work or new work);

- an integrated tourism strategy that prioritises events and experiences that encourage potential residents to visit the region; and

- targeted promotion of the employment, housing and lifestyle options available in the region to the potential new resident market and to portions of the current population at greatest risk of leaving.

Attracting new investors requires the JOC to:

- develop investment prospectus(es) that provide targeted information relevant to the best investment options available in the region;

- examine option to make the Namoi an easy investment destination (e.g. through harmonising and simplifying development and other requirements);

- coordinate investor engagement activities across the region, amongst business groups and with other levels of government; and

- be proactive in identifying and engaging with potential investors.

Facilitating change – local innovation and foreign investment

It is not feasible for the JOC itself to do the work necessary to **maximise innovation in agricultural production** or to **secure investment on the right terms.**

However, the effort in the region across both of these issues is likely to benefit from JOC efforts to better coordinate and focus resources in each area. The challenge for the JOC is to strengthen the local culture of innovation and encourage engagement with investors by businesses within the region.

Defining the particular strategies that will work in each area requires the JOC to engage with key stakeholders in each area. R&D stakeholders, producers, suppliers to the industry and associated business (such as logistics providers) all have a role to play.

In fact, many of the gains that could be realised can occur simply through networking effects. Facilitating business innovators to engage with each other, potential investors and experts should be an important strategy.

CONCLUSION

The upside benefits that the Namoi region stands to gain by realising the Future Factors outlined in this report are considerable.

Some of the Future Factors identified here are quite familiar – the role of commodities, and the productivity of the agriculture industry in the Namoi was always going to be central to the future of the region.

Other Future Factors may be controversial – using foreign investment to the region's advantage is not something that is typically considered in regional development strategies.

But whether these Factors are familiar or not, whether they are ambitious or not, does not change their potential importance to the future of the region. As the leaders of the region, it is up to the JOC to seize the opportunities for new growth and responsiveness to change.

CONTACTS

Please do not hesitate to contact either Jack Archer or Blake Ford from the Regional Australia Institute, if you have any questions about this project.

Jack Archer – Chief Executive Officer
(e) jack.archer@regionalaustralia.org.au
(p) (02) 6260 3733
(m) 0438 398 802

Blake Ford – Leader, Major Research Projects
(e) blake.ford@regionalaustralia.org.au
(p) (02) 6260 3733
(m) 0400 910 112

ABOUT THE REGIONAL AUSTRALIA INSTITUTE

Independent and informed by both research and ongoing dialogue with the community, the Regional Australia Institute (RAI) develops policy and advocates for change to build a stronger economy and better quality of life in regional Australia – for the benefit of all Australians.

To find out more about the RAI contact us at info@regionalaustralia.org.au or visit www.regionalaustralia.org.au

APPENDIX 1 – SURVEY OUTCOMES AND INITIAL ENGAGEMENT OVERVIEW

The RAI's information-gathering in the Namoi region commenced with the distribution of a survey to local leaders and other key stakeholders in the region, to determine local perspectives on possible Future Factors.

The survey revealed the following common factors, considered by participants to be central in driving change in the region:

- Rural sustainability;
- Government relations;
- Population pressures;
- Perceptions of the region;
- Tourism potential of the region;
- Commodity prices, and export demand;
- Infrastructure and logistical capacity;
- Education, workforce training and skills;
- Natural resources;
- Water availability and climate;
- Competition;
- Export demand;
- Foreign investment; and
- Locally-based value adding.

The first meeting between Namoi JOC and the RAI was convened to present the initial analysis conducted by the RAI, to seek Namoi JOCs input into this analysis and to use this analysis to come to a consensus on what will matter the most for the future of the Namoi region.

The meeting commenced with this analysis being presented to Namoi JOC. Namoi JOC participants added useful perspectives on the results of this analysis, as well as extending this input to include perceptions on social aspects of the Namoi's future – which are not readily captured by the analysis.

The importance of these factors was acknowledged, and throughout the meeting, their interrelationship with economic factors relevant to the future of the region was expanded upon. The social factors relevant to the future of the region can be summarised as follows:

- A lack of upskilling techniques, potentially contributing to social disenfranchisement;
- Existing lifestyle elements of the community and social infrastructure need to be built upon, to retain people in the region;
- The tension between looking after the existing population and their preferences, balanced against needs for the future;
- Adapting to a 'transient' workforce, who may not live, work or reside in the Namoi region 7 days per week; and
- Consideration of the 'lifecycle' needs within the community, and whether structures are in place to avoid preventable losses in any particular demographic.

The meeting proceeded with further discussion of the relevant factors for the future of the region. These factors were divided into two groups. Those 'external' to the region – beyond local leaders' control, and those 'internal' to the region – those factors within local leaders' control.

'External' factors relevant to the future of the Namoi region were:

- Commodity prices;
- Weather/climate change;
- Urbanisation trends;
- State/Federal government policy;
- Proximity to large cities/ports;
- International economic developments;
- Technological change;
- Perceptions and preferences (of investors, residents and potential residents);

- Competition (international and domestic); and
- Uncertainty.

The 'internal' factors relevant to the future of the Namoi discussed at the meeting were:

- Collaboration;
- Internal market opportunities;
- Increased understanding the operating environment;
- Relationship with other levels of government;
- International relationships;
- Investment on the right terms;
- Maximising productivity and innovation;
- New industries in the area;
- Attitudinal change;
- Attracting visitors to the region;
- The quality of the built environment; and
- Securing water resources.

The meeting concluded with participants identifying what they considered to be the most important 'internal' factor – the factor that would, with some action on their part, yield the greatest benefit for the future of the region. These factors are listed in order of collective significance:

- Increasing the understanding of the operating environment;
- Securing water resources;
- Managing the relationship with other levels of government (this factor tied for second place);
- Investment on the right terms;

- Maximising productivity and innovation; and
- Attitudinal change.

From the insights gained in this meeting, the RAI then proceeded to finalise the Future Factors presented in this report, based on information gained from local leaders' knowledge, as well as the insights from the RAI's data and analytical frameworks.

APPENDIX 2 – SCENARIO TECHNIQUES

This section of the report outlines the RAIs methods for modelling the impact that the Future Factors are likely to have on the Namoi over the next 15 years. The basis for many of these estimates is the economic data underlying the RAI's *Regional Economic Projections Framework*, which includes information on economic output and employment for every LGA in Australia, by industry. This data also includes a range of projections for these parameters, for each LGA under a range of scenarios for the national economy. The RAI gratefully acknowledges PricewaterhouseCoopers' partnership with the RAI in providing the data, which allowed the RAI to develop this framework.

Scenario methods – National and global commodity cycles

The effect that commodity cycles are likely to have on individual LGAs in the Namoi is taken directly from the projections underpinning the RAIs *Regional Economic Projections Framework*. Projections for the agriculture and mining industries are considered for three different scenarios that might play out at the national level – an optimistic, pessimistic and baseline scenario.

The value in this approach is that it gives an estimate of how each LGA in the region responds to changes beyond the local economy. The approach the RAI has used gives a much wider estimate of plausible futures for the region.

This is distinct from a series of specific, point-forecasts for commodity prices and their flow-on effect to the region. Point-forecasts have limited durability, and do not provide sufficient context for understanding the range of potential impacts on the region.

Scenario methods – Maximising innovation in agricultural production

The basis of the scenario modelling for this Future Factor is research undertaken by the Australian Bureau of Agricultural Research, Economics and Science (ABARES) on productivity trends in Australian agricultural production in general.

Step 1 – The RAI examined the variation in historical output per worker in agricultural production across all of the LGAs in the Namoi, and conservatively estimated 'maximised innovation' in agriculture in the region would in most cases achieve a modest 60 and 80 per cent of the annual historical gain in farm productivity observed by the ABARES research.

Step 2 – These productivity estimates were applied to current levels of agricultural output in each LGA in the Namoi region, holding employment projections from the RAIs *Regional Economic Projections Framework* constant for this sector, in each LGA in the Namoi. This approach yields an estimate of additional output in agricultural output that can be traced specifically to improvements in productivity, with a time lag of five years – under the assumption that action will take time to yield results.

Scenario methods – Securing investment on the right terms

Securing the productivity benefits of foreign investment in the region requires local businesses to learn from their foreign-owned counterparts, in terms of their approach to business – and adapt this knowledge to their own situation. Relevant literature on the topic suggests that foreign direct investment confers an additional 0.63 percentage point productivity gain on recipient firms.

Step 1- In estimating the potential effect on the Namoi region, the RAI assumes that 20 per cent of output in the agriculture and mining industries is accounted for by increased foreign ownership – and that commensurate productivity gains follow. To be clear, the RAI assumes that a proportion of *existing* businesses in the area become foreign-owned. This is distinct from the sixth Future Factor for the Namoi region, which concerns *new* investment.

The variation between LGAs on this basis is the result of the differing sizes of these particular industries in each LGA in the Namoi, as well as how changes in macroeconomic conditions are expected to influence the output of these industries in each LGA. Step 1 accounts for the first-order benefits of securing investment on the right terms, in the Namoi.

Step 2 - The RAI evaluated the effect of the second-order benefits of potential labour market stabilisation by considering the effect that labour market stability has on economic growth, by the types of region outlined in the RAI's *Foundations of Regional Australia* paper.

Each of the LGAs are grouped relative to their peer-regions of the type to which they belong under the *Foundations* framework. This data is divided into five 'groups', and the stabilising effect of investment on the right terms is considered to have a one in three chance of moving each LGA into the next 'group' of the growth/stability relationship for its regional type.

The additional effect on growth that this change in stability is on average likely to have is then applied to each of the LGAs in the Namoi. As such, differences between LGAs reflect the typology to which it belongs under the *Foundations* framework, as well as the characteristics of its labour market, with a time lag of five years – under the assumption that action will take time to yield results. Note that Tamworth does not receive an additional stability effect – it is already in the top grouping for the stability/growth relationship as a *Regional City*.

Scenario methods – Engaging the Namoi in major overseas markets

The indirect benefits of this Future Factor are extremely difficult to quantify – however, successfully securing foreign interest in a new venture in the region provides a baseline estimate for the kind of opportunities for the Namoi. As such, these estimates should be considered the minimum upside potential of this Future Factor.

While the indirect benefits of successfully realising this Future Factor are difficult to measure, the RAI has identified the potential first-order benefits of taking the first steps toward fully realising the potential of this Future Factor.

Our investigation into this Future Factor for the Namoi revealed that the nearby Hunter region in NSW secured foreign investment from China, in a new manufacturing plant to the value of around $6 million, which itself generated 200 jobs in the area.

Step 1 – The RAI conservatively evaluated the potential first-order benefits of a similarly-sized investment, which was split across the region, with any individual LGA only having a modest chance of successfully attracting its possible share of this investment.

The chance of success is assumed to never exceeding 50 per cent, and its chance is dependent on the size of the LGA in question.

Step 2 – Multiplying these probabilities by the distribution of this $6 million investment across the region, a multiplier for the jobs effect was applied to these expected values. This multiplier was taken from the investment/jobs relationship implied in the Hunter region case study. A time lag is applied, under the assumption that success in this Future Factor requires an investment of time, before it yields results.

Step 3 – The ongoing effect of this increase in employment was considered to attract as much additional economic activity to the LGA as the RAIs previously mentioned analysis of our *Regional Economic Projections* Tool. That is, on average, an additional person joining the population of a *Heartland Region* (the majority of the Namoi's LGAs are *Heartland Regions*) adds a further $46,000 of economic growth to the local economy. Tamworth, as a *Regional City*, could expect to see each additional person in the population add around $49,000 of economic growth to the local economy.

Scenario methods – Urbanisation

Step 1 – The RAI has taken urbanisation trends in the Namoi over the past decade and applied plausible variations in this trend to the future for each LGA in the region. The variations are around a baseline scenario for population growth – and hence urbanisation – in the Namoi. There are two scenarios considered – a 'slow' and a 'fast' scenario, which relate to the pace of urbanisation. In the slow scenario, urbansiation trends proceed at a far slower rate, or halt altogether in some LGAs. This reduces the rate at which Tamworth grows by absorbing these migrants. The fast case represents a slight increase in the rate of urbanisation.

Step 2 – Using the RAIs *Regional Economic Projections Tool* to analyse the typologies outlined in the *Foundations of Regional Australia* paper reveals that on average, an additional person joining the population of a *Heartland Region* (the majority of the Namoi's LGAs are *Heartland Regions*) adds a further $46,000 of economic growth to the local economy. Tamworth, as a *Regional City*, could expect to see each additional person in the population add around $49,000 of economic growth to the local economy.

Step 3 – Applying these figures to the population trends projected from the data reveals the disparate effect that urbanisation is likely to have across the Namoi region.

Scenario methods – Leveraging regional/brand marketing to attract people to live and work in the Namoi

In evaluating the effect that leveraging regional/brand marketing to generate jobs in the region could have for the future of the Namoi, the RAI examined population growth in each of the LGAs in the region and compared them to regions of their 'type', as defined in the RAIs *Foundations of Regional Australia* paper.

Step 1 - The range of population growth figures by these typologies was split into five groups, and the RAI estimated that successfully leveraging regional/brand marketing to generate jobs in the Namoi would take the form of a one-in-three chance of this Future Factor causing an LGA in the Namoi jump into the next-highest 'group' of the population growth/economic growth relationship. The exception to this being when an LGA is *already* within the top group of population growth, for its type.

Step 2 - Using the RAIs *Regional Economic Projections Framework* to analyse the typologies outlined in the *Foundations of Regional Australia* paper reveals that on average, an additional person joining the population of a *Heartland Region* (the majority of the Namoi's LGAs are *Heartland Regions*) adds a further $46,000 of economic growth to the local economy. Tamworth, as a *Regional City*, could expect to see each additional person in the population add around $49,000 of economic growth to the local economy.

Step 3 - The RAI applied these estimates in Step 2 to each LGAs position in the new 'group' that they had been assigned to in Step 1, with a time lag of five years – under the assumption that action will take time to yield results.

The Hon. Niall Blair, MLC
Minister for Land and Water
GPO Box 5341
SYDNEY NSW 2001

Dear Minister

PRICE OF BULK RAW WATER IN THE PEEL VALLEY

Ref: SF2229

I refer to your letter to the Peel Valley Water Users Association dated 20 December 2016, which included a discussion paper with options to address high bulk water service charges in the Peel regulated river water source. One of the options suggested in the discussion paper was altering the tariff structure paid by entitlement holders in the Peel from the present 40% fixed, 60% usage to a high percentage of fixed charges.

IPART has also commenced a review of bulk water charges levied by Water NSW in the Murray Darling Basin for the next 4 years commencing 1 July 2017. As part of the review IPART released an issues paper in September 2016 seeking public comment on the issues raised. One of the issues canvassed by IPART was a different tariff structure, with a suggestion that an 80/20 fixed to usage structure better reflected Water NSW costs. Both Council and the Peel Valley Water Users Association put in submissions and both rejected changes to the present 40/60 split up.

However, since the submissions Water NSW has had discussions with the Peel Valley Water Users and demonstrated a change in tariff structure from 40/60 to 80/20 would result in significant savings to general security surface water license holders in the Peel. As a result, the Association has decided to support a change in tariff structure to 80/20. Representatives from Water NSW also held discussions with Council staff about a change to tariff structure and how the suggested change to 80/20 would effect Council's high security entitlement in the Peel. An undertaking was given that the issue would be formally reported to Council for Council's consideration.

Whilst preparing the report IPART released its draft determination and so the report to Council (see copy attached) addressed both the draft determination and the issue of changing the tariff structure in the Peel.

The main points included in the report where;

- IPART's draft determination assumes a fixed/usage split up of 40/60 and shows that under this structure Council would save, in a year where the average volume of water was accessed from Chaffey dam, $253,313
- Using figures provided by Water NSW for charges under an 80/20 tariff Council would save, in a year where the average volume of water was accessed from Chaffey dam, $76,638.
- Some General Security license holders save over 50% compared to 2016-17 charges if an 80/20 tariff is introduced.

Following consideration of the report Council resolved as follows;

That in relation to the report "IPART's Review of Water NSW's Bulk Water Charges to 2020/2021 and the Split up of Fixed and Usage Charges", Council prepare a submission to IPART on its draft determination which generally includes, Council:

(i) welcomes the reduction in charges for all users in the Peel and for High security users in the Namoi;

(ii) does not support the introduction of a volatility allowance to manage revenue risk in the Namoi and, if it is introduced, the cost of such an allowance should not be borne by users;

(iii) does not support any change to the present 40/60 fixed/usage split for revenue in the Peel Valley unless the increased costs resulting from the change are permanently offset by the State Government so that residential and business consumers are not unfairly disadvantaged; and

(iv) reaffirm Council's opposition about the large differential water usage charges between the valleys in the Murray Darling Basin.

Councillors were of the view that whilst the significant savings to general security license holders was welcomed, these savings should not come at the expense of the residents of Tamworth. If the State Government could fund the difference in savings between the 40/60 and 80/20 tariff structure for Tamworth Regional Council then Councillors would be very happy to support the change in tariff.

Council also highlighted that even with an average annual saving of $253,313 under IPART's proposed 40/60 split, the cost of raw water in the Peel for High Security license holders is still almost double the next highest priced valley in the Murray Darling Basin. Council continues to struggle with this huge inequity in pricing across the state, which is not of its making. Council believes strongly the cost of raw water should not be a financial burden for the people of Tamworth and Peel Valley Irrigators.

However, Council recognises and thanks you for the work you have instigated via the release of the discussion paper into the price of water in the Peel and that other possible solutions to the problem remain on foot, such as the proposed new Dungowan Dam. Council remains committed to working with you and the State Government to find an equitable solution to the price of raw bulk water in the Peel Valley.

Yours sincerely

Col Murray
Mayor

Contact: Bruce Logan (02) 6767 5811

21 April 2017

Barnaby Joyce MP
Federal Member for New England
P O Box 963
TAMWORTH NSW 2340

Dear Sir

PRICE OF BULK RAW WATER IN THE PEEL VALLEY

Ref: *BL/SF2229*

I refer to your letter, dated 29 March 2017 and received by Council on 18 April 2017, concerning representations to you by the Peel Valley Water Users Association urging Council to accept a Water NSW proposal to change the current fixed to usage ratio of bulk raw water charging in the Peel Valley from the present 40/60 to 80/20 and advise as follows;

Council considered a report on this matter at its meeting of 11 April 2017 (see copy attached) and resolved;

> *That in relation to the report "IPART's Review of Water NSW's Bulk Water Charges to 2020/2021 and the Split up of Fixed and Usage Charges", Council prepare a submission to IPART on its draft determination which generally includes, Council:*
>
> *(i) welcomes the reduction in charges for all users in the Peel and for High security users in the Namoi;*
>
> *(ii) does not support the introduction of a volatility allowance to manage revenue risk in the Namoi and, if it is introduced, the cost of such an allowance should not be borne by users;*
>
> *(iii) does not support any change to the present 40/60 fixed/usage split for revenue in the Peel Valley unless the increased costs resulting from the change are permanently offset by the State Government so that residential and business consumers are not unfairly disadvantaged; and*
>
> *(iv) reaffirm Council's opposition about the large differential water usage charges between the valleys in the Murray Darling Basin.*

A copy of Council's submission to IPART is attached.

I trust the attached documents explain Council's considerations in relation to this issue and its reasons for adopting the present position.

Yours faithfully

Paul Bennett
General Manager

Contact: Bruce Logan (02) 6767 5811

26 April 2017

REGIONAL COUNCIL
Tamworth

ABN: 52 631 074 450
More than just a city. More than just one place.

Independent Pricing and Regulatory Tribunal
P O Box K35
HAYMARKET POST SHOP NSW 1240

Dear Sir

REVIEW OF PRICES FOR WATER NSW – RURAL BULK WATER SERVICES FROM 1 JULY 2017, ISSUES PAPER

Ref: BL/SF2229

On behalf of Tamworth Regional Council thank you for the opportunity to provide comments on IPART's Draft Determination - Review of Prices for Water NSW – Rural Bulk Water Services from 1 July 2017.

Council's submission follows.

Please contact the undersigned should you wish to discuss this matter further.

Yours faithfully

Bruce Logan
Director Water and Waste

Contact: (02) 6767 5820

13 April 2017

Tamworth Regional Council

Response to the Independent Pricing and Regulatory Tribunal's

Draft Determination

Review of Prices for Water NSW – Rural Bulk Water Services from 1 July 2017

Table of Contents

Background

Tamworth Regional Council holds

- a 16,400 Megalitre local water utility license for bulk raw water delivered from Water NSW's Chaffey Dam to supply the City of Tamworth.
- a 150 Megalitre local water utility license for bulk raw water delivered from Water NSW's Split Rock Dam to supply the town of Manilla.
- a 365 ML local water utility license for bulk raw water from Water NSW's Split Rock Dam to supply the town of Barraba.

Split Rock Dam is in the Namoi Valley and Chaffey is in the Peel Valley for the purposes of pricing and both valleys are in the Murray Darling Basin.

This submission is response to IPART's Draft Determination into the Review of prices for Water NSW Rural Bulk Water Services to apply from 1 July 2017.

Council would like to comment on a number of issues as detailed below;

Proposed Prices in the Peel Valley

Council notes that the Peel Valley is now considered to be at full cost recovery and therefore there is no need for charges to increase higher then CPI over the next 4 years

Council also welcomes the significant reduction in prices to be levied on high security entitlement holders like Council in the Peel Valley. A chart showing the effect on Council's charges in the Peel is attached. Council does note however that the cost of high security water in the Peel, even if the draft determination is implemented unchanged, is still almost double the cost of similar volumes of water sourced from other Murray Darling Basin Valleys. This inequity remains a serious concern for Council.

In relation to general security users Council also welcomes the slight reduction in charges paid by general security entitlement holders over the next 4 years.

Introduction of a volatility allowance in the Namoi

In the Namoi Council again welcomes the slight reduction in costs to high security entitlement holders, however notes an increase in bills for general security (GS) customers as result of IPART's decision to include a volatility allowance ($0.50 per ML per year) in the charge to manage revenue volatility risk faced by Water NSW associated with its 40:60 fixed to variable tariff structure.

Further, IPART has also made a decision to discontinue the under and overs mechanism (UOM), and adjusted prices to ensure the outstanding balance of the UOM account is payed back – which impacts (increases) GS bills.

Council does not agree with insuring against revenue volatility. The NSW Government under its Best Practise Guidelines for Water and Sewer require local utilities to recover income from water sales at 25/75 fixed/usage. It defies belief that on one hand the government is telling local water utilities to mange such volatility in house and yet allowing a State Owned Corporation to charge its customers under a suggested 80/20 split. Councils have to manage revenue volatility and Water NSW should as well.

If Water NSW and IPART insist in taking measures to insure against revenue volatility then the cost of that insurance should not be met by users.

Split up between fixed and usage in the Peel

Both Water NSW and the Peel Valley Water Users Association have approached Council urging support for a change to the fixed/usage split up for revenue in the Peel Valley form the existing 40/60 split to 80/20.

Council has considered this matter closely and has resolved not to support a change to the present 40/60 split unless the State Government reimburses Council, in perpetuity, for lost savings if the 80/20 split up is introduced. Council's reasons include;

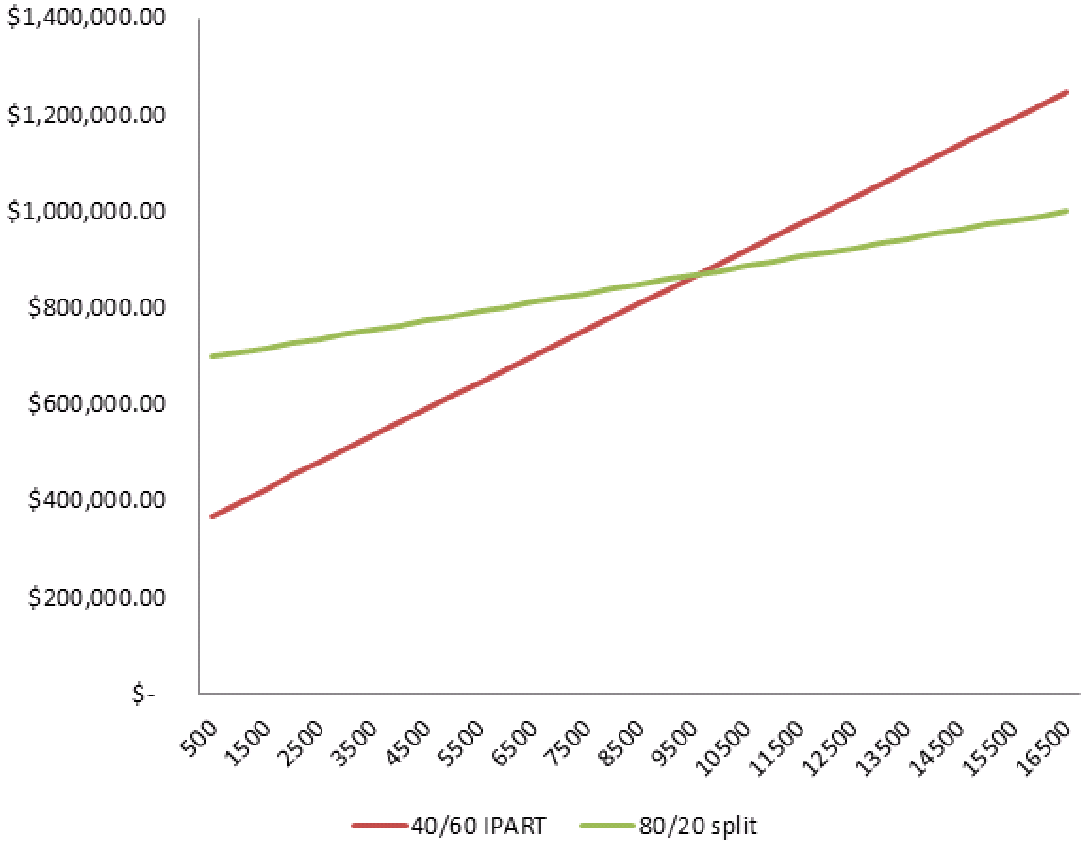
- Council's reduction in charges is reduced from $253,313 per year under IPART's draft determination based on 40/60 to $76,638 under the proposed 80/20 split up based on figures provided by Water NSW;
- At this time Council does not know what the final charges under an 80/20 split will be. IPART may adopt different charges to those provided by Water NSW under an 80/20 split. Not knowing the potential impact inhibits decision making.
- Whilst GS irrigators charges (based on an entitlement of 100 ML's and using 25 ML per year) will fall considerably further under an 80/20 split, based on Water NSW figures, than IPART's draft determination under a 40/60 split up, if the 80/20 split up is imposed Council will be directly subsidising GS users including irrigators. Council does not believe it is part of its responsibility to directly subsidise some business over others.
- Higher entitlement charges may see owners of licenses that have been inactive consider whether to start irrigating using these licenses or to trade to other active license holders. If more licenses become active, the Long Term Average Annual Exceedance Limit in the Peel may be breached, resulting in lower allocations for GS users.
- Council has in the past contributed financially to the construction of the original Chaffey dam and to the augmentation of the Dam, yet Council still pays the same charges as all other high security users who did not make any capital contribution to the cost of the asset. Suggestions that it may be in Council's interest long term to accept the 80/20 split up over 40/60 would therefore appear to be unfounded.
- Once in place there is no certainty that charging will ever go back to 40/60 or any other split up
- There will be no appeal after the final determination. The charges adopted by IPART will remain in place for the next four years until the next review
- Council will pay considerably more per year when we extract average amounts of water from Chaffey Dam – see comments and graph below.

  The introduction of an 80/20 split, if it were to occur, would mean that Council will pay almost $690,000 in charges, per year, to Water NSW whether Council accessed any water from Chaffey Dam or not, however, usage charges under an 80/20 split would be lower than under the present 40/60 split. As a result, there would be a usage amount where the total cost paid by Council to Water NSW under 80/20 would become less than under the present 40/60.

  The chart below shows this graphically. The annual consumption where the 80/20 regime becomes cheaper then 40/60 is when Council begins to access more than 9,706 ML's per annum. However, since 1990/91, with respect to the volume of water accessed from the Peel to supply treated water to Tamworth.

  - Average from the Peel 4,715 ML's
  - Maximum from the Peel (02-03) 9,151 ML's
  - Maximum from all sources (90/91) 9,809 ML's

  As a result, it is considered unlikely that Council will save any additional money from the introduction of an 80/20 split in the next 10 to 20 years.



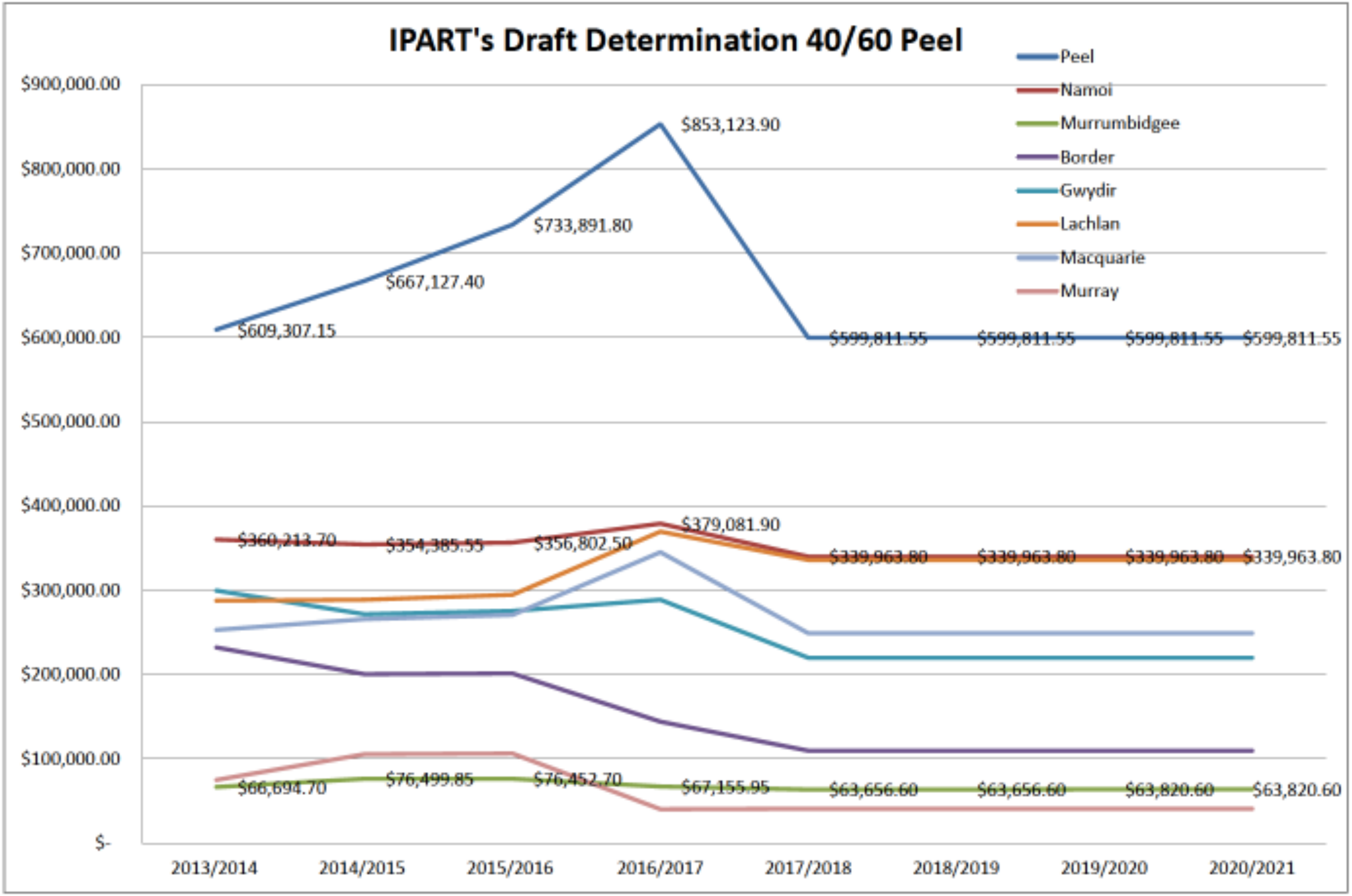
- If the 80/20 split is introduced Council will consider effectively moth balling it's own Dungowan Dam and take all its water from Chaffey Dam, to minimise the unit cost of raw water supply. As a result, instead of taking on average 4,715 Megalitres of water per annum from Chaffey Dam for Tamworth's supply, this figure will rise, under an 80/20 regime, to 8,418 Megalitres on average annually. Sourcing this increased volume of water from Chaffey Dam must have a detrimental effect on the security and reliability of the supply for general security irrigators and for the City of Tamworth itself.

Postage Stamp Pricing

Whilst some cost reductions are evident in the draft determination the fact remains that users in the Peel Valley pay an extraordinarily high price for accessing bulk water compared to other valleys within the Murray Darling Basin. Council is of the view this is equitable and to address this inequity has repeatedly called for postage stamp pricing for bulk water within NSW. Again Council makes the following points in support of postage stamp pricing

- In the case of supplementary or off allocation flows, where water flows from one valley into another, there is some debate about the charges levied for that water if it is intercepted by a user in a valley that is not the valley the water originated from. For example if flow in the Peel River results in supplementary or off allocation flows in the Namoi, the Namoi irrigators pay to intercept this water at the Namoi valley costs, even though if the water had been intercepted in the Peel the price to intercept would have been double. Postage stamp pricing does away with this issue.
- Water shepherding rules. In a similar manner to the point above in the event environmental flows are released from one valley for the purposes of addressing environmental concerns in a downstream valley how much does the environmental water holder pay for that water – is it the cost associated with the valley it was released from or the cost associated with the valley it ends up. Postage stamp pricing would address this issue.

- Legacy issues. The cost of supplying raw water in some valleys is higher because of decisions made by governments before the notion of users pays was conceived. For example in the Namoi Valley two dams were constructed, Keepit and Split Rock. With the benefit of hindsight, and the desire for users pays, it may have been better to construct one larger dam rather than two. In so doing the cost of raw water in the Namoi could have been reduced because no one argues that the operating cost of two separate smaller dams is higher than one larger dam. Present day users who are required to pay for raw water at costs which reflect the cost of operating two dams, or in the case of the Peel, one relatively small storage, were not consulted at the time the decision was made, or able to consider the decision to build the second dam/smaller storage in terms of increased ongoing costs.
- Council supports requiring monopoly suppliers to provide detailed cost break ups associated with the delivery of bulk water in a particular valley. This can help identify inefficiency's or unnecessary waste. But Council contends there is no reason why, having calculated the cost of the service in each valley, these costs could not be aggregated and divided by the total amount of water delivered across the state to determine the postage stamp price.
- To date regulatory bodies like IPART and the Australian Competition and Consumer Commission have repeatedly rejected postage stamp pricing for a variety of reasons. Yet in the recent determination handed down by IPART in relation to charges levied by DPI Water, IPART has accepted charges that will see all groundwater customers in the Murray Darling Basin (excluding the Murrumbidgee Valley) pay the same access and usage charges for groundwater, regardless of location. This seems to Council to be almost a postage stamp price for groundwater across NSW. If postage stamp pricing is able to be applied for groundwater, Council is asking why the same justification can't be applied to surface water, and questioning whether the reasons provided for rejecting postage stamp pricing for surface water previously are actually valid.


IPART's Draft Determination 40/60 Peel
Peel
Namoi
Murrumbidgee
Border
Gwydir
Lachlan
Macquarie
Murray
$900,000.00
$800,000.00
$700,000.00
$600,000.00
$500,000.00
$400,000.00
$300,000.00
$200,000.00
$100,000.00
$-
$853,123.90
$733,891.80
$667,127.40
$609,307.15
$599,811.55
$599,811.55
$599,811.55
$599,811.55
$379,081.90
$360,213.70
$354,385.55
$356,802.50
$339,963.80
$339,963.80
$339,963.80
$339,963.80
$66,694.70
$76,499.85
$76,452.70
$67,155.95
$63,656.60
$63,656.60
$63,820.60
$63,820.60
2013/2014
2014/2015
2015/2016
2016/2017
2017/2018
2018/2019
2019/2020
2020/2021

Independent Pricing and Regulatory Tribunal
P O Box K35
HAYMARKET POST SHOP NSW 1240

Dear Sir

REVIEW OF PRICES FOR WATER NSW – RURAL BULK WATER SERVICES FROM 1 JULY 2017, ISSUES PAPER

Ref: BL/SF2229

On behalf of Tamworth Regional Council thank you for the opportunity to provide comments on the issues paper related to IPART's Review of prices for Water NSW.

Council's submission follows.

Please contact the undersigned should you wish to discuss this matter further.

Yours faithfully

Bruce Logan
Director Water and Waste

Contact: (02) 6767 5820

14 October 2016

Tamworth Regional Council

Response to the Independent Pricing and Regulatory Tribunal

Issues Paper Associated with Review of Prices for Water NSW – Rural Bulk Water Services from 1 July 2017

Table of Contents

Background

Tamworth Regional Council holds

- a 16,400 Megalitre local water utility license for bulk raw water delivered from Water NSW's Chaffey Dam to supply the City of Tamworth.
- a 150 Megalitre local water utility license for bulk raw water delivered from Water NSW's Split Rock Dam to supply the town of Manilla.
- a 365 ML local water utility license for bulk raw water from Water NSW's Split Rock Dam to supply the town of Barraba.

Split Rock Dam is in the Namoi Valley and Chaffey is in the Peel Valley for the purposes of pricing and both valleys are in the Murray Darling Basin.

The Issues paper released contains a number of issues where IPART has requested comment. Some of those issues relate to valleys other than the Peel and Namoi and therefore Council has chosen not to make comment on those issues. The issues Council does wish to comment on are detailed below;

Issue 5 - Is Water NSW's proposed user share revenue requirement for the 2017 determination appropriate

Council supports Water NSW's proposal as this will lead to a reduction in overall costs for Council for bulk water supplied by Water NSW

Issue 7 - Are Water NSW's proposed operating costs over the 2017 determination period efficient, taking into account drivers of this expenditure and bulk water services delivered?

Council supports the proposed reduction in operating expenses.

Issue 8 - What scope is there for Water NSW to achieve further efficiency gains over the 2017 determination period

Whilst unable to comment directly about opportunities for further efficiency gains within Water NSW because of a lack of knowledge of the actual business, Council encourages Water NSW to investigate and implement further efficiency gains at all times.

Issue 10 – Is Water NSW's forecast capital expenditure for the 2017 determination period prudent and efficient?

Council accepts the reasons for the increased user share but expresses concern identified capital works are necessary and will be performed as forecast to avoid revenue being generated for capital works which will not/cannot, or should not, be undertaken during the determination period.

Issue 11 – Is Water NSW's proposal to have a capital maintenance allowance in addition to its building block allowance for depreciation reasonable?

This is a similar arrangement to how Council manages its depreciation and therefore Council supports this approach.

Issue 14 - Are there any reasons to depart from a straight-line depreciation method for calculating the allowance for regulatory depreciation?

Council uses a straight line depreciation approach for the majority of its assets and therefore sees no reason to depart from the present approach.

Issue 18 - Under current price structures, what measures should be used to manage risk (positive and negative) to Water NSW?

Council faces the same risks to revenue due to changes in consumption as those faced by Water NSW. Indeed the State Government in its "Best Practice Guidelines to the Management of Water and Sewer" recommends Councils adopt a 25:75 percent split between fixed and usage revenue and with no risk mitigation. Given this Council is reluctant to support any measures to manage risk for Water NSW.

However as Water NSW does not have the opportunity to raise and lower charges except in line with the 4 year determination, regardless of how actual revenue is tracking against forecast, the UOM is considered an appropriate mechanism and Council supports its retention.

Issue 19 - What rate should be applied to the Unders and Overs Mechanism (UOM) account?

Given the proposal is for no change to the rate applied to the unders and overs mechanism during the last determination, Council supports retaining the existing rate.

Issue 20 - Should an UOM be introduced for users in the Peel Valley?

Notwithstanding Council has to deal with revenue volatility from rising and falling water sales, Council does have the option of changing prices on an annual basis. Given Water NSW does not have the opportunity to raise and lower charges except in line with the 4 year determination, regardless of how actual revenue is tracking against forecast, the UOM is considered an appropriate mechanism and Council supports its introduction in the Peel.

Issue 21 - What implications, if any, should Water NSW's proposed risk transfer product (RTP) have for the Unders and Overs Mechanism and the annual adjustment to prices (and vice-versa)?

Council has to deal with revenue volatility without the use of an unders and overs mechanism nor an insurance scheme. Whilst Council accepts some of the arguments for an over and unders it does not in any way support an insurance scheme against revenue volatility and rejects any suggestion that the cost of such a product be borne by the users.

Council has to accept and work with increases and decrease in volatility in water revenue based on consumption, Water NSW should do the same.

Issue 22 - Should water users pay for Water NSW's purchase of a risk transfer product?

See comments above.

Issue 23 - Would water users be willing to move to an 80:20 fixed to variable price structure if they saved on the cost of a risk transfer product (or a similar means of managing risk to Water NSW of revenue volatility)?

Council supports the proposal to provide valleys with the choice of charging on the condition that Water NSW is bound to accept the decision and would like to see the details relating to whether all customers in the valley have to agree, or only some and if so what proportion, before agreeing to this proposal.

Issue 30 - What regulatory measures can enhance Water NSW's incentives to pursue efficiency gains?

Council believes regulation should not prevent efficiency gains and promote the pursuit of efficiency, although this may be easier in theory than in practise and Council would want to see the detail of any proposed changes before agreeing.

Issue 32 - Is Water NSW's proposed 40:60 fixed to usage charge split appropriate?

Based on the NSW Government's Best Practice Guidelines for Water and Sewer requiring Local Water Utilities to generate revenue from sale of water to be in a ratio of fixed to usage charges of 25:75, Council supports no change to the current fixed/usage split up.

Issue 33 - Are there reasons to depart from the current approach for setting high security and general security entitlement charges?

Council supports the approach of setting different charges for high security entitlements relative to general security as long as the premium paid by high security users is reflected in reliability and justifiable on a valley by valley basis.

Issue 40 - Are Water NSW's proposed bulk water prices reasonable?

Council supports the reduction in high security entitlement charges in the Peel. However, even with the proposed changes the cost paid by Council for high security water in the Peel, if Council uses its average annual amount sourced from the Peel, is still almost double the cost Council would pay if that water was sourced from the Namoi, the next highest valley and remains 10 times the cost the same amount of water would be if the water was sourced from the Murray or Murrumbidgee. See chart attached.

Council is also very concerned about the increase in entitlement for Peel Valley general security users and recommends IPART considers the capacity of the users to pay increased amounts for water in the Peel given the extraordinarily high amounts already paid. Council does however acknowledge the augmentation of Chaffey Dam has significantly improved reliability of supply for irrigators, which should be reflected through entitlement charges.

Issue 45 - Do customers support the introduction of credit card payment options?

Given Council levies a surcharge on credit card payments Council supports this measure.

Issue 46 - Is there any reason for IPART to regulate these fees?

Council does not see a need for IPART to regulate the surcharge fee unless it raises to the point where customer's request regulation.

Issue 47 - Are Water NSW's proposed meter service charges reasonable?

Council supports the water meter service charges so long as the charges levied accurately reflect the cost of the services being provided.

Issue 48 - Should Water NSW recover meter reading costs through a separate charge rather than including them in standard bulk water charges?

Council supports the separation of the cost of water meter services from entitlement and usage charges in the interest of providing more transparency to customers.

Issue 54 – Is Water NSW's analysis of the impacts of its proposed prices on customer bills reasonable?

Council strongly believes capacity to pay increased charges should be a critical component of IPART's considerations. Prices in the Peel continue to increase for general security irrigators and Council is concerned continued price increases are driving the industry to its knees. In Council's view a dam full of water with no general security customers to sell to, because they have all been driven out of business from high prices, is not a satisfactory outcome for anyone.

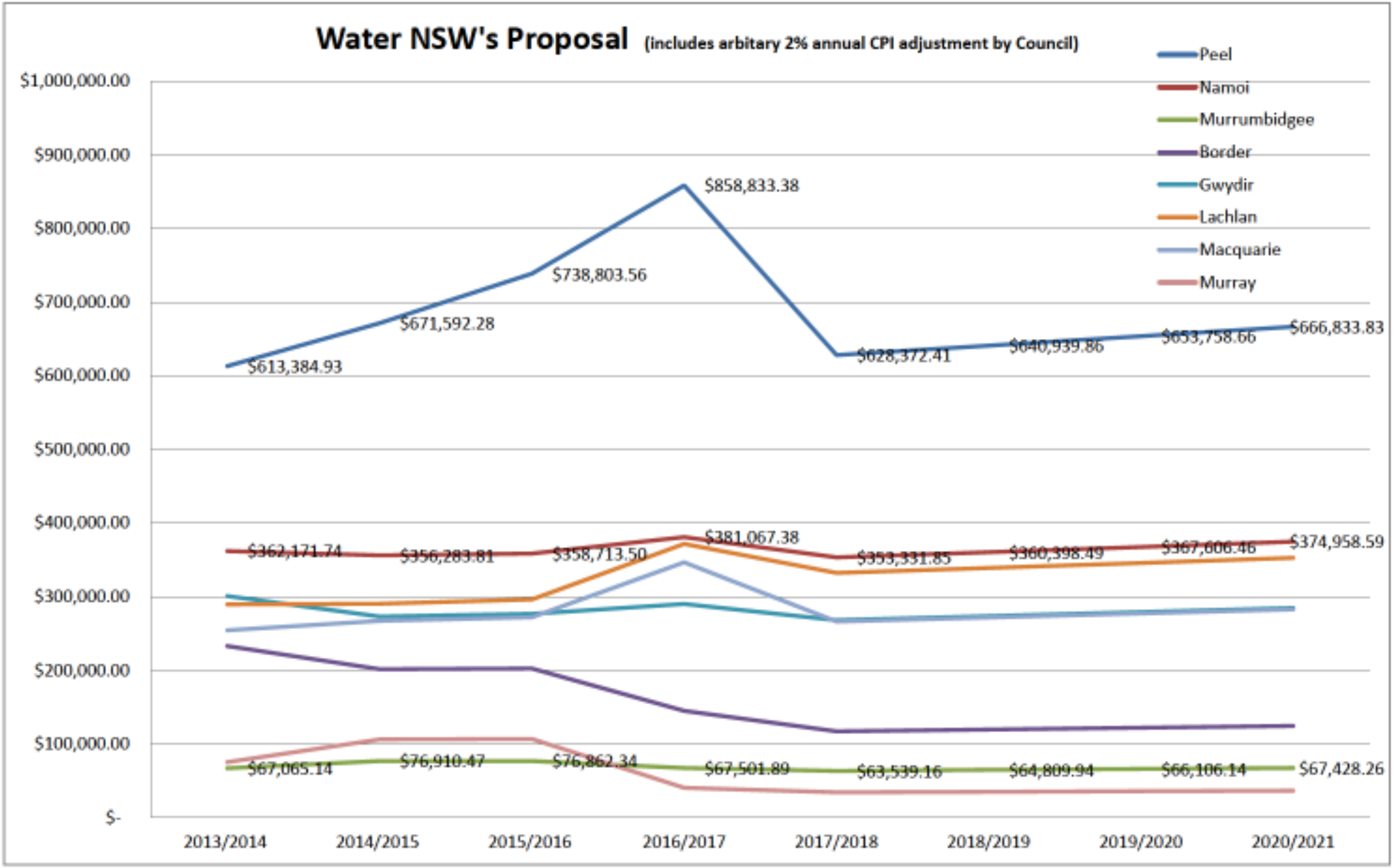
Issue 55 - Can we improve our proposed approach to assessing customer impacts?

See comments above.

Postage Stamp Pricing

Council and irrigators within the Peel Valley have long been campaigning against the extraordinarily high cost of raw water in the Peel compared to other valleys in the Murray Darling Basin. To this end Council has repeatedly called for postage stamp pricing for bulk water within NSW. Council makes the following points in support of postage stamp pricing

- In the case of supplementary or off allocation flows, where water flows from one valley into another, there is some debate about the charges levied for that water if it is intercepted by a user in a valley that is not the valley the water originated from. For example if flow in the Peel River results in supplementary or off allocation flows in the Namoi, the Namoi irrigators pay to intercept this water at the Namoi valley costs, even though if the water had been intercepted in the Peel the price to intercept would have been double. Postage stamp pricing does away with this issue.
- Water shepherding rules. In a similar manner to the point above in the event environmental flows are released from one valley for the purposes of addressing environmental concerns in a downstream valley how much does the environmental water holder pay for that water – is it the cost associated with the valley it was released from or the cost associated with the valley it ends up. Postage stamp pricing would address this issue.
- Legacy issues. The cost of supplying raw water in some valleys is higher because of decisions made by governments before the notion of users pays was conceived. For example in the Namoi Valley two dams were constructed, Keepit and Split Rock. With the benefit of hindsight, and the desire for users pays, it may have been better to construct one larger dam rather than two. In so doing the cost of raw water in the Namoi could have been reduced because no one argues that the operating cost of two separate smaller dams is higher than one larger dam. Present day users who are required to pay for raw water at costs which reflect the cost of operating two dams, or in the case of the Peel, one relatively small storage, were not consulted at the time the decision was made, or able to consider the decision to build the second dam/smaller storage in terms of increased ongoing costs.
- Council supports requiring monopoly suppliers to provide detailed cost break ups associated with the delivery of bulk water in a particular valley. This can help identify inefficiency's or unnecessary waste. But Council contends there is no reason why, having calculated the cost of the service in each valley, these costs could not be aggregated and divided by the total amount of water delivered across the state to determine the postage stamp price.
- To date regulatory bodies like IPART and the Australian Competition and Consumer Commission have repeatedly rejected postage stamp pricing for a variety of reasons. Yet in the recent determination handed down by IPART in relation to charges levied by DPI Water, IPART has accepted charges that will see all groundwater customers in the Murray Darling Basin (excluding the Murrumbidgee Valley) pay the same access and usage charges for groundwater, regardless of location. This seems to Council to be almost a postage stamp price for groundwater across NSW. If postage stamp pricing is able to be applied for groundwater, Council is asking why the same justification can't be applied to surface water, and questioning whether the reasons provided for rejecting postage stamp pricing for surface water previously are actually valid.


Water NSW's Proposal (includes arbitary 2% annual CPI adjustment by Council)
Peel
Namoi
Murrumbidgee
Border
Gwydir
Lachlan
Macquarie
Murray
$1,000,000.00
$900,000.00
$800,000.00
$700,000.00
$600,000.00
$500,000.00
$400,000.00
$300,000.00
$200,000.00
$100,000.00
$-
2013/2014
2014/2015
2015/2016
2016/2017
2017/2018
2018/2019
2019/2020
2020/2021
$613,384.93
$671,592.28
$738,803.56
$858,833.38
$628,372.41
$640,939.86
$653,758.66
$666,833.83
$362,171.74
$356,283.81
$358,713.50
$381,067.38
$353,331.85
$360,398.49
$367,606.46
$374,958.59
$67,065.14
$76,910.47
$76,862.34
$67,501.89
$63,539.16
$64,809.94
$66,106.14
$67,428.26

Independent Pricing and Regulatory Tribunal
P O Box K35
HAYMARKET POST SHOP NSW 1240

Dear Sir

REVIEW OF WATER NSW'S OPERATING LICENSE

Ref: BL/SF2229

On behalf of Tamworth Regional Council thank you for the opportunity to provide comments on IPART"S review of Water NSW's operating licenses.

Council's submission follows.

Please contact the undersigned should you wish to discuss this matter further.

Yours faithfully

Bruce Logan
Director Water and Waste

Contact: (02) 6767 5820

12 September 2016

Tamworth Regional Council

Response to Impendent Pricing and Regulatory Tribunal

Review of Water NSW's operating licenses

Table of Contents

1 Background

Tamworth Regional Council holds a 16,400 Megalitre local water utility license for bulk raw water delivered from Water NSW's Chaffey Dam to supply the City of Tamworth in the North West of NSW.

Chaffey Dam is in the Peel Valley and is part of the Murray Darling Basin.

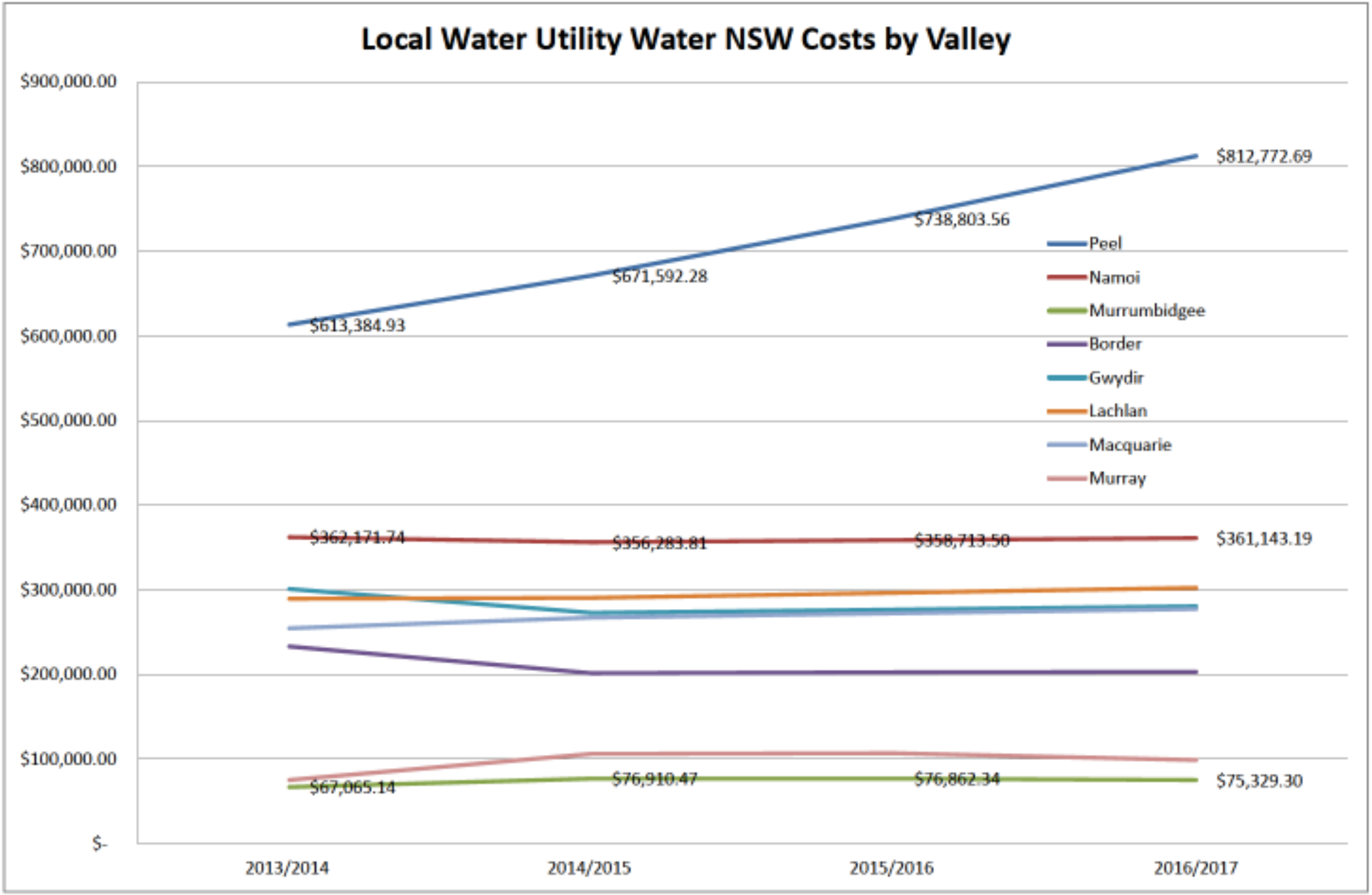
Average annual usage of this allocation is approximately 4,813 ML's. Under the most recent ACCC determination for State Water (now Water NSW) up to and including the 2016-17 financial year, the annual cost to Council to access this average quantity of water is shown in the table below. It should be noted that charges detailed are for Water NSW only and do not include additional charges levied by NSW Department of Primary Industry – Water (DPI Water)

			Peel				
Year	Ave Annual Usage ML's	Ent. ML's	Usage Price /ML	Usage Cost	Ent Price /ML	Ent Cost	Total
2013/14	4813	16400	41.61	$200,268.93	25.19	$413,116.00	$613,384.93
2014/15	4813	16400	45.56	$219,280.28	27.58	$452,312.00	$671,592.28
2015/16	4813	16400	50.12	$241,227.56	30.34	$497,576.00	$738,803.56
2016/17	4813	16400	55.13	$265,340.69	33.38	$547,432.00	$812,772.69

If it was possible to move the population of Tamworth to another centre within the Murray Darling Basin and access this quantity of water from the rivers in that location the cost of the same quantity of water in 2016-27 is shown in the table below and graphically on the following page.

Valley	2016-17 Annual Cost of a 16,400 ML license using 4,813 ML of water
Peel	$ 812,772.69
Namoi	$ 361,143.19
Murrumbidgee	$ 75,329.30
Border	$ 203,106.46
Gwydir	$ 280,649.82
Lachlan	$ 302,490.06
Macquarie	$ 277,344.76
Murray	$ 99,028.99

The table shows that it costs ½ as much to access the same quantity of water in the Namoi as compared to the Peel and 1/10 as much in the Murrumbidgee.


Local Water Utility Water NSW Costs by Valley
$900,000.00
$800,000.00
$700,000.00
$600,000.00
$500,000.00
$400,000.00
$300,000.00
$200,000.00
$100,000.00
$-
2013/2014
2014/2015
2015/2016
2016/2017
$613,384.93
$671,592.28
$738,803.56
$812,772.69
$362,171.74
$356,283.81
$358,713.50
$361,143.19
$67,065.14
$76,910.47
$76,862.34
$75,329.30
Peel
Namoi
Murrumbidgee
Border
Gwydir
Lachlan
Macquarie
Murray

2 Postage Stamp Pricing

Council and irrigators within the Peel Valley have long been campaigning against the extraordinarily high cost of raw water in the Peel compared to other valleys in the Murray Darling Basin. To this end Council has repeatedly called for postage stamp pricing for bulk water within NSW.

Both the Australian Competition and Consumer Commission and IPART have previously rejected postage stamp pricing in NSW, however, Council is concerned any future operating license for Water NSW does not exclude the introduction of postage stamp pricing at some future stage should the position of the relevant government change.

3 Who administers water licenses for Local Government

Council has been advised by officers of the NSW Department of Primary Industries – Water (DPI Water) that a wholly owned state owned corporation like Water NSW is prohibited from regulating water licensing for local government.

If this is the case then it would appear that the one of main reasons for the recent amalgamation of the Sydney Catchment Management Authority and State Water and thereafter the review of services provided by DPI Water and Water NSW, that is to remove duplication, has not been achieved, if, as advised, some staff will have to remain in DPI Water to administer local government whilst the bulk of the licensing staff are transferred to Water NSW to administer licensing for private customers.

If the instrument that is preventing Water NSW from administering local government licenses is the current operating license then Council would urge IPART to recommend the license be changed to allow this to occur. In any case, Council requests IPART make strong recommendations to the NSW Government that legislative change should to be made to allow Water NSW administer local government water licenses in NSW

Review of prices for the Water Administration
Ministerial Corporation
Independent Pricing & Regulatory Tribunal
P O Box K35
HAYMARKET POST SHOP NSW 1240

Dear Sir

DRAFT DETERMINATION – REVIEW OF PRICES FOR THE WATER ADMINISTRATION MINISTERIAL CORPORATION

Ref: BL/SF2229

Thank you for the opportunity to prepare a submission on this matter. Council considered a report on IPART's draft determination at its meeting of 22 March 2016 and resolved to raise the following issues.

Based on the figures detailed in the draft determination, if they are adopted unchanged, then Tamworth Regional Council's total payments to DPI Water over the 4 years of the determination will actually fall. Council welcomes this fall, which is largely due to reductions in cost associated with groundwater and unregulated streams.

However, Council notes charges in the Peel Regulated Supply will increase by 11% over the 4 years of the determination. IPART should be aware that customers in the Peel Regulated Supply already pay exorbitantly high charges to Water NSW for accessing water in the Peel Valley. Council believes that IPART should look at the total costs to customers in the Peel, rather than look at the charges associated with individual agencies in isolation. Based on the total cost to customers Council believes there are real concerns about the capacity of customers to pay any additional cost to access water, and further increases like those proposed in the draft determination will drive already struggling irrigation based enterprises out of business.

Blindly pursuing full cost recovery without considering whether the customers paying can actually afford to pay increased costs would seem counterproductive. Less customers will mean the remaining customers will be required to pay more, potentially forcing more out of business and the cycle continues. At the extreme we will have a dam with water to sell but no customers will be able to afford to buy it.

Secondly, Council has long advocated for postage stamp pricing for bulk raw water across New South Wales. Regulatory bodies like IPART and the Australian Competition and Consumer Commission have repeatedly rejected postage stamp pricing for a variety of reasons. Yet in the draft determination IPART appears to be accepting charges from DPI Water that will see groundwater customers in the Murray Darling Basin (excluding the Murrumbidgee Valley) pay the same access and usage charges for groundwater, regardless of location.

This seems to Council to be almost a postage stamp price for groundwater across NSW. If postage stamp pricing is able to be applied for groundwater, Council is asking why the same justification can't be applied to surface water, and questioning whether the reasons provided for rejecting postage stamp pricing for surface water are actually valid.

Please contact the undersigned should you wish to discuss these matters further.

Yours faithfully

Bruce Logan
Director Water & Waste
Contact: (02) 6767 5811

30 March 2016

REGIONAL COUNCIL
Tamworth

ABN: 52 631 074 450

More than just a city. More than just one place.

Review of Water Charge Rules
Australian Competition and Consumer Commission
GPO Box 520
MELBOURNE VIC 3001

Dear Sir

SUBMISSION ON WATER CHARGE RULES

Ref: BL/SF2229

On behalf of Tamworth Regional Council thank you for the opportunity to provide comments on the ACCC's review of Water Charge Rules.

Council's submission follows.

Please contact the undersigned should you wish to discuss this matter further.

Yours faithfully

Bruce Logan
Director Water and Waste

Contact: (02) 6767 5820

26 February 2016

Tamworth Regional Council

Response to Australian Competition and Consumer Commission's

Review of Water Charge Rules

Table of Contents

1 Background

Tamworth Regional Council holds a 16,400 Megalitre local water utility license for bulk raw water delivered from Water NSW's Chaffey Dam to supply the City of Tamworth in the North West of NSW.

Chaffey Dam is in the Peel Valley and is part of the Murray Darling Basin.

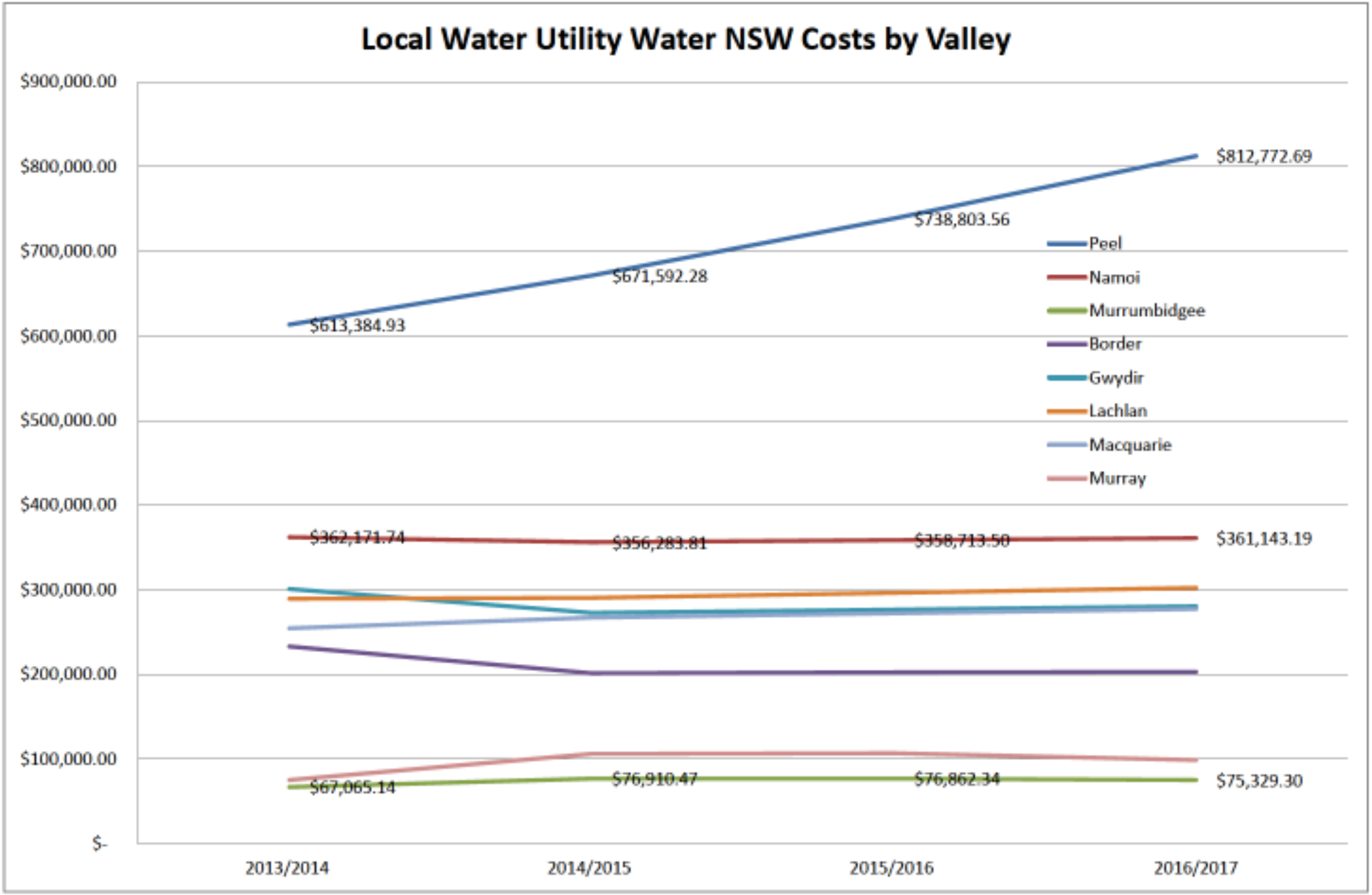
Average annual usage of this allocation is approximately 4,813 ML's. Under the most recent ACCC determination for State Water (now Water NSW) up to and including the 2016-17 financial year, the annual cost to Council to access this average quantity of water is shown in the table below. It should be noted that charges detailed are for Water NSW only and do not include additional charges levied by NSW Department of Primary Industry – Water (DPI Water)

			Peel				
Year	Ave Annual Usage ML's	Ent. ML's	Usage Price /ML	Usage Cost	Ent Price /ML	Ent Cost	Total
2013/14	4813	16400	41.61	$200,268.93	25.19	$413,116.00	$613,384.93
2014/15	4813	16400	45.56	$219,280.28	27.58	$452,312.00	$671,592.28
2015/16	4813	16400	50.12	$241,227.56	30.34	$497,576.00	$738,803.56
2016/17	4813	16400	55.13	$265,340.69	33.38	$547,432.00	$812,772.69

If it was possible to move the population of Tamworth to another centre within the Murray Darling Basin and access this quantity of water from the rivers in that location the cost of the same quantity of water in 2016-27 is shown in the table below and graphically on the following page.

Valley	2016-17 Annual Cost of a 16,400 ML license using 4,813 ML of water
Peel	$ 812,772.69
Namoi	$ 361,143.19
Murrumbidgee	$ 75,329.30
Border	$ 203,106.46
Gwydir	$ 280,649.82
Lachlan	$ 302,490.06
Macquarie	$ 277,344.76
Murray	$ 99,028.99

The table shows that it costs ½ as much to access the same quantity of water in the Namoi as compared to the Peel and 1/10 as much in the Murrumbidgee.



Local Water Utility Water NSW Costs by Valley
$900,000.00
$800,000.00
$700,000.00
$600,000.00
$500,000.00
$400,000.00
$300,000.00
$200,000.00
$100,000.00
$-
2013/2014
2014/2015
2015/2016
2016/2017
$812,772.69
$738,803.56
$671,592.28
$613,384.93
$362,171.74
$356,283.81
$358,713.50
$361,143.19
$67,065.14
$76,910.47
$76,862.34
$75,329.30
Peel
Namoi
Murrumbidgee
Border
Gwydir
Lachlan
Macquarie
Murray

Council and irrigators within the Peel Valley have long been campaigning against the extraordinarily high cost of raw water in the Peel compared to other valleys in the Murray Darling Basin. To this end Council has repeatedly called for postage stamp pricing for bulk water within NSW. It is pleasing to note the ACCC's acknowledgment of this issue and the devotion of a significant portion of the review to discussing the particular issues associated with pricing within the Peel Valley, however, it is also noted the ACCC does not support the introduction of postage stamp pricing and offers no other measures to address the pricing anomaly in the Peel.

Whilst Council does not agree with the ACCC's view about postage stamp pricing Council is concerned that the rules governing water charges should not exclude the introduction of postage stamp pricing at some future stage should the position of the ACCC, or the relevant government change.

2 The case for Postage Stamp Pricing

Council supports requiring monopoly suppliers to provide detailed cost break ups associated with the delivery of bulk water in a particular valley. This can help identify inefficiency's or unnecessary waste. But Council contends there is no reason why having calculated the cost of the service in each valley in the Murray Darling Basin these costs could not be aggregated and divided by the total amount of water delivered across the state to determine the postage stamp price.

Council makes the following points in support of postage stamp pricing

- In the case of supplementary or off allocation flows, where water flows from one valley into another, there is some debate about the charges levied for that water if it is intercepted by a user in a valley that is not the valley the water originated from. For example if flow in the Peel River results in supplementary or off allocation flows in the Namoi, the Namoi irrigators pay to intercept this water at the Namoi valley costs, even though if the water had been intercepted in the Peel the price to intercept would have been double. Postage stamp pricing does away with this issue.
- Water shepherding rules. In a similar manner to the point above in the event environmental flows are released from one valley for the purposes of addressing environmental concerns in a downstream valley how much does the environmental water holder pay for that water – is it the cost associated with the valley it was released from or the cost associated with the valley it ends up. Postage stamp pricing would address this issue.
- Legacy issues. The cost of supplying raw water in some valleys is higher because of decisions made by governments before the notion of users pays was conceived. For example in the Namoi Valley two dams were constructed, Keepit and Split Rock. With the benefit of hindsight it may have been possible to construct one larger dam rather than two. In so doing the cost of raw water in the Namoi could have been reduced because no one argues that the operating cost of two separate smaller dams is higher than one larger dam. Present day users who are required to pay for raw water at costs which reflect the cost of operating two dams were not consulted at the time the decision was made, or able to consider the decision to build the second dam in terms of increased ongoing costs.

3 Is the ACCC being consistent?

The NSW Independent Pricing and Regulatory Tribunal (IPART), a body which it is understood has been licensed by the ACCC to consider charges of monopoly service providers such as Water NSW, is currently considering a pricing submission from the NSW Department of Primary Industries – Water for charges for water management services provided by DPI Water, with the new prices to apply from 1 July 2016.

In their submission DPI Water have proposed a single meter charge for any meter reading west of the Great Dividing Range in NSW.

It is Council's belief that there would be differences in the cost of reading meters in individual valleys, attributed to the type and number of the meters, distances between meters, accessibility and other factors. In fact similar issues apply to the cost of delivering water via a regulated stream west of the Great Dividing Range. Yet for meter reading it is proposed that valley based pricing is not appropriate and a postage stamp price for meter reading be adopted (at least for the areas west of the range), but the same arguments cannot apply to the cost of delivering bulk water.

The ACCC seems to be going to great lengths to justify not allowing postage stamp pricing for bulk water delivery yet allowing one of its agencies to actively consider the exact same thing for meter reading by NSW DPI Water.

It is noted that the meter charge is a proposal at this stage but when this issue was raised with IPART at a public forum to discuss the submission from DPI Water, there was no suggestion that a single meter reading charge for west of the great divide was inconsistent with valley based pricing and therefore would not be accepted by IPART.

4 Conclusion

Council does not accept the ACCC's position on postage stamp pricing and can provide a number of reasons why postage stamp pricing should be adopted.

Notwithstanding these reasons Council's main concern is that the changes to water rules should not preclude the introduction of postage stamp pricing at some time in the future should the ACCC's position change, or one, or more, governments seek to introduce postage stamp pricing for water delivery in NSW.

REGIONAL COUNCIL
Tamworth

ABN: 52 631 074 450
More than just a city. More than just one place.

Kevin Humphries MP
Minister for Natural Resources, Lands and Water
Minister for Western New South Wales
Parliament House
Macquarie Street
SYDNEY NSW 2000

Dear Kevin

CURRENT AND FUTURE RAW WATER PRICING IN THE PEEL VALLEY

Ref: RW:lj SF2229

On behalf of Tamworth Regional Council I would like to thank you for the opportunity to meet with you and your staff in Sydney on 7th August, 2014. Your willingness to hear our concerns regarding current and future raw water pricing in the Peel Valley is greatly appreciated.

All of those present including myself, Cr James Treloar, General Manager Paul Bennett, Director of Water Enterprises Bruce Logan, and local member Kevin Anderson were all greatly encouraged by your understanding of the issues facing our community and the obvious commitment that you have to working with us to develop an acceptable long term solution. Council appreciates that the pricing of raw water across NSW is a complex issue that will require a multifaceted approach in resolving the current inequities that exist between different valleys.

We look forward to continuing our dialogue with you on this important topic.

Yours faithfully,

Cr Russell Webb
Acting Mayor

18 August 2014

Contact: (02) 6767 5441

All correspondence should be addressed to the General Manager:
Telephone: 6767 5555 | PO Box 555 (DX 6125) | trc@tamworth.nsw.gov.au
Facsimile: 6767 5499 | Tamworth NSW 2340 | www.tamworth.nsw.gov.au

Tamworth REGIONAL COUNCIL

ABN: 52 631 074 450

More than just a city. More than just one place.

Kevin Humphries MP
Minister for Natural Resources, Lands and Water
Minister for Western New South Wales
Parliament House
Macquarie Street
SYDNEY NSW 2000

Dear Kevin

CURRENT AND FUTURE RAW WATER PRICING IN THE PEEL VALLEY

Ref: RW:lj SF2229

On behalf of Tamworth Regional Council I would like to thank you for the opportunity to meet with you and your staff in Sydney on 7th August, 2014. Your willingness to hear our concerns regarding current and future raw water pricing in the Peel Valley is greatly appreciated.

All of those present including myself, Cr James Treloar, General Manager Paul Bennett, Director of Water Enterprises Bruce Logan, and local member Kevin Anderson were all greatly encouraged by your understanding of the issues facing our community and the obvious commitment that you have to working with us to develop an acceptable long term solution. Council appreciates that the pricing of raw water across NSW is a complex issue that will require a multifaceted approach in resolving the current inequities that exist between different valleys.

We look forward to continuing our dialogue with you on this important topic.

Yours faithfully,

Cr Russell Webb
Acting Mayor

18 August 2014

Contact: (02) 6767 5441

All correspondence should be addressed to the General Manager:

Telephone: 6767 5555 PO Box 555 (DX 6125) trc@tamworth.nsw.gov.au
Facsimile: 6767 5499 Tamworth NSW 2340 www.tamworth.nsw.gov.au

Mr Barnaby Joyce MP
Member for New England
PO Box 963
TAMWORTH NSW 2340

Dear Mr Joyce

PRICE OF BULK WATER IN THE PEEL VALLEY

Ref: BL/SF2229

In 2014 the Australian Competition and Consumer Commission (ACCC) handed down its first decision on charges that could be levied by Statewater, now Water NSW, for bulk water in valleys across the Murray Darling Basin. The decision related to pricing for 3 years from 2014/15 to and including 2016/17, however, there was a provision in the decision allowing Water NSW to apply for a review of the charges for an upcoming financial year if circumstances warranted.

Water NSW did indeed apply to the ACCC for a review for the 2015-2016 year suggesting, in a number of valleys, but not the Peel, prices should fall.

The ACCC, has recently handed down its decision in relation to this application and has rejected Water NSW's proposal - prices will remain the same as those handed down in the ACCC's 2014 determination with a couple of minor variations in some valleys.

What does this mean for the Peel? Well bulk water prices will rise in 2015-2016 in line with the original determination, which is about a 9% increase.

The attached chart shows the increase in Water NSW bulk water prices in the Peel, since the 2002-03 financial year, compared to the Namoi and Murrumbidgee valleys, based on Tamworth Regional Council's 16,400 Megalitre entitlement and an average annual use of 4,813 Megalitres from Chaffey Dam. It clearly demonstrates the inequity in bulk water pricing across the state. For instance Council pays twice as much for the same volume of water as it would if Tamworth was located where Gunnedah is and took its water from the Namoi River, and over 9 times as much as if Tamworth was located at Wagga Wagga.

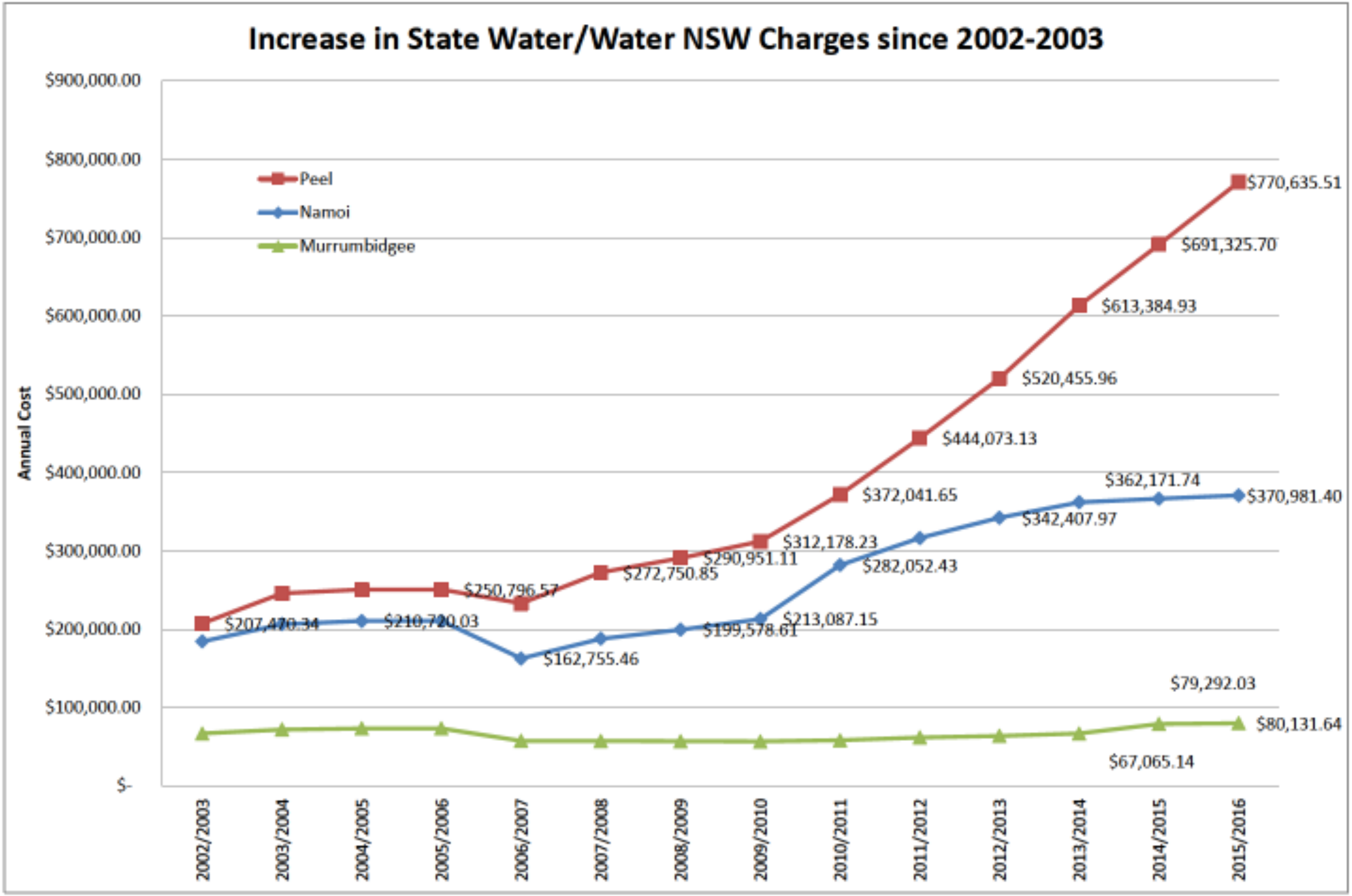
At Council's meeting of 9 June 2015 Council resolved to write to you and the NSW Member for Tamworth regarding the recent decision of the ACCC, highlighting the inequity of bulk water pricing, and seeking your ongoing support to address this inequity.

Yours faithfully

Paul Bennett
General Manager

Contact: Bruce Logan (02) 6767 5811

13 July 2015


Increase in State Water/Water NSW Charges since 2002-2003
$900,000.00
$800,000.00
$700,000.00
$600,000.00
$500,000.00
$400,000.00
$300,000.00
$200,000.00
$100,000.00
$-
Annual Cost
Peel
Namoi
Murrumbidgee
$770,635.51
$691,325.70
$613,384.93
$520,455.96
$444,073.13
$372,041.65
$312,178.23
$290,951.11
$272,750.85
$250,796.57
$207,470.34
$210,720.03
$362,171.74
$370,981.40
$342,407.97
$282,052.43
$213,087.15
$199,578.61
$162,755.46
$79,292.03
$80,131.64
$67,065.14
2002/2003
2003/2004
2004/2005
2005/2006
2006/2007
2007/2008
2008/2009
2009/2010
2010/2011
2011/2012
2012/2013
2013/2014
2014/2015
2015/2016

Mr Kevin Anderson MP
Member for Tamworth
PO Box 1740
TAMWORTH NSW 2340

Dear Kevin

PRICE OF BULK WATER IN THE PEEL VALLEY

Ref: BL/SF2229

In 2014 the Australian Competition and Consumer Commission (ACCC) handed down its first decision on charges that could be levied by Statewater, now Water NSW, for bulk water in valleys across the Murray Darling Basin. The decision related to pricing for 3 years from 2014/15 to and including 2016/17, however, there was a provision in the decision allowing Water NSW to apply for a review of the charges for an upcoming financial year if circumstances warranted.

Water NSW did indeed apply to the ACCC for a review for the 2015-2016 year suggesting, in a number of valleys, but not the Peel, prices should fall.

The ACCC, has recently handed down its decision in relation to this application and has rejected Water NSW's proposal - prices will remain the same as those handed down in the ACCC's 2014 determination with a couple of minor variations in some valleys.

What does this mean for the Peel? Well bulk water prices will rise in 2015-2016 in line with the original determination, which is about a 9% increase.

The attached chart shows the increase in Water NSW bulk water prices in the Peel, since the 2002-03 financial year, compared to the Namoi and Murrumbidgee valleys, based on Tamworth Regional Council's 16,400 Megalitre entitlement and an average annual use of 4,813 Megalitres from Chaffey Dam. It clearly demonstrates the inequity in bulk water pricing across the state. For instance Council pays twice as much for the same volume of water as it would if Tamworth was located where Gunnedah is and took its water from the Namoi River, and over 9 times as much as if Tamworth was located at Wagga Wagga.

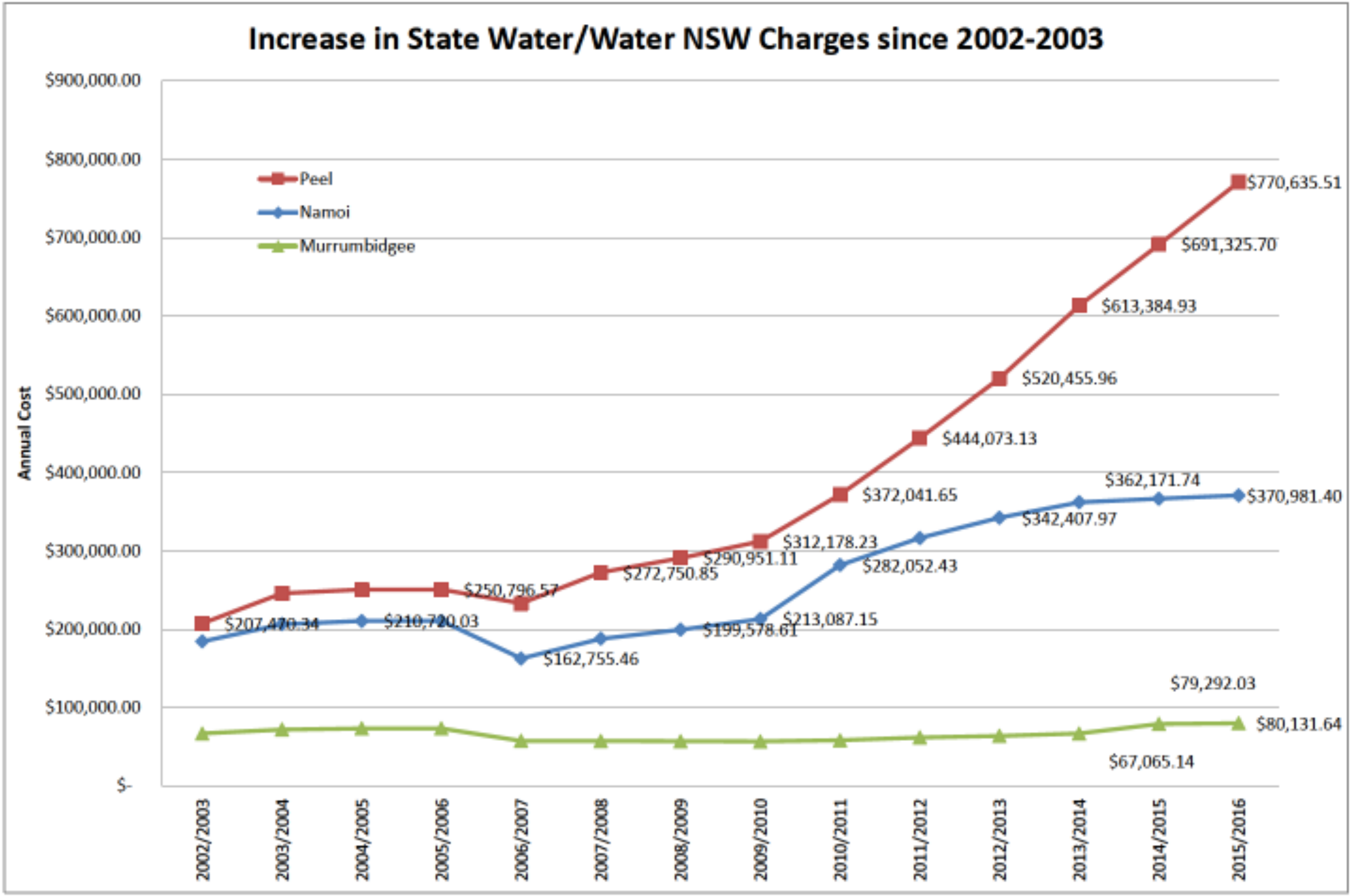
At Council's meeting of 9 June 2015 Council resolved to write to you and the Federal Member for New England regarding the recent decision of the ACCC, highlighting the inequity of bulk water pricing and seeking your ongoing support to address this inequity. To this end I note your attendance at a recent meeting with the NSW Minister for Water, the Honourable Niall Blair MP, to discuss the water pricing issue in the Peel valley, and attended by Councillor James Treloar. Council trusts it can count on your continued advocacy in relation to this matter in the future.

Yours faithfully

Paul Bennett
General Manager

Contact: Bruce Logan - (02) 6767 5811

13 July 2015


Increase in State Water/Water NSW Charges since 2002-2003
Annual Cost
$900,000.00
$800,000.00
$700,000.00
$600,000.00
$500,000.00
$400,000.00
$300,000.00
$200,000.00
$100,000.00
$-
Peel
Namoi
Murrumbidgee
$770,635.51
$691,325.70
$613,384.93
$520,455.96
$444,073.13
$372,041.65
$362,171.74
$370,981.40
$342,407.97
$312,178.23
$290,951.11
$282,052.43
$272,750.85
$250,796.57
$207,470.34
$210,720.03
$213,087.15
$199,578.61
$162,755.46
$79,292.03
$80,131.64
$67,065.14
2002/2003
2003/2004
2004/2005
2005/2006
2006/2007
2007/2008
2008/2009
2009/2010
2010/2011
2011/2012
2012/2013
2013/2014
2014/2015
2015/2016

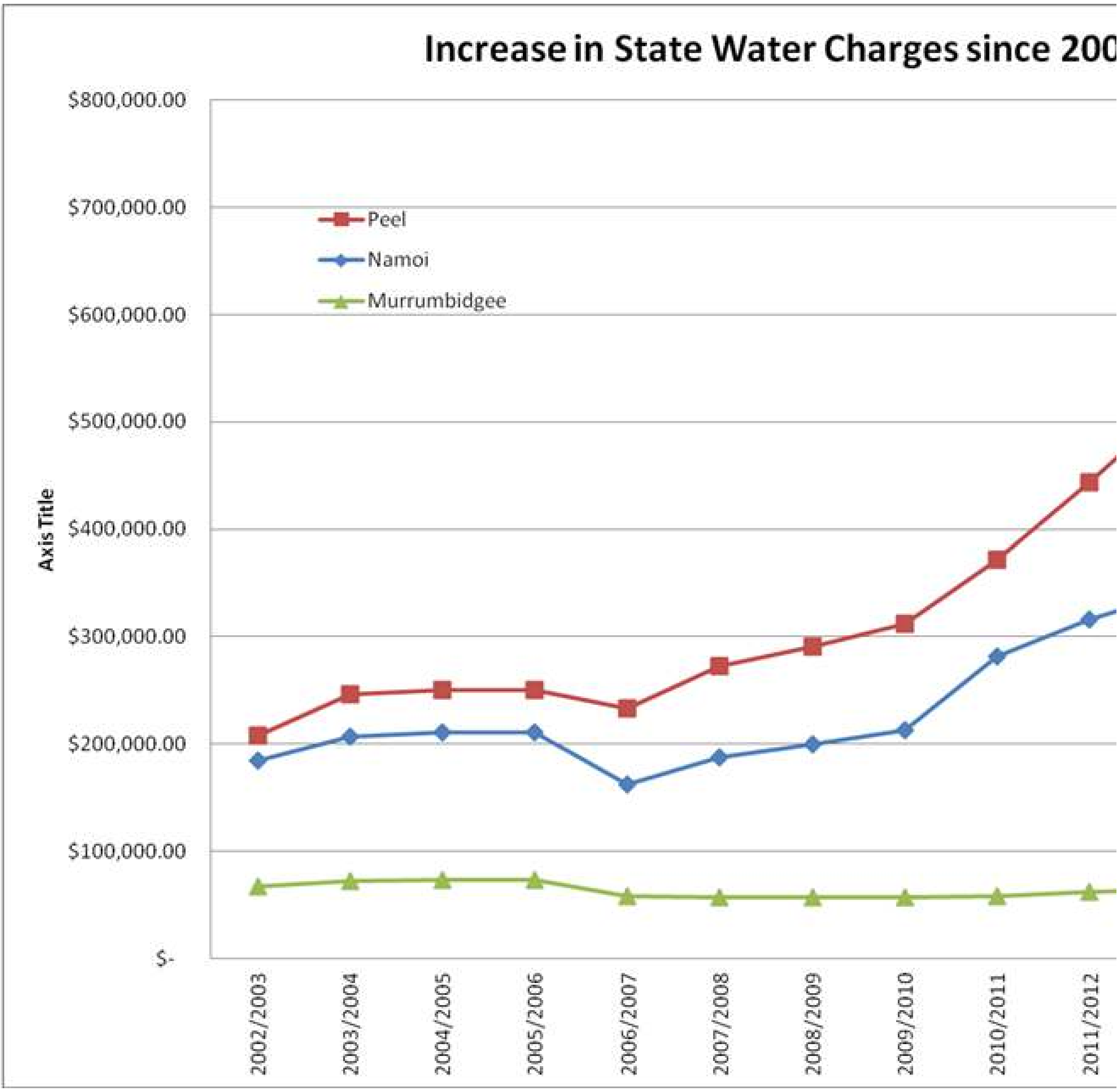
From: Logan, Bruce
Sent: Wednesday, 29 April 2015 11:11 AM
To: waternswreview@accc.gov.au
Subject: Submission on Annual Review of Regulated Charges 2015-2016

Dear Sir/Madam,

Thank you for the opportunity to provide submissions on the ACCC's draft decision relating to the annual review of regulated water charges 2015-2016.

Whist Council accepts the ACCC's draft decision to not agree to State Water's request and maintain charges as set in the ACCC's 2014 Determination Council remains vehemently opposed to the huge variation in charges for water in various valleys across the Murray Darling Basin and highlights again Council's concerns as follows;

1. **Increases in charges since 2002-2003**
    - The cost of high security water in the Peel River has already increased by 233% since 2002-2003 to the current price in 2014-2015, from the various determinations. See chart below;
    - Council believes determining authorities should take into account this fact when considering any future prices rises because, while the determining authority may consider the annual increases are acceptable, when those price rises start from a point already many times what other valleys pay, the benefits of such a decision fast evaporate;



2. Tamworth is being penalised because of its location

- In 2014-2015 if Tamworth was moved to where Wagga Wagga is on the Murrumbidgee and sourced its high security water from that river the cost would be one ninth of the cost it is from the Peel;
- Even if Tamworth moved to Gunnedah – 75 Kilometres away and sourced it's water from the Namoi, a river which the Peel drains into, the cost of sourcing water in 2013-2014 would reduce by 41%;

3. Equity

- Council has significant concerns that current prices unfairly discriminate against towns and cities that, through no fault of their own, happen to be receiving water from a state owned source that is, relatively speaking, expensive to operate. The cost of water should not be a primary consideration for industry wishing to relocate to particular regional areas, but repeated significant price rises, already experienced in the Peel and proposed for the future, are contributing to the cost of water becoming just such a consideration;

4. State Wide postage Stamp Pricing

- Council has previously, and continues to, support the introduction of postage stamp pricing across the State, or at the very least, the merging of the Peel and Namoi Valleys for pricing purposes;
- whilst the principle of user pays is accepted there are many examples where economic rationalism should be, and has been, set aside and a common sense approach applied – postage stamp pricing for raw water is one of them;
- State Water modelling suggests the following state wide prices would arise in 2013/14 if determined using a postage stamp (all valleys across NSW pay the same) recovery methodology;

  Postage Stamp Price (all valleys):

  - state usage charge $7.37; and
  - state high security entitlement charge $5.89.

  Under this scenario Tamworth's water charges for 4,813ML would reduce from $691,325 in 2014 -2015 to $132,068. That is the new cost would be 1/5 of the old.

  State Water modelling suggests that a combined price for Namoi and Peel valleys if they were to merge would be:

  Namoi Peel combined:

  - usage charge $21.54; and
  - high security entitlement charge $19.75.

  Under this scenario Tamworth's water charges for 4,813ML would reduce from $691,325 in 2014-2015 to $427,572. A reduction of 30%;
- Council could charge each of its seven water supply schemes differing costs based on the cost to produce and supply treated water, just like State Water. However, Council has decided to apply postage stamp pricing across the communities in its Council area so that everyone pays the same regardless of cost. If Council can see the equity in such a decision why can't State Water, the State Government and the ACCC?

Thank you for the opportunity to provide comment.

Bruce Logan
Director - Water Enterprises
Tamworth Regional Council
Ph (02)

Mobile
Emai

~ Toyota Country Music Festival Tamworth 2016- Friday 15 January to Sunday 24 January 2016 ~ www.tcmf.com.au

Mr Sebastian Roberts
General Manager – Water Branch
Australian Competition and Consumer Commission
GPO Box 520
MELBOURNE VIC 3001

Dear Sir

SUBMISSION ON THE ACCC'S DRAFT DECISION ON STATE WATER PRICING APPLICATION 2014/15 – 2016/17

Ref: BL/SF2229

I refer the Australian Competition and Consumer Commission's (ACCC's) draft decision on State Water Pricing Application 2014-15 to 2016-17 and call for public submissions.

Council has considered the draft decision and appreciates the opportunity to comment before the ACCC hands down its final decision.

Please find Council's submission attached.

Yours faithfully

Bruce Logan
Director, Water Enterprises

Contact: (02) 6767 5820

8 April 2014

Tamworth Regional Council

Response to ACCC's Draft Decision on State Water Pricing Application 2014-15 to 2016-17

Table of Contents

1 Introduction

Tamworth Regional Council would like to thank the Australian Competition and Consumer Commission (ACCC) for the opportunity to provide comments in relation to the ACCC's draft Decision on State Water Pricing Application 2014-15 to 2016-17.

Council does not propose to address every issue; however comments on key concerns identified in the draft decision are presented below.

2 How bulk water charges are determined and varied

State Water proposed recovering 80% of its costs through entitlement charges and 20% through usage charges (80:20). Council is pleased to see the ACCC recognised this split as unsustainable and supports the retention of the existing split of 40:60. However, Council encourages the ACCC to look at reducing the entitlement/usage charges split further to 25:75 and provides the following in support;

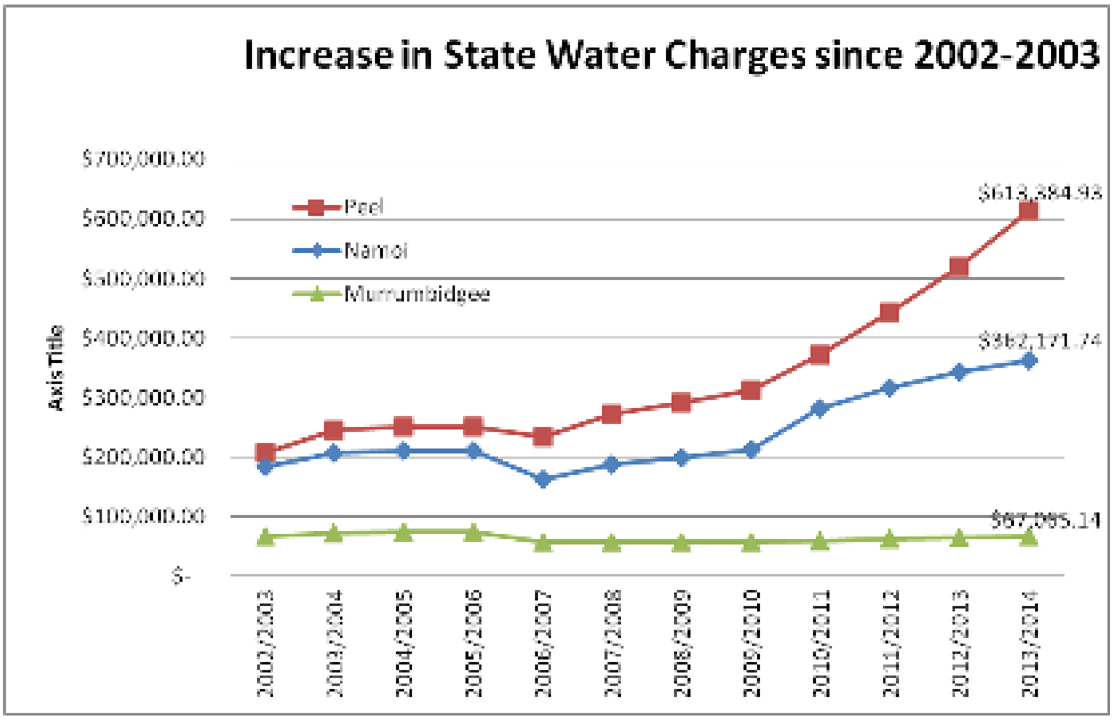
- in its own document, Best Practise Management for Water Supply and Sewer Guidelines – August 2007, the NSW Government recommends local water authorities raise 25% of income from fixed charges and 75% of income from consumption. Failure to comply with this guideline may exclude the Council from receiving funding subsidies from the NSW Government for projects. Yet the same State Government allows it own corporation to propose a completely different, and more onerous, split up
- Council is in the selling water business as well. It has to accept, and budget for, increases and decreases in revenue in its water reserve based on climate conditions – in dry times more water is consumed and revenue rises, in wet times water use falls and with it revenue. It is untenable that local Councils are required to accept and work with revenue volatility but State Government owned corporations do not.

3 Charges for the Peel Valley

In relation to the charges detailed for each valley in the draft decision, it is commendable the ACCC recognised the proposed price rises for the Peel Valley in State Water's submission could not be supported, however, the decision to increase the Peel Valley charges by 10% per year is extremely disappointing given the incredibly high prices Council already pays for water from the Peel. Further points are noted below:

3.1 Increases in charges since 2002-2003

- The cost of high security water in the Peel River has already increased by 196% since 2002-2003 to the current price in 2013-2014, from the various IPART determinations. See chart below;
- Council believes the ACCC should take into account this fact when considering any future prices rises because, while the ACCC may consider the annual increases if 10% a year are acceptable, when those price rises start from a point already many times what other valleys pay, the benefits of such a decision fast evaporate;



3.2 Price rises in the Peel under the Draft Decision

- The cost of water for Tamworth will increase by 33% by 2016-2017 to $812,772 per annum for 4,813 Megalitres;
- The chart below shows how the price paid by Tamworth would change over the next three years, based on an entitlement of 16,400ML/year and an average annual usage of 4,813ML's if Tamworth drew water from any of the Murray Darling Basin valleys based on the draft decision:

- And the table below shows the percentage increase or decrease from the current charges if Tamworth could draw its water from any of the Murray Darling Basin valleys under the draft decision:

Valley	Percentage Increase from current in 2016-2017
Peel	33%
Namoi	6%
Murrumbidgee	-8%
Border	-41%
Gwydir	1%
Lachlan	13%
Macquarie	16%
Murray	-47%

3.3 Tamworth is being penalised because of its location

- In 2013-2014 if Tamworth was moved to where Wagga Wagga is on the Murrumbidgee and sourced its high security water from that river the cost would be one ninth of the cost it is from the Peel;
- Even if Tamworth moved to Gunnedah – 75 Kilometres away and sourced it's water from the Namoi, a river which the Peel drains into, the cost of sourcing water in 2013-2014 would reduce by 41%;
- It is accepted that the Peel Valley and Chaffey Dam are relatively small and therefore, relatively speaking, quite expensive to run, but Council was not involved in the original decision about Dam size etc, and should not be penalised now for poor decisions made in the past.

3.4 Equity

- Council has significant concerns that the proposed price increases unfairly discriminate against towns and cities that, through no fault of their own, happen to be receiving water from a state owned source that is, relatively speaking, expensive to operate. The cost of water should not be a primary consideration for industry wishing to relocate to particular regional areas, but repeated significant price rises, already experienced in the Peel and proposed for the future, are contributing to the cost of water becoming just such a consideration;
- no other Murray Darling Basin town will experience such increases in costs as Tamworth under the draft decision – how can this be equitable?

3.5 State Wide postage Stamp Pricing

- Council has previously, and continues to, support the introduction of postage stamp pricing across the State, or at the very least, the merging of the Peel and Namoi Valleys for pricing purposes;

- whilst the principle of user pays is accepted there are many examples where economic rationalism should be, and has been, set aside and a common sense approach applied – postage stamp pricing for raw water is one of them;
- State Water modelling suggests the following state wide prices would arise in 2013/14 if determined using a postage stamp (all valleys across NSW pay the same) recovery methodology;

  Postage Stamp Price (all valleys):

  - state usage charge $7.37; and
  - state high security entitlement charge $5.89.

  Under this scenario Tamworth's water charges for 4,813ML would reduce from $613,385 in 2013 -2014 to $132,068. That is the new cost would be 1/5 of the old.

  State Water modelling suggests that a combined price for Namoi and Peel valleys if they were to merge would be:

  Namoi Peel combined:

  - usage charge $21.54; and
  - high security entitlement charge $19.75.

  Under this scenario Tamworth's water charges for 4,813ML would reduce from $613,385 in 2013-2014 to $427,572. A reduction of 30%;

- Council could charge each of its seven water supply schemes differing costs based on the cost to produce and supply treated water, just like State Water. However, Council has decided to apply postage stamp pricing across the communities in its Council area so that everyone pays the same regardless of cost. If Council can see the equity in such a decision why can't State Water, the State Government and the ACCC?

3.6 Council's contribution to the Construction and Augmentation of Chaffey Dam is not recognised

- Council contributed ¼ of the budgeted cost of the initial construction of Chaffey Dam yet Council receives no financial recognition of this contribution in ongoing water charges;
- Council is again contributing to the cost of the augmentation of Chaffey Dam to a larger storage. Once again where is the financial recognition of this contribution in ongoing charges?

3.7 Environmental Flows from the Peel

- 95% of all water that falls in the Peel Valley flows into the Namoi and valleys beyond. Why then does Council have to pay more than two times (in 2016-2017) as much for that water at Tamworth than if it was intercepted at Gunnedah, 75 Kilometres away on the Namoi?
- When flow from the Peel into the other valleys occurs and State Water allows supplementary pumping to occur, the price paid for that water is based on the charges levied for the valley where the water is extracted from not on the valley that the water originated in. Given the Peel is the most expensively priced valley in the Murray Darling Basin and 95% of all water that falls in the Peel Valley flows into the Namoi, why aren't downstream consumers who consume water from the Peel

charged at the same price as consumers in the Peel Valley? The introduction of such a scheme would spread the cost of the operating Chaffey Dam across all consumers who access water from Chaffey Dam and/or the Peel Valley, rather than just Peel valley customers, potentially lowering costs within the Peel. This is also another argument in support of postage stamp pricing as water would cost the same regardless of where it was intercepted and where it originated from.

3.8 Capacity to pay

- Council understands the ACCC does not consider capacity of customers to pay during their deliberations. Council believes this is a flawed approach as the increase in prices in the Peel Valley since 2002-2003, where the cost has trebled, does have a significant impact on costs for consumers. In the case of irrigators in the Peel these increased costs cannot be simply passed on to consumers. Council considers it would be perverse for State Water and the ACCC, through its pricing mechanisms, to render an entire valley unable to sustain an irrigation industry, leaving the City of Tamworth as the only significant customer of Chaffey Dam - a significant State asset.

Tamworth REGIONAL COUNCIL

ABN: 52 631 074 450

More than just a city. More than just one place.

Kevin Anderson MP
Member for Tamworth
P O Box 1740
TAMWORTH NSW 2340

Dear Mr Anderson

INEQUITABLE RAW WATER CHARGES PEEL VALLEY

Ref: SF2229

At its meeting of 26 March 2013 Council considered a report on the upcoming review of State Water charges for the supply of raw water in the Murray Darling Basin. This review will be undertaken, for the first time, by the Australian Consumer and Competition Commission rather than the NSW IPART.

A copy of the report is attached for your information.

After considering the report Council resolved as follows;

> *That in relation to the report "ACCC Review of State Water's Regulated Charges 2014-2017", Council:*
>
> *(i) receive and note the report;*
>
> *(ii) write to the Member for Tamworth Mr Kevin Anderson MP, requesting his assistance in ensuring the State Government continues to contribute 10% of State Water's annual operating cost associated with the Peel Valley;*
>
> *(iii) approve Cr Webb and Cr Treloar to make representation on behalf of Council to appropriate State and Federal elected representatives to press Council's case for a more equitable approach to water pricing; and*
>
> *(iv) request the General Manager to make enquiry to Local Government NSW as to possible legal avenues to achieve more equitable pricing of water.*

Your assistance in assisting the Deputy Mayor Cr Webb, and Cr Treloar to gain access to the relevant state Ministers, in particular the Minister for Primary Industries, The Hon. Katrina Hodgkinson, MP, and along with your support in securing a more equitable arrangement for raw water pricing across the State would be appreciated.

In support of Council's position the following information is provided

The spreadsheet attached shows the high security entitlement charges and usage charges for the Peel, Namoi and Murrumbidgee Valleys each year since 2002-2003. It also calculates the cost to Council to have our high security entitlement of 16,400 ML's and average annual water sourced from the Peel of 4,813 ML's and what the same water would cost (high security entitlement and usage) if Tamworth was supplied water from the Namoi or the Murrumbidgee Valleys. It shows that in the Peel the cost of our average annual supply has increased 151% since 2002-03, it would have increased by 85% if Tamworth was in the Namoi and fallen by 5% if Tamworth was supplied from the Murrumbidgee. Please note that the costs do not include NSW Office of Water charges – only State Water charges.

The document attached titled Pricing analysis for Namoi - Peel CSC ... was presented at a recent Namoi-Peel Customer Service Committee meeting as this committee agrees with the need for postage stamp pricing across the State and asked State Water to prepare some figures showing what a postage stamp pricing scheme would look like.

The figures show that if postage stamp price was introduced in 2013-2014 the state wide usage charge would be $7.37 and the state wide high security entitlement charge would be $5.89. If this was introduced then Tamworth's cost of water in 2013-2014 would be $132,068 compared to our current price in 2012-2013 of $520,455.

The other document is a submission Council made to IPART during the recent review of raw water charging systems and provides further arguments to support Councils call for sate wide postage stamp pricing of raw water or, at least, more equitable pricing across the state.

Yours faithfully

Paul Bennett
General Manager

Contact: (02) 6767 5441

11 April 2013

5 2 - Pricing analysis for Namoi-Peel CSC S

0674_001.pdf

Peel Water Usage.xlsx

Ordinary Council - 26-Mar-2013 - ACCC

CSC Report - ACCC Review of State Wat

The Chair
Independent Pricing & Regulatory Tribunal
PO Box Q2920
QVB Post Office NSW 1230

Dear Dr Keating

REVIEW OF NSW OFFICE OF WATER PRICES TO APPLY FROM 1 JULY 2011 – RESPONSE TO IPART'S DRAFT DETERMINATION & DRAFT REPORT

Ref: MB/SF2229

I refer to your letter of 20 July 2009 advising that IPART has commenced the review of bulk water prices proposed by State Water Corporation (SW) and NSW Office of Water (NOW) to apply from July 2010, and inviting input from interested parties on the draft determination.

Council has considered the IPART draft determination and draft report October 2010 for NSW Office of Water and appreciates the opportunity to comment before the Tribunal brings down its final determination.

Please find Council's submission attached.

Yours faithfully

Paul Bennett
General Manager

Contact: Michael Bryant (02) 6767 5817

24 November 2010

Tamworth Regional Council

Response to IPART's Draft Determination & Draft Report October 2010

NSW Office of Water

2011 Pricing Determination

Table of Contents

1 Introduction

Tamworth Regional Council would like to thank the Independent Pricing and Regulatory Tribunal (IPART) for the opportunity to provide comments in relation to the Tribunal's Draft Determination and Draft Report on the review of NSW Office of Water (NOW) charges to apply from July 2011 to June 2014.

Council does not propose to address every issue; however comments on key concerns identified in the IPART draft determination are presented below.

2 NOW Draft Price Increases

Council in its earlier submission to IPART (March 2010) raised concerns about the exceptionally high entitlement and usage charges proposed by NOW, particularly for the Peel Valley.

Attached Table 1 shows the NOW current access and charges (2009/10) and IPART's draft increases to NOW's charges for the Namoi and Peel regulated river entitlement High Security (HS), General Security (GS), unregulated river and groundwater charges over the three year period from 2011/12 to 2013/14.

The proposed pricing increases impact users depending upon the volume of water used. The Table compares prices for the various classes of water on the basis of 100% Usage of Entitlement, 50% Usage of Entitlement and 0% Usage of Entitlement. The proposed pricing shift of more cost to entitlement increases the cost burden to water users that use a small proportion, or none of their entitlement, which is fundamentally wrong as it does not encourage water conservation.

The NOW draft price increases from 2009/10 to 2013/14 are summarised below;

- Peel regulated prices increase from **71%** for a fully active licence (100% Usage) to as high as **85%** for a sleeper licence with no annual extraction.
- The Namoi regulated price increases range from **61%** for a fully active licence to as high as **112%** for a sleeper licence.
- The Namoi / Peel unregulated price increases range from **78%** for a fully active licence to as high as **107%** for a sleeper licence.
- The Namoi / Peel groundwater price increases range from **74%** for a fully active licence to as high as **83%** for a sleeper licence with no water meter fitted.

The proposed increases are lower than originally proposed by NOW however are significant particularly in the Peel Valley (source of Tamworth water supply).

3 NOW Draft Price Increases & Approved SW Maximum Price Increases

Table 2 lists the combined IPART Draft NOW prices and IPART approved SW maximum price increases for most categories of water use in the Peel and Namoi valleys proposed under the 2010/11 price determination (Prices are \$/ML except for area based charges which are \$/ha, which is being phased out in unregulated rivers).

The SW approved and Draft NOW price increases are very high and it is important that IPART consider the combined impact on water users, particularly in the Peel valley. Unfortunately IPART has already approved significant price increase that may be applied by SW effective 1 July 2010 which are a large proportion of bulk water charges for regulated rivers.

The entitlement charges for HS water in the Peel are proposed to increase by **97%** over four years from \$12.66/ML in 2009/10 to \$24.96/ML in 2013/14, while GS entitlement charges will increase by **63%** from \$2.88/ML to \$4.68/ML. Peel usage charges will increase by **48%** from an already very high \$27.83/ML to \$41.11/ML over the four years. These charges are very high compared with most other valleys in NSW. HS access and usage charges in the Peel will increase to a combined **\$66.07/ML** which is well above the state average.

Impact on TRC Town Water Users

Tamworth Regional Council operates town water supplies at Tamworth, Barraba, Manilla, Attunga, Bendemeer, Kootingal / Moonbi and Nundle. The seven town water supplies draw bulk water from various surface and groundwater sources in the Namoi and Peel valleys with approximately 93% of extractions from the Peel valley.

The IPART Draft NOW prices and IPART approved SW maximum prices for bulk water if applied will have a significant impact on Tamworth Regional Council town water supplies plus other water users in the Peel and Namoi Valleys. The consequences of price increases would be severe, particularly in the Peel Valley which already is subject to exceptionally high bulk water charges for regulated water.

Impact of IPART Draft NOW Prices on TRC Water Supplies

Table 3 shows the projected impact of the IPART Draft NOW price increases on Council's town water supplies to 2013/14. The NOW prices **increase by $40,000 or 80%** from $50,000 to $90,000 which is a significant impost on local water users.

Impact of IPART Approved SW Prices & IPART Draft NOW Prices on TRC Water Supplies

Table 4 shows the projected impact of the IPART Draft NOW prices and IPART approved SW maximum prices on Council's town water supplies over four years from 2009/10 to 2013/14. The overall cost would increase from $386,000 to $680,000, **an increase of $294,000 or 76%** which is very high.

Table 5 shows the price increases from 2009/10 to 2013/14 which Council would pay in an average year for **bulk water for Tamworth** supplied from Dungowan and Chaffey Dams. In an average year Council would pay $667,000 and **in a drought year would pay $801,000** which would be $134,000 more. The 2009/10 prices currently paid for an average year for Tamworth water supply amount to $378,000 which is significantly less than the proposed price increases.

The proposed maximum price increases are considered too steep and if applied will severely impact water users in the short and longer terms. IPART should reconsider the proposed price increases and limit any price increases to a much more modest level.

4 Issues Raised by Council for Further Consideration by IPART

Council in its earlier submission to IPART on the NOW and SW proposed pricing raised many concerns as summarised below:

- steepness of proposed increases, particularly for the Peel valley;
- impact of proposed price increases on Peel valley water users including Tamworth water supply customers;
- projected reduced annual extractions by customers going forward will drive up considerably the price of bulk water, and lead to over charging in years when extractions exceed the low level predicted;
- proposed conversion factor for HS to GS to rise above the 2006 level of 6.3 can not be justified given the low level of security of HS water in the Peel;
- the drive by NOW and SW for full cost recovery in the Peel valley should not be allowed due to the unique situation of a small dam in a small catchment, which would make water too expensive;

- ability of Peel water users including the residents of Tamworth city and the towns and villages to pay the exceptionally high prices proposed for 2010 onwards, on top of already very high prices. IPART has previously approved large increases in electricity charges and State Water charges which has a further negative effect on users capacity to pay. IPART needs to consider the cumulative effect of all price increases not just look at each individual situation.
- council paid 25% towards the estimated cost of Chaffey Dam construction costs and should be recognised in bulk water pricing (to date has not been recognised by NOW, SW or IPART);
- implications of the future augmentation of Chaffey Dam from 62GL to 100GL at an estimated cost of $36 Million, part of which Peel water users including Council will be expected to pay (to date has not been recognised by NOW , SW or IPART);; and
- Council has previously raised the need for a single price for each category of water across all Valleys in the State. This would even out the costs of access and delivery of water on a state wide basis, and introduce a level playing field for all water users.

A real concern to local water users including Council is that there appears to be no relief to the exponential increase in water charges for the Peel valley, with significant price hikes proposed over the next four years and IPART foreshadowing the drive to full cost recovery moving forward.

5 Summary

Overall IPART in its Draft Report & Draft Determination has taken on very little of the concerns raised by Council in its earlier submission on proposed NOW price increases and Council requests the Tribunal to revisit the concerns raised and only allow modest increases in the Peel, not the exceptionally high prices proposed in the Draft Determination.

It should also be noted that these proposed price increases are only for NOW charges. Council also pays bulk water charges to SW, and IPART has already approved significant price increases for SW going forward. The combined impact of bulk water pricing by both State owned monopolies needs to be taken into consideration when determining prices for each service provider.

Finally, Council, with funding from the Federal and State Governments, is endeavouring to encourage people to the Tamworth region through its membership of the Evocities group of Councils. Price rises like those proposed contribute to making regional areas less attractive. It is counterproductive for the State Government to fund and support a campaign to encourage people to move to regional areas on one hand and then increase prices in those same regional areas rendering them less attractive on the other.

TABLE 1					
BULK WATER PRICES NAMOI & PEEL VALLEYS - IPART DRAFT APPROVED PRICE INCREASES NSW OFFICE OF WATER FOR 2010/11 TO 2013/14					
Catchment/Water Source	2009/10 Charges NOW	2011/12 Charges NOW	2013/14 Charges NOW	Increase Over 4 years to 2013/14 Amount	Percent
Peel Regulated					
HS - Entitlement	$1.17	$1.51	$2.17	$1.00	85%
GS - Entitlement	$1.17	$1.51	$2.17	$1.00	85%
Usage	$2.12	$2.39	$3.45	$1.33	63%
**Comparison Usage 100% Entitlement*	**$3.29**	**$3.90**	**$5.62**	**$2.33**	**71%**
**Comparison Usage 50% Entitlement*	**$2.23**	**$2.71**	**$3.90**	**$1.67**	**75%**
**Comparison Usage 0% Entitlement*	**$1.17**	**$1.51**	**$2.17**	**$1.00**	**85%**
Namoi Regulated					
HS - Entitlement	$1.21	$1.84	$2.56	$1.35	112%
GS - Entitlement	$1.21	$1.84	$2.56	$1.35	112%
Usage	$1.46	$1.26	$1.75	$0.29	20%
**Comparison Usage 100% Entitlement*	**$2.67**	**$3.10**	**$4.31**	**$1.64**	**61%**
**Comparison Usage 50% Entitlement*	**$1.94**	**$2.47**	**$3.44**	**$1.50**	**77%**
**Comparison Usage 0% Entitlement*	**$1.21**	**$1.84**	**$2.56**	**$1.35**	**112%**
Namoi/Peel Unregulated					
Annual charge (mimimum)	$60.00	$97.90	$97.90	$37.90	63%
Irrigator/Stock & Domestic Area Based ($/ha)	$11.38	$0.00	$0.00	-$11.38	-100%
Irrigator Entitlement - no meter	$2.78	$3.44	$4.96	$2.18	78%
Irrigaton Entitlement - Metered	$1.68	$2.41	$3.47	$1.79	107%
Irrigator Metered - usage	$1.10	$1.03	$1.49	$0.39	35%
**Comparison Usage 100% Entitlement - Metered Irrig*	**$2.78**	**$3.44**	**$4.96**	**$2.18**	**78%**
**Comparison Usage 50% Entitlement - Metered Irrig*	**$2.23**	**$2.93**	**$4.22**	**$1.99**	**89%**
**Comparison Usage 0% Entitlement - Metered Irrig*	**$1.68**	**$2.41**	**$3.47**	**$1.79**	**107%**
Town & Industry with Entitlement - Entitlement	$1.68	$2.41	$3.47	$1.79	107%
Town & Industry with Entitlement - Usage	$1.10	$1.03	$1.49	$0.39	35%
Comparison Usage 100% Entitlement - Town WS	**$2.78**	**$3.44**	**$4.96**	**$2.18**	**78%**
Comparison Usage 50% Entitlement - Town WS	**$2.23**	**$2.93**	**$4.22**	**$1.99**	**89%**
Comparison Usage 0% Entitlement - Town WS	**$1.68**	**$2.41**	**$3.47**	**$1.79**	**107%**
Peel / Namoi Groundwater					
Annual charge (mimimum)	$60.00	$97.90	$97.90	$37.90	63%
Entitlement - Metered	$2.47	$3.21	$4.52	$2.05	83%
Entitlement - No Meter	$2.47	$4.59	$6.46	$3.99	162%
Usage - Metered	$1.24	$1.83	$1.94	$0.70	56%
**Comparison Usage 100% Entitlement - Metered*	**$3.71**	**$5.04**	**$6.46**	$2.75	**74%**
**Comparison Usage 50% Entitlement - Metered*	**$3.09**	**$4.13**	**$5.49**	$2.40	**78%**
**Comparison Usage 0% Entitlement - Metered*	**$2.47**	**$3.21**	**$4.52**	$2.05	**83%**
* NOTE: Nearly all water users use much less water than the 100% water licence Entitlement.					

TABLE 2

BULK WATER PRICES NAMOI & PEEL VALLEYS - PART APPROVED STATE WATER & PART DRAFT APPROVAL NSW OFFICE OF WATER FOR 2010/11 TO 2013/14

Catchment/River Source	2009/10 Charges			2011/12 Charges			2013/14 Charges			Increase Over 4 years to 2013/14	
	SW	NOW	Total	SW	NOW	Total	SW	NOW	Total	Amount	Percentage
Peel Regulated											
HS - Entitlement	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
GS - Entitlement	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Usage	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Namoi Regulated											
HS - Entitlement	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
GS - Entitlement	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Usage	[illegible]	1.45	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	42%
Namoi/Peel Unregulated											
Annual charge (minimum)		60	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
Irrigation Stock & Domestic Area Based (Cents)		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
Irrigation Entitlement - No meter		2.25	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
Irrigation Entitlement - Metered		1.55	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
Irrigation Metered - Usage		1.1	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
Town & Industry with Entitlement - Entitlement		1.65	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
Town & Industry with Entitlement - Usage		1.1	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
Peel / Namoi Groundwater											
Annual charge (minimum)		60	[illegible]		[illegible]			[illegible]	[illegible]	[illegible]	[illegible]
Entitlement - Metered		2.47	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
Entitlement - No Meter		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
Usage - Metered		1.21	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]

TABLE 3

TAMWORTH REGIONAL COUNCIL TOWN WATER SUPPLIES - PROJECTED IMPACT OF BULK WATER SUPPLY IPART DRAFT APPROVED PRICE INCREASES FOR NSW OFFICE OF WATER FOR 2010/11 TO 2013/14 PERIOD

					2009/10			2013/14			
Town/Village	Supply	Water Source	License Volume (ML's)	Cons. (ML's)	Entitlement Charge /ML	Usage Charge /ML	Cost	Entitlement Charge /ML	Usage Charge /ML	Cost	Percentage change
Tamworth	Dungowan Dam	Dungowan Crk - Unreg	5600	3378	1.68	1.1	$13,124	3.47	1.49	$ 24,465	
	Chaffey Dam	Peel River - Regulated	16400	5665	1.17	2.12	$31,198	2.17	3.45	$ 55,132	
Total			**22000**	**9043**			**$44,322**			**$ 79,597**	**80%**
Manilla	Split Rock Dam	Namoi River - Regulated	150	10	1.21	1.46	$196	2.56	1.75	$ 402	
	Namoi River Weir	Namoi River - Unreg	800	409	1.68	1.1	$1,794	3.47	1.49	$ 3,385	
	Bore	Namoi - Ground water	60	0	2.47	1.24	$148	4.52	1.94	$ 271	
Total			**1010**	**419**			**$2,138**			**$ 4,058**	**90%**
Barraba	Barraba Creek	Namoi River - Unreg		87	1.68	1.1	$96	3.47	1.49	$ 130	
	Manilla River	Namoi River - Unreg	381	80	1.68	1.1	$728	3.47	1.49	$ 1,441	
	Connor's Crk Dam	Namoi River - Unreg		10	1.68	1.1	$11	3.47	1.49	$ 15	
	Town bore	Namoi - Ground water	40	0	2.47	1.24	$99	4.52	1.94	$ 181	
Total			**421**	**177**			**$934**			**$ 1,767**	**89%**
Bendemeer	Macdonald River	Namoi Unregulated	74	40	1.68	1.1	$168	3.47	1.49	$ 316	
	Town bore	Namoi Ground water	10	0	2.47	1.24	$25	4.52	1.94	$ 45	
Total			**84**	**40**			**$193**			**$ 362**	**87%**
Nundle	Town bores	Peel - Ground water	100	136	2.47	1.24	$416	4.52	1.94	$ 716	**72%**
Attunga	Town bores	Peel - Ground water	145	70	2.47	1.24	$445	4.52	1.94	$ 791	**78%**
Moonbi Kooting	Town bores	Peel - Ground water	530	307	2.47	1.24	$1,690	4.52	1.94	$ 2,991	**77%**
TOTAL			**24290**	**10192**			**$50,137**			**$90,282**	**80%**
ADDITIONAL ANNUAL COST OF IPART DRAFT APPROVED BULK WATER PRICE INCREASES PROPOSED BY NSW OFFICE OF WATER										**$40,145**	

NOTES:

1) License volumes for Tamworth are correct (have volumetric conversions)

2) Some towns and village licence volumes are not all yet finalised with NOW regarding volumetric conversions.

3) All water supply consumptions except Tamworth (10 year average figures) are based on 2004/05 usage.

4) Fees and charges assume all water supply licences in TRC have a volumetric licence.

TABLE 4

TANWORTH REGIONAL COUNCIL TOWN WATER SUPPLIES - PROJECTED IMPACT OF BULK WATER SUPPLY IPART APPROVED STATE WATER PRICES & IPART DRAFT APPROVED NSW OFFICE OF WATER INCREASES FOR 2010/11 TO 2013/14 PERIOD

					2009/10			2013/14			
Town/Village	Supply	Water Source	License Volume (ML's)	Cons. (ML's)	Entitlement Charge /ML	Usage Charge /ML	Cost	Entitlement Charge /ML	Usage Charge /ML	Cost	Percentage change
Tamworth	Dungowan Dam	Dungowan Crk - Unreg	5600	3378	1.68	1.1	$13,124	3.47	1.49	$ 24,465	
	Chaffey Dam	Peel River - Regulated	16400	5665	12.66	27.63	$365,281	24.96	41.11	$ 642,232	
Total			**22000**	**9043**			**$378,405**			**$ 666,697**	**76%**
Manila	Split Rock Dam	Namoi River - Regulated	150	10	10.52	14.01	$1,718	17.24	19.83	$ 2,784	
	Namoi River Weir	Namoi River - Unreg	800	409	1.68	1.1	$1,794	3.47	1.49	$ 3,385	
	Bore	Namoi - Ground water	60	0	2.47	1.24	$148	4.52	1.94	$ 271	
Total			**1010**	**419**			**$3,660**			**$ 6,441**	**76%**
Barraba	Barraba Creek	Namoi River - Unreg		87	1.68	1.1	$96	3.47	1.49	$ 130	
	Manilla River	Namoi River - Unreg	381	80	1.68	1.1	$728	3.47	1.49	$ 1,441	
	Connor's Crk Dam	Namoi River - Unreg		10	1.68	1.1	$11	3.47	1.49	$ 15	
	Town bore	Namoi - Ground water	40	0	2.47	1.24	$99	4.52	1.94	$ 181	
Total			**421**	**177**			**$934**			**$ 1,767**	**89%**
Bendemeer	Macdonald River	Namoi Unregulated	74	40	1.68	1.1	$168	3.47	1.49	$ 316	
	Town bore	Namoi Ground water	10	0	2.47	1.24	$25	4.52	1.94	$ 45	
Total			**84**	**40**			**$193**			**$ 362**	**87%**
Nundle	Town bores	Peel - Ground water	100	136	2.47	1.24	$416	4.52	1.94	$ 716	**72%**
Attunga	Town bores	Peel - Ground water	145	70	2.47	1.24	$445	4.52	1.94	$ 791	**78%**
Moonbi Kootingal	Town bores	Peel - Ground water	530	307	2.47	1.24	$1,690	4.52	1.94	$ 2,991	**77%**
TOTAL			**24290**	**10192**			**$385,742**			**$679,765**	**76%**
ADDITIONAL ANNUAL COST OF PART APPROVED STATE WATER PRICES & DRAFT APPROVED NOW BULK WATER PRICE INCREASES										**$294,023**	

NOTES:

1) License volumes for Tamworth are correct (have volumetric conversions)

2) Some towns and village licence volumes are not all yet finalised with NOW regarding volumetric conversions.

3) All water supply consumptions except Tamworth (10 year average figures) are based on 2004/05 usage.

4) Fees and charges assume all water supply licences in TRC have a volumetric licence.

TABLE 5											
TAMWORTH REGIONAL COUNCIL - TAMWORTH WATER SUPPLY - PROJECTED IMPACT OF IPART APPROVED BULK WATER SUPPLY PRICES & IPART DRAFT NSW OFFICE OF WATER PRICES 2009/10 TO 2013/14											
					2009/10			2013/14			
Town/Village	Supply	Water Source	License Volume (ML's)	Cons. (ML's)	Entitlement Charge /ML	Usage Charge /ML	Cost	Entitlement Charge /ML	Usage Charge /ML	Cost	Percentage change
Tamworth Water Sourced Dungowan & Chaffey Dams											
Tamworth	Dungowan Dam	Dungowan Crk - Unreg	5800	3378	1.98	1.1	$13,124	3.47	1.49	$ 24,465	
	Chaffey Dam	Peel River - Regulated	16400	5665	12.98	27.53	$365,281	24.89	41.11	$ 642,724	
Total			22000	9043			$378,405			$ 667,189	76%
Tamworth Water Sourced Chaffey Dam (drought)											
Tamworth	Dungowan Dam	Dungowan Crk - Unreg	5800	0	1.98	1.1	$9,408	3.47	1.49	$ 19,432	
	Chaffey Dam	Peel River - Regulated	16400	9043	12.98	27.53	$459,281	24.89	41.11	$ 781,594	
Total			22000	9043			$468,689			$ 801,026	71%
NOTES											
1) License volumes for Tamworth are correct (have volumetric conversions)											
2) Tamworth Water supply consumptions based on 10 year average figures to 2004/05											

Tamworth Regional Council
ABN: 52 631 074 450
More than just a city. More than just one place.

The Chair
Independent Pricing & Regulatory Tribunal
PO Box Q2920
QVB Post Office NSW 1230

Dear Dr Keating

REVIEW OF NSW OFFICE OF WATER PRICES TO APPLY FROM 1 JULY 2010 – COMMENTS ON NSW OFFICE OF WATER SUBMISSION

Ref: MB/SF2229

I refer to your letter of 20 July 2009 advising that IPART has commenced the review of bulk water prices proposed by State Water Corporation (SW) and NSW Office of Water (NOW) to apply from July 2010, and inviting input from interested parties on the draft determination.

Council has considered the NSW Office of Water submission of December 2009 to IPART and appreciates the opportunity to comment before the Tribunal brings down its draft determination.

Please find Council's submission attached.

Yours faithfully

Glenn Inglis
General Manager

Contact: Michael Bryant (02) 6767 5817

23 February 2010

Tamworth Regional Council

Response to IPART

NSW Office of Water's Submission Regarding the 2010 Pricing Determination

Table of Contents

1 Executive Summary

Tamworth Regional Council has considered the Submission by the NSW Office of Water (NOW) to the Independent Pricing and Regulatory Tribunal (IPART) on the 2010 bulk water pricing determination and has grave concern about the impact of the proposed price increases on water users, particularly in the Peel valley.

The NOW submission proposes a significant increase in staffing levels associated with the national water initiatives including Murray Darling Basin planning, with the costs to be sheeted home to water users instead of the broader community via Federal and State government funding. The additional resources claimed by NOW need to closely examined by IPART to establish if all current resources are being used in a cost effective manner, and whether any additional resources are actually required. The split up of costs between water users and the State Government also needs to be closely examined to identify any cost shifting and whether cost should be absorbed by the broader community associated with the Murray Darling Basin.

The NOW submission proposes a fixed pricing regime based on "entitlement" instead of the current "entitlement plus usage" pricing, which will lead to wastage of water, as there would be no pricing signals to encourage water conservation. The current pricing based on "entitlement plus usage" should be maintained in any future pricing determinations.

The proposed NOW price increases over the next three years would impact significantly on water users in the Peel and Namoi Valleys, as summarised below;

- Peel regulated prices increase from **111%** for a fully active licence (100% Usage) to as high as **492%** for a sleeper licence with no annual extraction.
- The Namoi regulated price increases range from **107%** for a fully active licence to as high as **358%** for a sleeper licence.
- The Namoi / Peel unregulated price increases range from **138%** for a fully active licence to as high as **293%** for a sleeper licence.
- The Namoi / Peel groundwater price increases range from **174%** for a fully active licence to as high as **312%** for a sleeper licence.

The proposed increases are significant particularly in the Peel Valley (source of Tamworth water supply). There is also no transition with all the proposed increases taking place in the first year 2010/11 which is totally unacceptable to all water users including Council.

If the proposed bulk water price increases were applied to Council's seven town water supplies over three years from 2009/10 to 2012/13.the overall cost for bulk water in an average year would increase from the current $386,000 to $933,000, an increase of $561,000 or 142%.. In a drought year when all water for Tamworth water supply is sourced from Chaffey Dam Council would pay $1,129,000 which would be $216,000 more than for an average year. The proposed maximum price increases are considered far too steep and if applied will severely impact water users in the short and longer terms

In the 2006 IPART determination the consumption forecast for the Peel of 14,675ML per year was developed using the Long Run Average (LRA) approach based on the Integrated Quantity and Quality Model (IQQM) of the NOW. SW and NOW are now proposing a 15 year rolling average based on actual extractions as the basis for forecasting consumption in the new determination, which for the Peel results in a 22.2% reduction in annual extraction to 11,422 per year. SW and NOW costs applied over a smaller volume of water significantly increase the consumption charge. What is proposed is not in the best interest of bulk water customers as the charges for water delivered would be far too high should a run of wetter seasons (and more runoff into SW dams) be experienced and larger volumes of bulk water sold to customers (mainly for irrigation).

When the storage capacity for Chaffey Dam in the Peel valley is increased from 62GL to 100GL the current LRA extraction figure for the Peel of 14,675ML per year may be a reasonable figure to use instead of the 11,422ML per year proposed by SW. Therefore the Tribunal should adopt the current LRA figure of 14,675ML per year for the Peel and not the 15 year rolling average proposed by SW and NOW.

If full cost recovery proposed by SW and NOW was to be applied it would have a dramatic impact on water users particularly in the Peel valley which already has exceptionally high bulk water prices compared with other valleys in NSW. In the Peel valley the combined access and usage charges for **High Security** water would **increase from $40.49/ML in 2009/2010 to $95.29/ML in 2012/2013** and for **General Security** the **increases would be from $27.83/ML to $64.02/ML**. What is of concern to Council and other regulated water users in the Peel valley is that **Peel water users are paying usage charges up to 17 times more than most other inland regulated water users**. While being forced to pay such high prices for water, the security of regulated water in the Peel Valley needs improving by increasing the storage capacity of Chaffey Dam. Therefore any increase in prices beyond the current level is considered untenable as water users do not have the ability to pay full cost recovery.

An additional concern for regulated water users in the Peel Valley is that should Chaffey Dam be augmented at an estimated cost of $36 Million to increase capacity to provide greater reliability for water users, under the current arrangements regulated water users in the Peel Valley would be required to contribute to the cost of these works.

Council contributed 25% toward the estimated cost of constructing Chaffey Dam (62 GL capacity) when it was constructed in 1979. This needs to be taken into consideration by the State Government when determining user charges that return income on investment to the government.

Council has previously raised the need for a single price for each category of water across all Valleys in the State to even out the costs of access and delivery of water on a state wide basis, and introduce a level playing field for all water users. It is pleasing to note that in the NOW submission it is seeking approval from IPART to apply a common price to groundwater west of the Great Dividing Range and a common price for groundwater in costal areas.

If a state wide price, or west of the Great Dividing Range price for each category of bulk water is not able to be introduced then NOW and SW should consider merging the Peel Valley with the Namoi Valley to overcome the inequity in having a small sub-catchment of the Namoi valley quarantined and paying significantly higher prices for regulated water with a lower reliability

Despite obvious links a high security user in Gunnedah, 75 kilometres West of Tamworth on the Namoi River in 2010/11, under the NOW & SW proposals (entitlement and usage charges) will pay a total of $39.51 per Megalitre compared to $95.29 per Megalitre for a high security user in Tamworth on the Peel.

Council believes that the valley by valley approach for pricing and full cost recovery within each valley, is effectively disadvantaging business production in the Tamworth region by distorting the competitive process.

2 Introduction

Tamworth Regional Council would like to thank the Independent Pricing and Regulatory Tribunal (IPART) for the opportunity to provide comments in relation to the NSW Office of Water (NOW) Submission on the 2010 Pricing Determination

Council does not propose to address every issue; however comments on key concerns identified in the NOW submission are presented below.

In the submission Council requests the Tribunal to take into consideration the quantum of the combined price increases proposed by NOW and State Water (SW) in their pricing submissions to apply from 2010/11.

3 Proposed Increase in NOW Staffing Levels

The NOW submission proposes a significant expansion in staffing levels to undertake current activities and to implement activities associated with the national water initiative agreed to by the State and Federal Governments. The submission also foreshadows that extra cost may also arise in the future to cover the cost of the metering being rolled out under the water initiative. Actual details in the submission are somewhat sketchy other than additional staff number that will be required.

The resources proposed by NOW in the submission are significant and a real concern as the costs will be sheeted home to water users. The Tribunal will need to closely examine if current resources are being effectively used and whether any additional staff and resources are in fact required.

The proposed share of costs between the State Government and water users needs to be closely examined by the Tribunal to ascertain if there is cost shifting and if it is fair and equitable taking into consideration the environment, broader catchment management and national water issues and other non water user activities which are undertaken by NOW. It would appear that water users are being saddled with costs which should be the responsibility of the broader community and government to pay for.

4 Fixed Pricing Proposed by NOW

The proposed pricing change by NOW from “entitlement plus usage” to a “100% entitlement” charge does not encourage water conservation and will lead to wastage of water.

On this basis Council opposes a sole fixed charge irrespective of how much water is used within the limit of the licence. The NSW Government should have a water pricing structure in place like Councils are required under Best Practice Guidelines which encourages water conservation. Council therefore favours a pricing arrangement with a mix of entitlement and usage charges which send the correct pricing signals encouraging water conservation.

Within the submission (Section 11.1) NOW argue that there is a conflict of interest by NOW having part of its revenue linked to water usage. This is not considered to be the case as Water Sharing Plans include rules and trigger levels for the determination of annual extractions in accordance with seasonal conditions and water reserves.

The submission states that water charges are small in relation to the total budget of a viable farm business and that in recent times prices in the regulated rivers for trade of allocation water has been around $200 per ML. These two claims are totally inappropriate particularly in the Peel valley where water prices combined with low reliability have a significant impact on the viability of water users. As for trading in general security water, if there is any water to trade within the Peel valley it only brings a fraction of the price claimed by NOW particularly when the current and proposed usage charges in the Peel are exceptionally high.

5 NOW Proposed Price Increases

Council sources bulk water for its seven town water supplies from the Peel and Namoi valleys, with the majority sourced from the Peel valley.

Council has concerns about the exceptionally high fixed charges proposed by NOW, particularly for the Peel Valley.

Table 1 below shows the NOW current charges and proposed increases to Namoi and Peel regulated river entitlement High Security (HS), General Security (GS), unregulated river and groundwater charges over the three year period from 2009/10 to 2012/13. The prices are based on 100% cost recovery including the costs of the Commonwealth reforms should they be passed onto the States.

The proposed shift in pricing from a mix of entitlement and usage charges to a single charge based on entitlement volume will impact users depending upon the volume of water used. The Table also compares prices for the various classes of water on the basis of 100% Usage of Entitlement, 50% Usage of Entitlement and 0% Usage of Entitlement. The proposed pricing on entitlement only shifts more of the cost to water users that use a small proportion of their entitlement.

The price increases over the three years are summarised below;

- Peel regulated prices increase from **111%** for a fully active licence (100% Usage) to as high as **492%** for a sleeper licence with no annual extraction.
- The Namoi regulated price increases range from **107%** for a fully active licence to as high as **358%** for a sleeper licence.
- The Namoi / Peel unregulated price increases range from **138%** for a fully active licence to as high as **293%** for a sleeper licence.
- The Namoi / Peel groundwater price increases range from **174%** for a fully active licence to as high as **312%** for a sleeper licence.

The proposed increases are significant particularly in the Peel Valley (source of Tamworth water supply). There is also no transition with all the proposed increases taking place in the first year 2010/11 which is totally unacceptable to all water users including Council.

6 NOW & SW Proposed Maximum Price Increases in Peel & Namoi Valleys

Table 2 below summarises the combined NOW and SW proposed maximum price increases for most categories of water use in the Peel and Namoi valleys proposed under the 2010 price determination (Prices are $/ML except for area based charges which are $/ha).

The SW and NOW proposed price increases are exceptionally high and it is very important that the Tribunal consider the combined impact of the significant price increases proposed by SW and NOW.

TABLE 1

BULK WATER PRICES NAMOI & PEEL VALLEYS – NSW OFFICE OF WATER SUBMISSIONS TO IPART FOR 2010/11 TO 2012/13 (Propose 100% Fixed Cost on Licence Volume, 100% Fixed Cost Recovery, Including Costs of Commonwealth Reforms)

Catchment/Water Source	2008/10 Charges NOW	2010/11 Charges NOW	2011/12 Charges NOW	2012/13 Charges NOW	Increase Over 3 years to 2012/13 Amount	Increase Over 3 years to 2012/13 Percent
Peel Regulated						
HS - Entitlement	1.17	$6.49	$6.81	$6.93	$5.76	492%
GS - Entitlement	1.17	$6.49	$6.81	$6.93	$5.76	492%
Usage	2.12	$0.00	$0.00	$0.00	-$2.12	-100%
*Comparison Usage 150% Entitlement	3.29	$6.49	$6.81	$6.93	$3.64	111%
*Comparison Usage 50% Entitlement	2.23	$6.49	$6.81	$6.93	$4.70	211%
*Comparison Usage 0% Entitlement	1.17	$6.49	$6.81	$6.93	$5.76	492%
Namoi Regulated						
HS - Entitlement	1.21	$5.17	$5.41	$5.54	$4.33	358%
GS - Entitlement	1.21	$5.17	$5.41	$5.54	$4.33	358%
Usage	1.46	$0.00	$0.00	$0.00	-$1.46	-100%
*Comparison Usage 150% Entitlement	2.67	$5.17	$5.41	$5.54	$2.87	107%
*Comparison Usage 50% Entitlement	1.94	$5.17	$5.41	$5.54	$3.60	186%
*Comparison Usage 0% Entitlement	1.21	$5.17	$5.41	$5.54	$4.33	358%
Namoi/Peel Unregulated						
Annual charge (minimum)	60	$0.00			-$60.00	-100%
Irrigator/Stock & Domestic Area Based ($/ha)	11.38	$0.00	$0.00	$0.00	-$11.38	-100%
Irrigator Entitlement - no meter	2.78	$5.76	$6.15	$6.61	$3.83	138%
Irrigator Entitlement - Metered	1.68	$5.76	$6.15	$6.61	$4.93	293%
Irrigator Metered - Usage	1.10	$0.00	$0.00	$0.00	-$1.10	-100%
*Comparison Usage 150% Entitlement - Metered Irrig	2.78	$5.76	$6.15	$6.61	$3.83	138%
*Comparison Usage 50% Entitlement - Metered Irrig	2.23	$5.76	$6.15	$6.61	$4.38	196%
*Comparison Usage 0% Entitlement - Metered Irrig	1.68	$5.76	$6.15	$6.61	$4.93	293%
Town & Industry with Entitlement - Entitlement	1.68	$5.76	$6.15	$6.61	$4.93	293%
Town & Industry with Entitlement - Usage	1.10	$0.00	$0.00	$0.00	-$1.10	-100%
Comparison Usage 150% Entitlement - Town WS	2.78	$5.76	$6.15	$6.61	$3.83	138%
Comparison Usage 50% Entitlement - Town WS	2.23	$5.76	$6.15	$6.61	$4.38	196%
Comparison Usage 0% Entitlement - Town WS	1.68	$5.76	$6.15	$6.61	$4.93	293%
Peel / Namoi Groundwater						
Annual charge (minimum)	60				-$60.00	-100%
Entitlement	2.47	$9.64	$9.88	$10.17	$7.70	312%
Usage	1.24	$0.00	$0.00	$0.00	-$1.24	-100%
*Comparison Usage 150% Entitlement	3.71	$9.64	$9.88	$10.17	$6.46	174%
*Comparison Usage 50% Entitlement	3.09	$9.64	$9.88	$10.17	$7.08	229%
*Comparison Usage 0% Entitlement	2.47	$9.64	$9.88	$10.17	$7.70	312%

* NOTE: Nearly all water users use much less water than the 100% water licence Entitlement

TABLE 2

BULK WATER PRICES NAMOI & PEEL VALLEYS - STATE WATER & NSW OFFICE OF WATER SUBMISSIONS TO IPART FOR 2010/11 TO 2012/13 (NSW Office of Water propose 100% Fixed Cost on Licence Volume, 100% Fixed Cost Recovery, Including Costs of Commonwealth Reforms)

Catchment/Water Source	2009/10 Charges			2010/11 Charges			2012/13 Charges			Increase Over 3 years to 2012/13	
	SW	NOW	Total	SW	NOW	Total	SW	NOW	Total	Amount	Percentage
Peel Regulated											
HS - Entitlement	11.49	1.17	$12.66	$23.72	$6.49	$30.21	$24.34	$6.93	$31.27	$18.61	147%
GS - Entitlement	1.71	1.17	$2.88	$2.03	$6.49	$8.52	$2.09	$6.93	$9.02	$6.14	213%
Usage	25.71	2.12	$27.83	$62.36	$0.00	$62.36	$64.02	$0.00	$64.02	$36.19	130%
Namoi Regulated											
HS - Entitlement	9.31	1.21	$10.52	$12.37	$5.17	$17.54	$14.01	$5.54	$19.55	$9.03	86%
GS - Entitlement	7.44	1.21	$8.65	$7.41	$5.17	$12.58	$8.39	$5.54	$13.93	$5.28	61%
Usage	12.55	1.46	$14.01	$17.62	$0.00	$17.62	$19.96	$0.00	$19.96	$5.95	42%
Namoi/Peel Unregulated											
Annual charge (minimum)		60	$60.00		$0.00	$0.00		$0.00	$0.00	-$60.00	-100%
Irrigator/Stock & Domestic Area Based ($/ha)		11.38	$11.38		$0.00	$0.00		$0.00	$0.00	-$11.38	-100%
Irrigator Entitlement - no meter		2.78	$2.78		$5.64	$5.64		$6.61	$6.61	$3.83	138%
Irrigaton Entitlement - Metered		1.68	$1.68		$5.64	$5.64		$6.61	$6.61	$4.93	293%
Irrigator Metered - usage		1.1	$1.10		$0.00	$0.00		$0.00	$0.00	-$1.10	-100%
Town & Industry with Entitlement - Entitlement		1.68	$1.68		$5.64	$5.64		$6.61	$6.61	$4.93	293%
Town & Industry with Entitlement - Usage		1.1	$1.10		$5.64	$5.64		$6.61	$6.61	$5.51	501%
Peel / Namoi Groundwater											
Annual charge (mimimum)		60	$60.00						$0.00	-$60.00	-100%
Entitlement		2.47	$2.47		$9.64	$9.64		$10.17	$10.17	$7.70	312%
Usage		1.24	$1.24		$0.00	$0.00		$0.00	$0.00	-$1.24	-100%

7 Impact on Water Users

The seven town water supplies in the Tamworth Regional Council draw bulk water from various surface and groundwater sources in the Namoi and Peel valleys with approximately 93% of extractions from the Peel valley.

The proposed NOW and SW maximum price increases for bulk water if applied will have a significant impact on Tamworth Regional Council town water supplies plus other water users in the Peel and Namoi Valleys. Council is gravely concerned about the consequences of price increases, particularly in the Peel Valley which already is subject to exceptionally high bulk water charges for regulated water.

Table 3 below shows the projected impact of the proposed bulk water price increases on Council's town water supplies over three years from 2009/10 to 2012/13. The overall cost will increase from $386,000 to $933,000, an increase of $561,000 or 142% which is not considered viable.

Table 4 shows the price increases from 2009/10 to 2012/13 which Council would pay in an average year for bulk water for Tamworth supplied from Dungowan and Chaffey Dams, plus the scenario of a drought year when all water is sourced from Chaffey Dam. In an average year Council would pay $913,000 and in a drought year would pay $1,129,000 which would be $216,000 more. The 2009/10 prices currently paid for an average year for Tamworth water supply amount to $378,000 which is significantly less than the proposed price increases

The proposed maximum price increases are considered far too steep and if applied will severely impact water users in the short and longer terms. Council therefore request the Tribunal to closely scrutinise the proposed price increases and limit any price increases to a much more modest and sustainable level.

TABLE 3

TAMWORTH REGIONAL COUNCIL TOWN WATER SUPPLIES - PROJECTED IMPACT OF BULK WATER SUPPLY PRICE INCREASES PROPOSED BY STATE WATER & NSW OFFICE OF WATER TO IPART FOR 2009/10 TO 2012/13 PERIOD

					2009/10			2012/13			
Town/Village	**Supply**	**Water Source**	**License Volume (ML's)**	**Ave Annual Cons. (ML's)**	**Entitlement Charge /ML**	**Usage Charge /ML**	**Cost**	**Entitlement Charge /ML**	**Usage Charge /ML**	**Cost**	**Percentage change**
Tamworth	Dungowan Dam	Dungowan Crk - Unreg	5600	3378	1.68	1.1	$13,124	6.61	0	$ 37,016	
	Chaffey Dam	Peel River - Regulated	16400	5665	12.66	27.83	$365,281	31.27	64.02	$ 875,501	
Total			**22000**	**9043**			**$378,405**			**$ 912,517**	**141%**
Manilla	Split Rock Dam	Namoi River - Regulated	150	10	10.52	14.01	$1,718	19.55	19.96	$ 3,132	
	Namoi River Weir	Namoi River - Unreg	800	409	1.68	1.1	$1,794	6.61	0	$ 5,288	
	Bore	Namoi - Ground water	60	0	2.47	1.24	$148	10.17	0	$ 610	
Total			**1010**	**419**			**$3,660**			**$ 9,030**	**147%**
Barraba	Barraba Creek	Namoi River - Unreg		87	1.68	1.1	$96	6.61	0	$ -	
	Manilla River	Namoi River - Unreg	381	80	1.68	1.1	$728	6.61	0	$ 2,518	
	Connor's Crk Dam	Namoi River - Unreg		10	1.68	1.1	$11	6.61	0	$ -	
	Town bore	Namoi - Ground water	40	0	2.47	1.24	$99	10.17	0	$ 407	
Total			**421**	**177**			**$934**			**$ 2,925**	**213%**
Bendemeer	Macdonald River	Namoi Unregulated	74	40	1.68	1.1	$168	10.17	0	$ 753	
	Town bore	Namoi Ground water	10	0	2.47	1.24	$25	10.17	0	$ 102	
Total			**84**	**40**			**$193**			**$ 854**	**343%**
Nundle	Town bores	Peel - Ground water	100	136	2.47	1.24	$416	10.17	0	$ 1,017	**145%**
Attunga	Town bores	Peel - Ground water	145	70	2.47	1.24	$445	10.17	0	$ 1,475	**231%**
Moonbi Kootingal	Town bores	Peel - Ground water	530	307	2.47	1.24	$1,690	10.17	0	$ 5,390	**219%**
TOTAL			**24290**	**10192**			**$385,742**			**$933,209**	**142%**
ADDITIONAL ANNUAL COST OF PROPOSED BULK WATER PRICE INCREASES										**$547,467**	

NOTES:
1) License volumes for Tamworth are correct (have volumetric conversions)
2) Some towns and village licence volumes are not all yet finalised with NOW regarding volumetric conversions.
3) All water supply consumptions except Tamworth (10 year average figures) are based on 2004/05 usage.
4) Fees and charges assume all water supply licences in TRC have a volumetric licence.

TABLE 4

TAMWORTH REGIONAL COUNCIL - TAMWORTH WATER SUPPLY - PROJECTED IMPACT OF BULK WATER SUPPLY PRICE INCREASES PROPOSED BY STATE WATER & NSW OFFICE OF WATER TO IPART FOR 2009/10 TO 2012/13 PERIOD

					2009/10			2012/13			
Town/Village	Supply	Water Source	License Volume (ML's)	Ave Annual Cons. (ML's)	Entitlement Charge /ML	Usage Charge /ML	Cost	Entitlement Charge /ML	Usage Charge /ML	Cost	Percentage change
Tamworth Water Sourced Dungowan & Chaffey Dams											
Tamworth	Dungowan Dam	Dungowan Crk - Unreg	5600	3378	1.68	1.1	$13,124	6.61	0	$ 37,016	
	Chaffey Dam	Peel River - Regulated	16400	5665	12.66	27.83	$365,281	31.27	64.02	$ 875,501	
Total			**22000**	**9043**			**$378,405**			**$ 912,517**	**141%**
Tamworth Water Sourced Chaffey Dam (drought)											
Tamworth	Dungowan Dam	Dungowan Crk - Unreg	5600	0	1.68	1.1	$9,408	6.61	0	$ 37,016	
	Chaffey Dam	Peel River - Regulated	16400	9043	12.66	27.83	$459,291	31.27	64.02	$ 1,091,761	
Total			**22000**	**9043**			**$468,699**			**$ 1,128,777**	**141%**

NOTES:

1) License volumes for Tamworth are correct (have volumetric conversions)

2) Tamworth Water supply consumptions based on 10 year average figures to 2004/05.

8 Projected Reduced Water Consumption by Customers

Council in its recent submission to IPART on the SW submission for price increases from July 2010 raised concerns about the proposed future projected water consumption figures proposed by SW which are also being proposed by NOW (should a usage charge be applied in the 2010 IPART determination on NOW prices).

In the 2006 IPART determination the consumption forecast for the Peel of 14,675ML per year was developed using the Long Run Average (LRA) approach based on the Integrated Quantity and Quality Model (IQQM) of the NOW. SW and NOW are now proposing a 15 year rolling average based on actual extractions as the basis for forecasting consumption in the new determination, which for the Peel results in a 22.2% reduction in annual extraction to 11,422 per year. SW and NOW costs applied over a smaller volume of water significantly increase the consumption charge.

This is a new initiative by SW and NOW and Council considers that it is not in the best interest of bulk water customers as the charges for water delivered would be far too high should a run of wetter seasons (and more runoff into SW dams) be experienced and larger volumes of bulk water sold to customers (mainly for irrigation).

It should also be noted that when the storage capacity for Chaffey Dam in the Peel valley is increased from 62GL to 100GL the current LRA extraction figure for the Peel of 14,675ML per year may be a reasonable figure to use instead of the 11,422ML per year proposed by SW.

Therefore the Tribunal should adopt the current LRA figure of 14,675ML per year for the Peel and not the 15 year rolling average proposed by SW and NOW.

9 Full Cost Recovery by SW & NOW

If full cost recovery proposed by SW and NOW was to be applied it would have a dramatic impact on water users particularly in the Peel valley which already has exceptionally high bulk water prices compared with other valleys in NSW.

At present in the Peel the 2009/10 SW & NOW charges for HS water comprise an entitlement charge of $12.66/ML and usage charge of $27.83/ML totalling $40.49/ML which is well in excess of all other river valleys except the North Coast and South Coast.

The “percentage” increases in the cost of Peel regulated water may not sound so high when compared with some other proposed “percentage” price increases, however what the Tribunal needs to be aware of and address is the quantum of the current high prices for Peel regulated water, and if the proposed 147% increase for HS entitlement and 130% increase in usage price is added to the NOW and SW prices, the additional cost of water becomes massively high. For example the proposed increase in Peel regulated usage from the current $**27.83 per ML** to **$64.02 per ML** represents an increase of $36.19 per ML, which is far in excess of the increase in usage costs of other inland regulated river catchments. **The proposed increase would see Peel regulated usage prices being over three times higher than the Namoi, around seven times higher than the Border Rivers, and 17 times higher than the Murrumbidgee Valley.**

What is of concern to Council and other regulated water users in the Peel Valley is that Peel water users are paying usage charges up to 17 times more than most other inland regulated water users. While being forced to pay such high prices for water, the security of regulated water in the Peel

Valley needs improving by increasing the storage capacity of Chaffey Dam. Therefore any increase in prices beyond the current level is considered untenable.

Under the National Water Initiative (NWI) the bulk water supplier is generally to achieve full cost recovery for water services to ensure business viability and avoid monopoly rents. SW notes that a further NWI principle is transparency of operating subsidies when full cost recovery is not likely to be achieved in the long term.

A transitional operating subsidy was provided from the NSW Government over the 2006 IPART determination period. This operating subsidy resulted from IPART's decision to exercise its discretion not to pursue full cost recovery in the Peel, North Coast, South Coast and Hunter due to impacts on customers.

The principle of full cost recovery may be acceptable in Valleys with large storages, but the Peel valley and Chaffey Dam are too small to apply full cost recovery principles and therefore it is Council's view that similar subsidies should remain in place at least until Chaffey Dam is augmented and a more reliable supply is provided to all users.

10 Other Related Issues

Some other related issues are listed below

10.1 Ability to Pay

The report titled "Ability to Pay – State Water Customers", prepared by RMCG August 2009 as part of SW's submission to IPART concluded that regions facing the most significant impact due to the proposed price changes are relatively small in terms of business numbers and total water usage. The high impact regions being the Peel Valley, North Coast and South Coast will face a significant increase in the cost/affordability of water should full cost recovery be implemented.

In the NOW submission Section 13 Impacts of Pricing, it states that bulk water costs as a percentage of total farm costs are relatively small, representing between 0.8 to 4.7 percent of total farm costs, and that IPART had previously concluded that bulk water costs are not a significant factor such as commodity prices, interest rates, fuel prices and climatic conditions. This statement by NOW is in conflict with the RMCG report and needs to be revisited and take into consideration the serious situation that currently applies in the Peel valley which would be elevated by the proposed price increases.

Council has grave concerns about the capacity for general security users to meet the significant cost increases foreshadowed in the SW and NOW submissions.

What needs to be taken into consideration by the Tribunal is that due to the gross over allocation of water in the Peel valley and associated low reliability most water users have excess licence in an attempt to access a reasonable volume of water for irrigation. This amplifies the costs. Further even after taking these steps for many years prior to the current water year Peel irrigators have not received an annual allocation. Also due to the limited size of Chaffey Dam there is no continuous accounting which means water can not be carried over into subsequent years, a feature that is enjoyed by regulated water users in all other valleys west of the range.

10.2 Council Contribution to Chaffey Dam Construction 62GL Capacity

Council contributed 25% toward the estimated cost of constructing Chaffey Dam when it was constructed in 1979. This needs to be taken into consideration by the State Government when determining user charges that return income on investment to the government.

Council is of the view that it too should be receiving a return on the investment in Chaffey Dam, or alternatively a discount on bulk water charges.

Council would like the Tribunal to determine its position on this very important issue. Such determination will enable Council to examine its legal position going forward.

10.3 Future Augmentation of Chaffey Dam to 100GL Capacity

The State Government has recognised for many years now that Chaffey Dam with a capacity of 62GL was undersized to provide adequate reliability for town water supply, other HS users and GS users.

Planning for upgrading the dam to 100GL capacity was well advanced by 1990, however the government of the day decided not to proceed with the project. This decision by the government to delay the project has now severely disadvantaged regulated water users in the Peel Valley.

An additional concern for regulated water users in the Peel Valley is that should Chaffey Dam be augmented to increase capacity to provide greater reliability for water users, under the current arrangements regulated water users in the Peel Valley would be required to contribute to the cost of these works. The price of this backlog capital works is presently estimated at $36 Million to increase the dam capacity. So on one hand, the Government is asking users to contribute to the cost of an augmentation that increases the reliability of supply, yet whilst those users are waiting, unfairly charges existing users because of this very unreliability. This may be acceptable if there was some prospect that users charges will fall for those who contribute to the cost of the augmentation but on evidence to date this will not happen.

10.4 A State Wide Price for Water

Council has previously raised the need for a single price for each category of water across all Valleys in the State. This would even out the costs of access and delivery of water on a state wide basis, and introduce a level playing field for all water users. The present system unfairly discriminates against towns and cities that, through no fault of their own, happen to be receiving water from a state owned storage/source that is, relatively speaking, expensive to operate. In Council's view the cost of water should not be a primary consideration for industry wishing to relocate to particular regional areas, but repeated significant price rises by the State Government are contributing to the cost of water becoming just such a consideration.

It is pleasing to note that in the NOW submission it is seeking approval from IPART to apply a common price to groundwater west of the Great Dividing Range and a common price for groundwater in costal areas. This is a positive step and the principle should also be applied to all surface water charges for NOW and SW west of the Great Dividing Range.

10.5 Peel Valley to become part of the Namoi

If a state wide price, or west of the Great Dividing Range price for each category of bulk water is not able to be introduced then NOW and SW should consider merging the Peel Valley with the Namoi Valley.

NOW already has a common charge in the Namoi and Peel for groundwater and unregulated surface water. NOW and SW at present apply different prices for regulated water in the Namoi and Peel.

The Peel River runs into the Namoi system and is a much smaller system relative to the Namoi. The existing Namoi Water Sharing Plan links the two Valleys by stating that any increase in Tamworth City's water requirements will be accommodated 95 % from the Namoi and only 5 % from the Peel.

Further, the absence of off stream storages in the Peel Valley means that off stream allocation pumping and storage of water in the Peel is virtually non existent. Therefore significant flows in the Peel, capable of providing environmental flows and off allocation pumping, pass virtually untouched into the Namoi system where users with off stream storages can pump water that originated in the Peel Valley just up stream. Ironically this same water is able to be purchased at a much cheaper price in the Namoi. The Peel river flows into the Namoi immediately below Keepit Dam at Carroll Gap (mid way between Tamworth and Gunnedah) and for most of the time keeps the Namoi River primed, playing a large part in minimising transmission losses in the Namoi valley below Keepit Dam which is a huge benefit for all regulated water users in the Namoi valley below Keepit Dam.

Despite these obvious links a high security user in Gunnedah, 75 kilometres West of Tamworth on the Namoi River in 2010/11, under the NOW & SW proposals (entitlement and usage charges) will pay a total of $39.51 per Megalitre compared to $95.29 per Megalitre for a high security user in Tamworth.

Clearly there are good reasons for the Peel and Namoi valleys to have a common water pricing structure. There are no other examples in NSW where a small valley in the upper reaches of a major valley such as the Namoi have been quarantined for water pricing, particularly when the downstream valley benefits significantly from water flowing out of the sub-catchment.

11 Summary

The proposed NOW price increases for bulk water if applied will have a significant impact on Tamworth Regional Council town water supplies plus other water users in the Peel and Namoi Valleys, and Council is gravely concerned about the consequences of price increases, particularly in the Peel valley where the current regulated water prices are already exceptionally high.

The State Government is effectively disadvantaging business production in the Tamworth region by distorting the competitive process. Inaccurate resource allocations in this way, necessitate decisions on production and consumption, for example, where to purchase goods and services, being gravely distorted. Trade practices legislation is being examined to determine conformity or otherwise.

Council trusts that the above comments provide constructive input to the Tribunal when considering the NOW submission and urges IPART to consider the effect on users of the proposed price charges and to recommend more appropriate charging regimes that more equitably share the burden of cost recovery across the State.

The Chair
Independent Pricing & Regulatory Tribunal
PO Box Q2920
QVB Post Office NSW 1230

Dear Dr Keating

REVIEW OF STATE WATER BULK WATER PRICES TO APPLY FROM 1 JULY 2010

Ref: MB/SF2229

I refer to your letter of 20 July 2009 advising that IPART has commenced the review of bulk water prices proposed by State Water Corporation (SW) and NSW Office of Water (NOW) to apply from July 2010, and inviting input from interested parties on the draft determination.

Council has considered the SW submission of September 2009 to IPART and appreciates the opportunity to comment before the Tribunal brings down its draft determination.

Please find Council's submission attached.

Yours faithfully

Glenn Inglis
General Manager

Contact: Michael Bryant (02) 6767 5817

15 October 2009

Tamworth Regional Council

Response to IPART

State Water Corporation’s Submission Regarding the

2010 Pricing Determination

Table of Contents

1 Introduction

Tamworth Regional Council would like to thank the Independent Pricing and Regulatory Tribunal (IPART) for the opportunity to provide comments in relation to State Water Corporation's (SW) Submission on the 2010 Pricing Determination

Council does not propose to address every issue; however comments on key concerns identified in the SW submission are presented below.

2 SW Proposed Price Increases

Council has concerns about the exceptionally high entitlement and usage charges proposed by SW, particularly for the Peel Valley.

The Table below shows the current prices and proposed increases to Namoi and Peel regulated river entitlement High Security (HS) and General Security (GS) and usage charge prices over the four year period from 2009/10 to 2013/14.

The proposed increases are significant particularly in the Peel Valley (source of Tamworth water supply) where there is no transition with all the proposed increases taking place in the first year 2010/11. The prices in the Peel continue to rise from 2010/11 to peak in the third year 2012/13 and then drop by around 4%. The prices at the peak in 2012/13 represent a 149% increase from 2009/10 for usage rising from $25.72 to $64.02/ML. HS entitlement charges will more than double in the first year while GS entitlement charges will increase by 22% by the third year.

The proposed HS and usage price increases in the Namoi are about half as steep as the prices proposed for the Peel, however with increases of around 60% they remain very high and will impact on the price of raw water sourced from Split Rock Dam for the town of Manilla.

Proposed SW Prices for Regulated Rivers

Year	Namoi Charges (\$/ML)			Peel Charges (\$/ML)		
	H/S Ent.	G/S Ent.	Usage	H/S Ent.	G/S Ent.	Usage
2009/10	9.31	7.44	12.56	11.50	1.71	25.72
2010/11	12.37	7.41	17.62	23.72	2.03	62.36
2011/12	13.53	8.1	19.29	24.22	2.08	63.68
2012/13	14.01	8.39	19.96	24.34	2.09	64.02
2013/14	14.68.	8.79	20.92	23.37	2.00	61.47
Inc. over 4 years	**58%**	**18%**	**67%**	**103%**	**17%**	**139%**

3 Impact of Proposed SW Price Increases in Peel

The Table below summarises the impact of the proposed price increases on Tamworth water supply in the first year 2010/11 based on Council's Chaffey Dam HS water entitlement of 16,400ML and annual bulk water consumption from Chaffey Dam of an average 5,400ML per year.

Charge	2009/10	2010/11	Increase in Charges	%age Increase
Entitlement 16,400ML	$188,600	$389,008	$200,408	**106.3%**
Chaffey usage 5,400ML pa	$138,888	$336,744	$197,856	**142.5%**
Total	**$327,488**	**$725,752**	**$398,264**	**121.6%**

If approved by IPART the proposed SW price increases for supply of Peel bulk water for Tamworth on average would increase in the first year from $327,488 to $725,752, an increase of $398,264 or 122%, which would be a significant impost on town water supply users.

In dry and drought years when Council draws nearly all of Tamworth's water from Chaffey Dam the SW bulk water charges for Tamworth could increase to as high as $900,000 per year which equates to a 274 % increase.

Also in addition to the above SW price increases NOW will also be applying to IPART for price increases for regulated and unregulated surface water plus ground water which will increase the cost of bulk water.

The price increases proposed by SW for the Peel are mainly driven by reduced water consumption forecasts, and for HS water a proposed premium (conversion factor) to reflect the level of security, plus full cost recovery.

4 Projected Reduced Water Consumption by Customers

In the 2006 IPART determination the consumption forecast for the Peel of 14,675ML per year was developed using the Long Run Average (LRA) approach based on the Integrated Quantity and Quality Model (IQQM) of the NOW. SW now proposes a 15 year rolling average based on actual extractions as the basis for forecasting consumption in the new determination, which for the Peel results in a 22.2% reduction in annual extraction to 11,422 per year. SW costs applied over a smaller volume of water significantly increase the consumption charge.

This is a new initiative by SW and Council considers that it is not in the best interest of bulk water customers as the charges for water delivered would be far too high should a run of wetter seasons (and more runoff into SW dams) be experienced and larger volumes of bulk water sold to customers (mainly for irrigation).

It should also be noted that when the storage capacity for Chaffey Dam is increased from 62GL to 100GL the current LRA extraction figure for the Peel of 14,675ML per year may be a reasonable figure to use instead of the 11,422ML per year proposed by SW.

Therefore IPART should adopt the current LRA figure of 14,675ML per year for the Peel and not the 15 year rolling average proposed by SW.

5 Conversion Factors

SW defines the conversion factor as representing the quantity of GS units needed to secure one unit of HS water. SW reason that in theory, the conversion factor incorporates an "unders" and "overs" system so that in dry times, HS licence holders benefit from greater water security and in wet times HS pay more than necessary. If the conversion factor is correct, the net effect of converting from a GS licence to a HS licence should be more or less equal. If it is incorrect, this will influence licence holder behaviour. If there is a large net benefit, more licence holders will seek to convert their licences to capture the benefit. Similarly, if there is a large net cost conversion from HS to GS licences would occur to avoid the cost.

Under the 2006 Determination, HS licence holders pay a higher entitlement charge than GS licence holders, known as the HS premium which is based on the Water Sharing Plan (WSP) conversion factors. SW and IPART believe that HS licence holders do receive a higher standard of service, therefore a differentiated price, including a HS premium is deemed appropriate. Given that there is no WSP for the Peel Valley it is considered that the 2006 Determination used conversion factors based on assumptions which are questionable.

SW believe the current conversion factors (based on previous assumptions for the Peel Valley) do not accurately reflect the benefit of holding a HS licence over a GS licence and propose that the HS premium be adjusted by a scarcity premium based on allocations over the last 15 years. This approach is a concern for Council. SW proposes that in the 2010 Determination IPART adopt an alternative methodology which incorporates existing conversion factors, adjusted for recent changes in reliability. SW proposes that the HS premium incorporate two elements, an access premium and a scarcity premium. The access premium to reflect the greater security of supply enjoyed by HS licence holders, which is reflected in the 2006 Determination premium via the WSP conversion factors. The scarcity premium to reflect the value of this supply under changing seasonal conditions which is not currently reflected in the 2006 Determination.

The ratios of current and proposed GS to HS conversion factors for various Valleys across NSW are shown in the Table below;

SW Proposed Conversion Factors

Valley	Existing Ratios	15 Year Average Allocation	Inverse Average Allocations	Proposed Ratio (Existing Ratio multiplied by Inv Av Alloc)
Border	1.28	39%	2.56	3.28
Gwydir	1.81	55%	1.81	3.28
Hunter	3.0	93%	1.07	3.22
Lachlan	2.45	43%	2.34	5.73
Macquarie	1.88	36%	2.74	5.16

Valley	Existing Ratios	15 Year Average Allocation	Inverse Average Allocations	Proposed Ratio (Existing Ratio multiplied by Inv Av Alloc)
Murray	1.25	50%	1.99	2.49
Murrumbidgee	1.63	54%	1.85	3.01
Namoi	1.25	75%	1.34	1.67
North Coast	1.25	81%	1.23	1.54
Peel	6.73	58%	1.73	11.66
South Coast	1.7	67%	1.49	2.53

The proposed ratios would result in large increases in the proposed HS premium in Valleys where the security of GS licences has been deemed to have deteriorated relative to HS licences.

The Peel conversion factor would increase from an already very high 6.73 to an exceptionally high 11.66, more than double the second highest proposed conversion factor of 5.73 being the Lachlan Valley. As Tamworth Regional Council holds the majority of HS water in the Peel, this constitutes a major shift in charges from GS users to Council.

In the submission SW propose that HS licence holders generally receive near or full allocations every year and therefore they also have a greater capacity to meet higher water charges than GS licence holders. This may be the situation in some Valleys across NSW however is definitely not the case in the Peel Valley. Chaffey Dam currently has limited storage capacity and until such time as the dam is augmented to increase capacity from 62GL to 100GL capacity Tamworth water supply will not have access to water with the high level of security described by SW.

In June 2007 Tamworth was facing a very grave situation with its water supply where the city was forced onto Level 5 Emergency water restrictions as Chaffey Dam fell below 15% capacity. Under Level 5 Emergency restrictions water is rationed with no outdoor use, no use of evaporative air conditioners and severe restrictions on business consumers including schools, motels and other institutions. The city had reached a stage where there was only 12 months emergency water supply for essential purposes only remaining from all known sources. It is clear that under the current water sharing arrangements Tamworth does not enjoy a high level of security on its Peel HS water licences.

The Peel Valley is considered unique in that it does not have the ratio of HS and GS licences like other larger Valleys and the whole theory on conversion factors is not really relevant, particularly as Council does not trade its HS town water supply licence which is about 95% of the HS licence volume in the Peel Valley.

There is a significant equity issue raised by the proposed changes. There is no doubt that as proposed SW intends to unfairly shift costs to Tamworth Regional Council.

Clearly the conversion factors proposed in the Peel Valley are unrealistic, can not be justified and should not be approved by IPART particularly when there is no WSP for the Peel Valley and overall security in the Valley is very low, including security of water for town water supply.

6 Full Cost Recovery

The "percentage" increases in the cost of Peel regulated water may not sound so high when compared with some other proposed "percentage" price increases, however what the Tribunal needs to be aware of and address is the quantum of the current high prices for Peel regulated water, and if the proposed 111% increase for HS entitlement and 149% increase in usage price is added to the SW price, the additional cost of water becomes massively high. For example the proposed increase in Peel regulated usage from the current $25.72 per ML to $64.02 per ML represents an increase of $38.30 per ML, which is far in excess of the increase in usage costs of other inland regulated river catchments. The proposed increase would see Peel regulated usage prices being over three times higher than the Namoi, around seven times higher than the Border Rivers, and 17 times higher than the Murrumbidgee Valley.

What is of concern to Council and other regulated water users in the Peel Valley is that Peel water users are paying usage charges up to 17 times more than most other inland regulated water users. While being forced to pay such high prices for water, the security of regulated water in the Peel Valley needs improving by increasing the storage capacity of Chaffey Dam. Therefore any increase in prices beyond the current level is considered untenable.

Under the National Water Initiative the bulk water supplier is generally to achieve full cost recovery for water services to ensure business viability and avoid monopoly rents. SW notes that a further NWI principle is transparency of operating subsidies when full cost recovery is not likely to be achieved in the long term.

SW received a transitional operating subsidy from the NSW Government over the 2006 IPART determination period. This operating subsidy resulted from IPART's decision to exercise its discretion not to pursue full cost recovery in the Peel, North Coast, South Coast and Hunter due to impacts on customers.

The principle of full cost recovery may be acceptable in Valleys with large storages, but the Peel Valley and Chaffey Dam are too small to apply full cost recovery principles and therefore it is Council's view that similar subsidies should remain in place at least until Chaffey Dam is augmented and a more reliable supply is provided to all users.

7 Other Related Issues

Some other related issues are listed below

7.1 Ability to Pay

The report titled "Ability to Pay – State Water Customers", prepared by RMCG August 2009 as part of SW's submission to IPART concluded that regions facing the most significant impact due to the proposed price changes are relatively small in terms of business numbers and total water usage. The high impact regions being the Peel Valley, North Coast and South Coast will face a significant increase in the cost/affordability of water should full cost recovery be implemented.

Council has grave concerns about the capacity for general security users to meet the significant cost increases foreshadowed in the SW submission.

7.2 Council Contribution to Chaffey Dam Construction 62GL Capacity

Council contributed 25% toward the estimated cost of constructing Chaffey Dam when it was constructed in 1979. This needs to be taken into consideration by the State Government when determining user charges that return income on investment to the government.

Council is of the view that it too should be receiving a return on the investment in Chaffey Dam, or alternatively a discount on bulk water charges.

Council would like IPART to determine its position on this very important issue. Such determination will enable Council to examine its legal position going forward.

7.3 Future Augmentation of Chaffey Dam to 100GL Capacity

The State Government has recognised for many years now that Chaffey Dam with a capacity of 62GL was undersized to provide adequate reliability for town water supply, other HS users and GS users.

Planning for upgrading the dam to 100GL capacity was well advanced by 1990, however the government of the day decided not to proceed with the project. This decision by the government to delay the project has now severely disadvantaged regulated water users in the Peel Valley.

An additional concern for regulated water users in the Peel Valley is that should Chaffey Dam be augmented to increase capacity to provide greater reliability for water users, under the current arrangements regulated water users in the Peel Valley would be required to contribute to the cost of these works. The price of this backlog capital works is presently estimated at $36 Million to increase the dam capacity. So on one hand, the Government is asking users to contribute to the cost of an augmentation that increases the reliability of supply, yet whilst those users are waiting, unfairly charges existing users because of this very unreliability. This may be acceptable if there was some prospect that users charges will fall for those who contribute to the cost of the augmentation but on evidence to date this will not happen.

7.4 A State Wide Price for Water

Council has previously raised the need for a single price for each category of water across all Valleys in the State. This would even out the costs of access and delivery of water on a state wide basis, and introduce a level playing field for all water users. The present system unfairly discriminates against towns and cities that, through no fault of their own, happen to be receiving water from a state owned storage/source that is, relatively speaking, expensive to operate. In Council's view the cost of water should not be a primary consideration for industry wishing to relocate to particular regional areas, but repeated significant price rises by the State Government are contributing to the cost of water becoming just such a consideration.

7.5 Peel Valley to become part of the Namoi

If a state wide price for raw water is not able to be introduced then SW should consider merging the Peel Valley with the Namoi Valley. The Peel River runs into the Namoi system and is a much smaller system relative to the Namoi. The existing Namoi Water Sharing Plan links the 2 Valleys by stating that any increase in Tamworth City's water requirements will be accommodated 95 % from the Namoi and only 5 % from the Peel.

Further, the absence of off stream storages in the Peel Valley means that off stream allocation pumping and storage of water in the Peel is virtually non existent. Therefore significant flows in the Peel, capable of providing off allocation pumping, pass virtually untouched to the Namoi system where users with off stream storages can pump water that originated in the Peel Valley just up stream.

Despite these obvious links a high security user in Gunnedah, 75 kilometres West of Tamworth on the Namoi River will pay in 2010/11, under the SW proposal, a total of $29.99 per Megalitre compared to $86.08 per Megalitre for a high security user in Tamworth.

7.6 Pricing to encourage sale of inactive licenses

The Peel Valley is significantly over allocated. However a large proportion of the licenses issued for the Peel are inactive. One mechanism to reduce the number of inactive licenses is to look at the ratio of entitlement to usage charges for general security users and increasing the entitlement charges relative to usage charges. In this way an inactive license holder will pay more for water even if it is not used and therefore be encouraged to sell/relinquish the license on financial grounds. The present ratio of $2.03 per Megalitre for general security users compared to $62.36 for usage (proposed 2010/11) does not provide the correct financial incentive.

8 Summary

The proposed SW price increases for bulk water on regulated streams if applied will have a significant impact on Tamworth Regional Council town water supplies (Tamworth and Manilla) plus other water users in the Peel and Namoi Valleys, and Council is gravely concerned about the consequences of price increases, particularly in the Peel Valley where the current prices are already exceptionally high.

The State Government is effectively disadvantaging business production in the Tamworth region by distorting the competitive process. Inaccurate resource allocations in this way, necessitate decisions on production and consumption, for example, where to purchase goods and services, being gravely distorted. Trade practices legislation is being examined to determine conformity or otherwise.

Council trusts that the above comments provide constructive input to the Tribunal when considering the SW submission and urges IPART to consider the effect on users of the proposed price charges and to recommend more appropriate charging regimes that more equitably share the burden of cost recovery across the State.

Hon David Campbell, MP
Minister for Water Utilities
GPO Box 5341
SYDNEY NSW 2001

Dear Mr Campbell

SEPTEMBER 2006 IPART DETERMINATION ON 2006-20010 BULK WATER PRICES

Ref: MB/SF2229

The purpose of the letter is to express Council's concern about the severe impact on local water users of the recent increases in bulk water prices adopted by the State Government to apply over the period 1 October 2006 to 30 June 2010, and to seek assurances that water users in the Peel Valley will not continue to be penalised by the high cost of bulk water.

Council is appreciative of you meeting with a deputation of Peel/Namoi valley water users including representatives of Council in early September 2006 to discuss the Independent Pricing and Regulatory Tribunal (IPART) Draft review of bulk water prices plus the need to upgrade Chaffey Dam to provide an adequate level of security to Peel Valley water users.

While the IPART Final Determination on bulk water prices are slightly lower than the Draft IPART Determination, the increases are extremely high and will impact water users in the Peel and Namoi Valleys, particularly with water users having limited access to water.

The **ATTACHED** Table summarises most of the combined State Water Corporation (SWC) and Department of Natural Resources (DNR) price increases for the Peel and Namoi valleys, assuming a CPI increase of 3% per annum for regulated and unregulated surface water plus ground water. (Prices are $/ML except for annual charges and area based charges which are $/ha).

Town Water Supplies

The seven town water supplies administered by Tamworth Regional Council (TRC) draw bulk water from various surface and groundwater sources in the Namoi and Peel valleys. The **ATTACHED** table summarises the impact of the proposed price increases on Council's water supplies.

Tamworth Water Supply

The Tamworth water supply is supplied with bulk water from two dams, Council's Dungowan Dam (via pipeline) and the State owned Chaffey Dam (via the Peel River).

The maximum prices increases approved by IPART will have a big impact on Tamworth water supply, due to the significant price increases imposed on Peel Regulated High Security water from Chaffey Dam.

While the Peel Regulated High Security entitlement charge will reduce by 10% from the 2005/06 level of $13.93 per ML to $12.53 per ML the usage charge will increase dramatically from the current $11.11 to around $27.55 per ML by 2009/10, an increase of 148% over four years. On average use this will increase the cost for bulk water from the Peel River for Tamworth water supply by 24% from the current $290,000 to around $360,000 per year.

Water charges for raw water extracted from Council's Dungowan Dam on the Unregulated Dungowan Creek will reduce from $18,000 to $13,000 per year, which only goes little way towards offsetting the steep price increases in the Peel River.

On average water use for Tamworth water supply (from Dungowan Dam and Peel River) the maximum price increases approved by IPART will see costs for raw water increase from around $310,000 to around $375,000 per year, or a 21% increase. However in drought years when Council draws nearly all Tamworth's water from the Peel River the cost for bulk raw water could increase to as high as $465,000 per year.

Other Town and Village Water Supplies in Council Area

With the exception of Tamworth and Manilla, other towns and villages within TRC area draw water from groundwater and unregulated river sources. During drought periods when the Namoi River runs low the Manilla water supply is supplemented from Split Rock Dam via the regulated Manilla River.

Unregulated Surface water prices for town water and industry customers have been decreased in 2006/07 and then increase annually with the CPI through to 2009/10;

- Entitlement $2.30 per ML down to $1.66 per ML, a 28% decrease
- Usage $1.53 per ML down to $1.09 per ML , a 29% decrease

Groundwater prices have increased significantly over the four years;

- Entitlement charge from $0.85 to $2.45 per ML, a 188% increase
- Usage charge from $0.43 to $1.22 per ML, a 188% increase

Namoi High Security (back up to Manilla) entitlement charges have dropped slightly from $10.70 per ML, however usage charges have increased by about 66% to $13.87 per ML.

The net effect of all these changes is bulk water for town and village water supplies will increase significantly, placing extra cost on consumers.

Namoi/Peel Irrigation Industry

The Namoi/Peel irrigation industry has also been adversely impacted by the IPART determination, particularly Peel regulated irrigators.

For the past four years the Peel General Security users have had zero allocation at the commencement of the water year and presently with Chaffey Dam at around 30% capacity the Tamworth water supply is restricted to hand held hoses to conserve water.

In Councils submission to IPART it was pointed out that the ABARE report relating to the Peel valley was flawed in that it examined large scale mixed farms with a relatively minor amount of irrigation, and did not examine the impact of price increases on irrigation dependent dairy or lucerne growing enterprises. The Tribunal did not have the ABARE report reviewed to assess the impact on dairy and lucerne growing enterprises in the Peel Valley with users now required to pay exceptionally higher prices for bulk water.

By 2009/10 Peel Regulated General Security Entitlement charges will drop from the current $6.11 to $2.85 per ML, a 53% decrease, however Usage charges will escalate by 148% from the current $11.11 to $27.55 per ML. The Tribunal dropped the entitlement charges so that irrigators are not faced with paying high charges during periods when there is no water available for irrigation; however the usage charge is exceptionally high compared to other inland valleys.

Some valleys such as the Murrumbidgee valley will pay combined entitlement and usage charges at around 20% of prices paid in the Peel valley, which places Peel valley irrigators at a distinct disadvantage, particularly when other valleys have much higher reliability of supply.

Other Aspects of the IPART Determination

The Tribunal has indicated that the determination continues to move towards cost reflective levels, in accordance with agreed COAG objectives and taking into account the impact on customers, which is of real concern to water users in the Peel Valley.

In announcing the significant increases in bulk water prices up to 2009/10 IPART has indicated that SWC will only be recovering 45% of total costs for the Peel Valley, which means that there will be a push from SWC to increase regulated water prices beyond 2009/10, which would see Tamworth bulk water prices from Chaffey Dam increase should the government not intervene.

The increases originally proposed by SWC in the submission to IPART to fully recover costs by taking the price up to $88.07 per ML would have been crippling for Tamworth town water users with bulk water prices from the Peel River sky rocketing to over $1Million per year.

Also of concern to Council and other regulated water users in the Peel valley is that Peel water users are paying usage charges two to eight times more than most other inland regulated water users. While being forced to pay such high prices for water, the security of regulated water in the Peel valley is low and needs improving by increasing the capacity of Chaffey Dam from the current 62GL capacity to at least 100GL capacity. Water users in the Peel valley believe this work is a legacy or backlog works which should be undertaken and paid for by the government at no additional cost to water users.

A two tier entitlement charge has been maintained in the latest pricing with a premium for holders of high security licences for SWC charges. In the Peel valley the current ratio is 2.3 and will rise steeply to 6.73 by 2009/10 under the IPART determination. The Namoi valley will reduce slightly from the current level of 1.5 down to 1.25. The Peel valley has been singled out with a ratio of 6.73 compared to the next highest the Lachlan valley at 2.45. This demonstrates the lack of security for regulated water in the Peel valley compared with other catchments, and hence the need to increase the Chaffey Dam storage capacity to improve the security for general security users.

Within the report the Tribunal states that it will not allow SWC to fully recover costs in the North Coast, South Coast and Peel valleys, because users in these valleys currently pay the highest prices of all regulated river valleys. The Tribunal also notes that there are a smaller number of users in these valleys from which to recover costs, and that substantial price increases would have had a damaging impact on users. The Tribunal believes that cost reflectivity will never be applied in these three valleys; however the Tribunal states it can not bind any future Tribunal.

The Tribunal also notes that the National Water Commission (NWC) has recognized the importance of considering the impact on users in its recent reviews of the NSW compliance with the National Competition Policy. The NWC points out that while achieving full cost recovery is an important tenet of COAG water reforms, provisions are made for community service obligations to those regions where full cost recovery would result in unacceptable community outcomes.

Regulated water users in the Peel valley need to be able to see a way forward including equitable pricing for water across the State. At present in the middle of a severe drought, Peel water users face a barrage of exceptionally high bulk water prices to be introduced over the next four years with no improvement to the reliability of supply from Chaffey Dam.

Summary

Council and other water users in the Namoi/Peel valleys are very concerned about the huge hike in raw water charges approved by the State Government.

Council is seeking assurances from the State Government that bulk water prices in the Peel valley will become more equitable in any future reviews, and that Chaffey Dam capacity be increased to provide a reasonable level of security to Peel water users. Also that due to the special circumstances that exist in the Peel valley the Chaffey Dam capacity upgrade be paid for by the government.

Unless these issues are rectified the socio- economic development of the Peel Valley will stall or decline, particularly intensive agriculture which will fall away if access to a cost effective and reliable water supply is not available.

Please contact me should you require any additional information.

Yours faithfully

Glenn Inglis
General Manager

Contact: (02) 6767 5441

9 November 2006

Tamworth Regional Council

437 Peel Street, Tamworth NSW 2340
Telephone:- (02) 6755 4555
Facsimile:- (02) 6755 4499
Email:- trc@tamworth.nsw.gov.au

ABN 52 631 074 450

14 July 1006

The Hon Malcolm Turnbull MP
Parliamentary Secretary to the Prime Minister
PO Box 1840
BONDI JUNCTION NSW 1355

Dear Mr Turnbull

Water Issues in the Tamworth Regional Council Area

I am writing to you on behalf of the Tamworth Region to invite you to visit Council to discuss several key issues pertaining to water supply within Council's geographic area.

I have asked Council's Public Affairs Officer, Mr Jim Carey, to pass this letter directly to you while he attends a function at which you will be the guest speaker in Sydney on 22 July 2006.

Tamworth Regional Council was proclaimed in March 2004 as a voluntary merger of the bulk of the area covered by five smaller Councils (Tamworth, Parry, Nundle, Manilla and Barraba). Council covers an area of almost 10,000 square kilometres stretching from the Nandewar Range north of Barraba south east to the Great Dividing Range. Council includes the urban centres of Tamworth, Manilla, Barraba and Nundle, and its total urban and rural population numbers close to 60,000.

At present, Council is attempting to deal with several critical water supply and related infrastructure issues which have implications across all three tiers of government.

These issues include: a major water recycling proposal; the augmentation of Chaffey Dam; the NSW Government's IPART water pricing strategies to 2010.

Council has noted and has been encouraged by some of your relatively recently stated views and actions in your Parliamentary Secretary capacity in the context of issues, including cost-shifting by the NSW Government, to those that are presently before Council.

Accordingly, Council invites you to visit Tamworth and discuss a range of water supply and conservation issues in the Peel, Namoi and Barwon Catchments and directly related areas.

Council would be happy to suggest aspects of your itinerary with your staff – including access to the wide ranging regional media outlets that operate from Tamworth (i.e. the three NSW commercial television networks and the ABC).

If you are interested in accepting Council's invitation, could your office please contact me directly (Phone (02) 67667 5441) to discuss the specific details of your visit. In that context, Council would be pleased to provide a draft itinerary to you.

Yours faithfully

For further information please contact:-

Glenn Inglis
Telephone:- (02) 6767 5440
Email:- g.inglis@tamworth.nsw.gov.au
Please address all correspondence to:-
The General Manager
Tamworth Regional Council
PO Box 555, Tamworth NSW 2340
OR DX 6125

Please Quote:- File GI/SF2229

Glenn Inglis
General Manager

Tamworth Regional Council

437 Peel Street, Tamworth NSW 2340
Telephone:- (02) 6755 4555
Facsimile:- (02) 6755 4499
Email:- trc@tamworth.nsw.gov.au
ABN 52 631 074 450

26 June 2006

Mr Tony Windsor MP
Member for New England
Shop 5
259 Peel Street
TAMORTH NSW 2340

Dear Tony,

Review of New South Wales Bulk Water Prices from 2006/07 to 2009/10- Comments on Draft IPART Determination

The NSW Independent Pricing and Regulatory Tribunal (IPART) in May 2006 released a draft determination on the review of bulk water prices proposed by State Water Corporation (SWC) and Department of Natural Resources (DNR) from 2006/07 to 2009/10, and has invited input from interested parties on the draft determination.

Council is very concerned about the consequences of the proposed price increases, particularly in the Peel Valley, and is seeking Federal Government support and representation to the State Government to not apply the high level of price increases proposed by SWC and DNR.

Please find **ATTACHED** a copy of Council's letter to the National Water Commission (NWC) of 26 June 2006 raising concern about the proposed price increases and seeking the NWC representation to the NSW State Government.

The proposed maximum price increases for bulk water if applied would severely impact Tamworth Regional Council town water supply consumers plus other water users in the Peel and Namoi Valleys.

Council has requested IPART to undertake a thorough socio-economic assessment of the proposed price increases for the Peel Valley prior to considering any price increases. To date this has not been done.

As a way forward to addressing the inequitable pricing issues associated with attempting to apply full cost recovery to regulated water users in small valleys such as the Peel Valley, Council has requested IPART to consider three options.

Option 1, freeze the price of Peel regulated surface water until such time as a thorough socio-economic assessment is undertaken,

Option 2, have one single price for each category of water across all valleys in NSW,

Option 3, merge the Peel and Namoi valley pricing for regulated surface water.

Councils preferred option is Option 2, have one single price for each category of water across all valleys in the State. This would benefit valleys in northern NSW which have traditionally paid more for water than in southern NSW. It would also introduce "a level playing field" for water users across NSW.

If Option 2 is not achievable then adopt Option 3, merge the Peel and Namoi valley pricing for regulated surface water. The Peel and Namoi unregulated river and groundwater users already pay the same prices and it would be a sensible approach to extend this arrangement to the prices for regulated river water.

Should Options 1 & 2 not be achievable for the current IPART determination then adopt Option 1 and freeze the price of Peel regulated water until such time as a thorough socio-economic assessment is undertaken.

With respect to increases in water prices in general, any justified increases should be ramped up over a number of years. The proposed increases of up to 180% over four years have a significant impact on water users and should not be approved by the government.

Your representations in this matter would be appreciated and would need to take place by early July 2006 before the NSW Government makes a decision on the draft maximum prices recommended by IPART.

Yours faithfully

Glenn Inglis
General Manager

For further information please contact:-

Glenn Ingis
Telephone:- (02) 6767 4549
Email:- g.inglis@tamworth.nsw.gov.au
Please address all correspondence to:-
The General Manager
Tamworth Regional Council
PO Box 555, Tamworth NSW 2340
OR DX 6125

Please Quote:- File /SF2229

Tamworth Regional Council

437 Peel Street, Tamworth NSW 2340
Telephone:- (02) 6755 4555
Facsimile:- (02) 6755 4499
Email:- trc@tamworth.nsw.gov.au

ABN 52 631 074 450

26 June 2006

Mr John Anderson MP
Member for Gwydir
PO Box 725
GUNNEDAH NSW 2380

Dear John,

Review of New South Wales Bulk Water Prices from 2006/07 to 2009/10- Comments on Draft IPART Determination

The NSW Independent Pricing and Regulatory Tribunal (IPART) in May 2006 released a draft determination on the review of bulk water prices proposed by State Water Corporation (SWC) and Department of Natural Resources (DNR) from 2006/07 to 2009/10, and has invited input from interested parties on the draft determination.

Council is very concerned about the consequences of the proposed price increases, particularly in the Peel Valley, and is seeking Federal Government support and representation to the State Government to not apply the high level of price increases proposed by SWC and DNR.

Please find **ATTACHED** a copy of Council's letter to the National Water Commission (NWC) of 26 June 2006 raising concern about the proposed price increases and seeking the NWC representation to the NSW State Government.

The proposed maximum price increases for bulk water if applied would severely impact Tamworth Regional Council town water supply consumers plus other water users in the Peel and Namoi Valleys.

Council has requested IPART to undertake a thorough socio-economic assessment of the proposed price increases for the Peel Valley prior to considering any price increases. To date this has not been done.

As a way forward to addressing the inequitable pricing issues associated with attempting to apply full cost recovery to regulated water users in small valleys such as the Peel Valley, Council has requested IPART to consider three options.

Option 1, freeze the price of Peel regulated surface water until such time as a thorough socio-economic assessment is undertaken,

Option 2, have one single price for each category of water across all valleys in NSW,

Option 3, merge the Peel and Namoi valley pricing for regulated surface water.

Councils preferred option is Option 2, have one single price for each category of water across all valleys in the State. This would benefit valleys in northern NSW which have traditionally paid more for water than in southern NSW. It would also introduce "a level playing field" for water users across NSW.

If Option 2 is not achievable then adopt Option 3, merge the Peel and Namoi valley pricing for regulated surface water. The Peel and Namoi unregulated river and groundwater users already pay the same prices and it would be a sensible approach to extend this arrangement to the prices for regulated river water.

Should Options 1 & 2 not be achievable for the current IPART determination then adopt Option 1 and freeze the price of Peel regulated water until such time as a thorough socio-economic assessment is undertaken.

With respect to increases in water prices in general, any justified increases should be ramped up over a number of years. The proposed increases of up to 180% over four years have a significant impact on water users and should not be approved by the government.

Your representations in this matter would be appreciated and would need to take place by early July 2006 before the NSW Government makes a decision on the draft maximum prices recommended by IPART.

Yours faithfully

Glenn Inglis
General Manager

For further information please contact:-

Glenn Ingis
Telephone:- (02) 6767 4549
Email:- g.inglis@tamworth.nsw.gov.au
Please address all correspondence to:-
The General Manager
Tamworth Regional Council
PO Box 555, Tamworth NSW 2340
OR DX 6125

Please Quote:- File /SF2229

Tamworth Regional Council

437 Peel Street, Tamworth NSW 2340
Telephone:- (02) 6755 4555
Facsimile:- (02) 6755 4499
Email:- trc@tamworth.nsw.gov.au
ABN 52 631 074 450

I19 June 2006

Mr Ian Slack Smith MP
Member for Barwon
PO Box 526
WEE WAA NSW 2388

Dear Sir

Review of Bulk Water Prices from 2006/07 to 2009/10- Comments on Draft IPART Determination

The Independent Pricing and Regulatory Tribunal (IPART) in May 2006 released a draft determination on the review of bulk water prices proposed by State Water Corporation (SWC) and Department of Natural Resources (DNR) from 2006/07 to 2009/10, and has invited input from interested parties on the draft determination.

Council is very concerned about the consequences of the proposed price increases, particularly in the Peel Valley, and is seeking your support and representation to the State Government to not apply the high level of price increases proposed by SWC and DNR.

Please find **ATTACHED** a copy of Council's submission to IPART of 19 June 2006 raising concern about the proposed price increases and recommending a way forward.

The proposed maximum price increases for bulk water if applied would severely impact Tamworth Regional Council town water supply consumers plus other water users in the Peel and Namoi Valleys.

The seven town water supplies in the Tamworth Regional Council (TRC) area draw bulk water from various surface and groundwater sources in the Namoi and Peel valleys, and while there has been a proposed reduction in unregulated surface water prices of around 22% over the four years, the increases in regulated surface and groundwater are extremely high (up to 180% over four years including CPI adjustments).

If the draft maximum prices approved by IPART were to be applied by SWC and DNR bulk water charges for Council's town water supplies would rise from around $316,000 to $409,000 per annum, and in drought years up to around $500,000 per year.

Council previously provided detailed written submissions to IPART in letters dated 23 November 2005 and 6 April 2006 on the pricing submissions lodged by SWC and DNR plus subsequent investigative reports commissioned by the Tribunal. I have **ATTACHED** a copy of the submissions for your convenience.

Council has requested IPART to undertake a thorough socio-economic assessment of the proposed price increases for the Peel Valley prior to considering any price increases. To date this has not been done.

As a way forward to addressing the inequitable pricing issues associated with attempting to apply full cost recovery to regulated water users in small valleys such as the Peel Valley, Council has requested IPART to consider three options.

Option 1, freeze the price of Peel regulated surface water until such time as a thorough socio-economic assessment is undertaken,

Option 2, have one single price for each category of water across all valleys in NSW,

Option 3, merge the Peel and Namoi valley pricing for regulated surface water.

Councils preferred option is Option 2, have one single price for each category of water across all valleys in the State. This would benefit valleys in northern NSW which have traditionally paid more for water than in southern NSW. It would also introduce "a level playing field" for water users across NSW.

If Option 2 is not achievable then adopt Option 3, merge the Peel and Namoi valley pricing for regulated surface water. The Peel and Namoi unregulated river and groundwater users already pay the same prices and it would be a sensible approach to extend this arrangement to the prices for regulated river water.

Should Options 1 & 2 not be achievable for the current IPART determination then adopt Option 1 and freeze the price of Peel regulated water until such time as a thorough socio-economic assessment is undertaken.

With respect to increases in water prices in general, any justified increases should be ramped up over a number of years. The proposed increases of up to 180% over four years have a significant impact on water users and should not be approved by the government.

Your representations in this matter would need to take place by early July 2006 before the State Government makes a decision on the draft maximum prices recommended by IPART.

Yours faithfully

Glenn Inglis
General Manager

For further information please contact:-

Glenn Ingis
Telephone:- (02) 6767 4549
Email:- g.inglis@tamworth.nsw.gov.au
Please address all correspondence to:-
The General Manager
Tamworth Regional Council
PO Box 555, Tamworth NSW 2340
OR DX 6125

Please Quote:- File /SF2229

Tamworth Regional Council

437 Peel Street, Tamworth NSW 2340
Telephone:- (02) 6755 4555
Facsimile:- (02) 6755 4499
Email:- trc@tamworth.nsw.gov.au

ABN 52 631 074 450

26 June 2006

Mr Ken Matthews
Chairman
National Water Commission
95 Northbourne Avenue
CANBERRA ACT 2600

Dear Sir

Review of New South Wales Bulk Water Prices from 2006/07 to 2009/10-Draft IPART Determination

The New South Wales Independent Pricing and Regulatory Tribunal (IPART) in May 2006 released a draft determination on the review of bulk water prices proposed by State Water Corporation (SWC) and Department of Natural Resources (DNR) from 2006/07 to 2009/10, and has invited input from interested parties on the draft determination.

Council is very concerned about the consequences of the proposed price increases (of up to 180%), particularly in the Peel Valley, and is seeking Federal Government support and representation to the NSW State Government to not apply the high level of price increases proposed by SWC and DNR.

The reason Council resolved to write to the National Water Commission is that the bulk water prices proposed for the Peel valley are exceptionally high when compared with other catchments in the Murray Darling Basin. The Peel valley also has low security which impacts regulated water users.

Background on Bulk Water in the Peel Valley

The Peel valley is a relatively small valley in the upper reaches of the Namoi valley and SWC operate and maintain the state owned Chaffey Dam, one of the smaller state owned dams with a storage capacity of 62GL.

Chaffey Dam was constructed in 1979 and supplies water to high security, general security plus stock and domestic users along the Peel River.

The former Tamworth City Council constructed its own town water supply dam, Dungowan Dam (6GL capacity), in 1958 on Dungowan Creek a sub-catchment of the Peel Valley. As Tamworth developed the Council investigated building a second Council owned town water supply dam to cater for future growth of the city. In 1975 Council entered into an agreement with the NSW State Government whereby Council contributed 25% towards the estimated cost of constructing Chaffey Dam on the Peel River and in return Council received a 16.4GL annual allocation from Chaffey Dam for Tamworth water supply.

At present Council draws approximately 60% (6GL pa) of Tamworth raw water from the Peel River at Tamworth (Chaffey Dam), with the other 40% (4GL pa) coming from Council's Dungowan Dam via a pipeline.

The State Government has recognised for many years now that Chaffey Dam with a capacity of 62GL was undersized to provide adequate reliability for Tamworth town water supply and other users.

During drought periods Council invokes water restrictions in Tamworth to conserve water and to make water available to other water users. The frequency of water restrictions is much more frequent then the industry standard for town water supply.

Planning for upgrading of Chaffey Dam to 100GL capacity was well advanced by 1990, however the NSW Government of the day decided not to proceed with the project. This decision by the government to delay the project has now severely disadvantaged regulated water users in the Peel valley, by way of low security water and the legacy of who pays for increasing the storage capacity of the dam.

Chaffey Dam also has inadequate spillway capacity to handle the Probable Maximum Flood (PMF) and requires augmentation to comply with current dam safety requirements. At present SWC in consultation with the local community and water users is considering options for the PMF upgrade including increasing the storage capacity.

Should Chaffey Dam be augmented to increase capacity to provide greater reliability for water users, under the current arrangements regulated water users in the Peel valley would be required to pay for the cost of these works. The price of this backlog capital works of around $15 to $20 Million to increase the dam capacity is far beyond the ability of Peel regulated water users to pay, particularly with the current high prices being charged for Peel regulated water.

Proposed Increases to Bulk Water Charges

I have **ATTACHED** a copy of Councils response to IPART of 19 June 2006 with full details and comments on the May 2006 draft determination for maximum prices allowed to be applied by SWC and DNR from 2006/07 to 2009/10.

In summary Council's cost for bulk water will increase from around $316,000 to $409,000, an increase of 29% over four years. This is a large increase in dollar terms on the high prices that Council currently pays.

In drought years when Council draws nearly all of Tamworth's water from Chaffey Dam the cost of bulk water for Tamworth could increase to as high as $500,000 per year taking Councils annual bulk water charges to around $510,000 per year.

The proposed increase in Peel regulated water usage over four years from the current $11.16 per ML to around $29.50 per ML represents an increase of $18.30 per ML, which is far in excess of the increase in usage costs of other NSW inland regulated river catchments.

In addition to the usage charge, Council has to pay an entitlement charge of around $13.00 per ML, with general security users paying $3.00 per ML.

Impact of Proposed Price Increases

The proposal by the State Government to achieve full cost recovery of Chaffey Dam from Peel regulated water users would cause severe hardship for all water users, due to the relatively small size of the Peel valley and Chaffey Dam and the limited number of water users over which to recover the costs.

Peel water users would be paying usage charges from two to ten times more than most other inland regulated water users. While being forced to pay such high prices for water, the security of regulated water in the Peel valley needs improving by increasing the storage capacity of Chaffey Dam. Any increase in prices beyond the current levels is considered untenable.

What is alarming to Peel regulated water users is that in announcing the proposed significant increases in bulk water prices up to 2009/10 the Tribunal has indicated that SWC will only be recovering 55% of total costs for the Peel Valley, which means that there will most likely be a continued push from SWC to increase regulated water prices beyond 2009/10, which could see prices for bulk water from Chaffey Dam for town water increase to well over $1million per year.

The situation at present is that Peel regulated water users are not able to absorb the significant price increases proposed for bulk water, and the State Government needs to recognize that there are special circumstances relating to the Peel valley, which need to be resolved.

IPART and the NSW Government need to take into account when determining user charges and the return income on investment to the government, the fact that Council contributed 25% toward the estimated cost of constructing Chaffey Dam

In fact Council should be receiving a return on the investment in Chaffey Dam, or alternatively a discount on bulk water charges.

Within the IPART draft pricing determination report the Tribunal states that it will not allow SWC to fully recover costs in the NSW North Coast, South Coast and Peel valleys, because users in these valleys currently pay the highest prices of all regulated river valleys. The Tribunal noted that there are a smaller number of users in these valleys from which to recover costs, and that substantial price increases would have had a significant impact on users.

The Tribunal also noted in the draft determination that the National Water Commission (NWC) has recognized the importance of considering the impact on users in its recent reviews of the NSW compliance with the National Competition Policy.

It is pleasing to note that the NWC pointed out that while achieving full cost recovery is an important tenet of COAG water reforms, provisions are made for community service obligations to those regions where full cost recovery would result in unacceptable community outcomes.

It would appear that while the Tribunal is concerned about the price of water in the Peel regulated system, it is still proposing to allow a significant increase in the prices. Council has requested the Tribunal to reconsider the matter and not allow any price increases in the current round of price increases for the Peel regulated system due to the current exceptionally high level of user charges.

It was drawn to the Tribunal's attention in Council's earlier submissions that it is of critical importance that IPART not consent to the introduction of significant price increases within the Peel Valley in the complete absence of some reasonable socio-economic impact assessment.

To date no socio-economic assessment has been undertaken for the Peel Valley (for all classes of water use) and therefore IPART should not allow any price increases in bulk water prices in the Peel Valley until a comprehensive study is undertaken and the implications of the proposed price increases fully understood.

The ABARE report commissioned by IPART consists of essentially a financial analysis to identify the level and relative importance of water costs to irrigation farmers in the main valleys in NSW including the Peel Valley. The report does not present a socio-economic assessment for various reasons as pointed out in Councils earlier submission to IPART of 6 April 2006.

Suggested Way Forward

As a way forward to addressing the inequitable pricing issues associated with attempting to apply full cost recovery to regulated water users in small valleys such as the Peel Valley, Council has requested IPART and the NSW Government to consider three options.

Option 1, freeze the price of Peel regulated surface water until such time as a thorough socio-economic assessment is undertaken,

Option 2, have one single price for each category of water across all valleys in NSW,

Option 3, merge the Peel and Namoi valley pricing for regulated surface water.

Council's preferred option is Option 2, have one single price for each category of water across all valleys in the State. It would also introduce "a level playing field" for water users across NSW.

If Option 2 is not achievable then adopt Option 3, merge the Peel and Namoi valley pricing for regulated surface water. The Peel and Namoi unregulated river and groundwater users already pay the same prices and it would be a sensible approach to extend this arrangement to the prices for regulated river water.

Should Options 1 & 2 not be achievable for the current IPART determination then adopt Option 1 and freeze the price of Peel regulated water until such time as a thorough socio-economic assessment is undertaken.

With respect to increases in water prices in general, any justified increases should be ramped up over a number of years. The proposed increases of up to 180% over four years have a significant impact on water users and should not be approved by the State Government.

Summary

The following key issues confront water users in the Peel valley and need to be resolved by government as part of the water reform process;

- The Peel valley is a relatively small valley and Chaffey Dam a small dam resulting in inherently very high operation costs per ML of water stored in the dam.
- Attempting to apply full cost recovery within the Peel Regulated river would significantly impact water users due to the high cost and small number of water users.
- Chaffey Dam at 62GL capacity is too small and needs increasing to at least 100GL capacity to improve security,
- Chaffey Dam is a State Government owned dam and the PMF upgrade plus the increasing of the dam storage capacity are both considered legacy works and should be paid for by the government.
- The intent of the COAG Agreement on national water reform was not to apply significant financial hardship to certain water users, such as the Peel regulated water users.
- The government needs to recognize the special circumstances which apply in the Peel regulated river system and put in place a mechanism to improve the plight of water users.

Your representations in this matter to IPART and the NSW State Government would be very much appreciated and would need to take place by early July 2006 before the State Government makes a decision on the draft maximum prices recommended by IPART.

Yours faithfully

Glenn Inglis
General Manager

For further information please contact:-

Glenn Ingis
Telephone:- (02) 6767 4549
Email:- g.inglis@tamworth.nsw.gov.au
Please address all correspondence to:-
The General Manager
Tamworth Regional Council
PO Box 555, Tamworth NSW 2340
OR DX 6125

Please Quote:- File /SF2229

Attachments

Copy to, Hon John Anderson, Member for Gwydir
Hon Tony Windsor, Member for New England

Tamworth Regional Council

437 Peel Street, Tamworth NSW 2340
Telephone:- (02) 6755 4555
Facsimile:- (02) 6755 4499
Email:- trc@tamworth.nsw.gov.au

ABN 52 631 074 450

19 June 2006

Mr Peter Draper MP
Member for Tamworth
PO Box 1740
TAMWORTH NSW 2340

Dear Sir

Review of Bulk Water Prices from 2006/07 to 2009/10- Comments on Draft IPART Determination

The Independent Pricing and Regulatory Tribunal (IPART) in May 2006 released a draft determination on the review of bulk water prices proposed by State Water Corporation (SWC) and Department of Natural Resources (DNR) from 2006/07 to 2009/10, and has invited input from interested parties on the draft determination.

Council is very concerned about the consequences of the proposed price increases, particularly in the Peel Valley, and is seeking your support and representation to the State Government to not apply the high level of price increases proposed by SWC and DNR.

Please find **ATTACHED** a copy of Council's submission to IPART of 19 June 2006 raising concern about the proposed price increases and recommending a way forward.

The proposed maximum price increases for bulk water if applied would severely impact Tamworth Regional Council town water supply consumers plus other water users in the Peel and Namoi Valleys.

The seven town water supplies in the Tamworth Regional Council (TRC) area draw bulk water from various surface and groundwater sources in the Namoi and Peel valleys, and while there has been a proposed reduction in unregulated surface water prices of around 22% over the four years, the increases in regulated surface and groundwater are extremely high (up to 180% over four years including CPI adjustments).

If the draft maximum prices approved by IPART were to be applied by SWC and DNR bulk water charges for Council's town water supplies would rise from around $316,000 to $409,000 per annum, and in drought years up to around $500,000 per year.

Council previously provided detailed written submissions to IPART in letters dated 23 November 2005 and 6 April 2006 on the pricing submissions lodged by SWC and DNR plus subsequent investigative reports commissioned by the Tribunal. I have **ATTACHED** a copy of the submissions for your convenience.

Council has requested IPART to undertake a thorough socio-economic assessment of the proposed price increases for the Peel Valley prior to considering any price increases. To date this has not been done.

As a way forward to addressing the inequitable pricing issues associated with attempting to apply full cost recovery to regulated water users in small valleys such as the Peel Valley, Council has requested IPART to consider three options.

Option 1, freeze the price of Peel regulated surface water until such time as a thorough socio-economic assessment is undertaken,

Option 2, have one single price for each category of water across all valleys in NSW,

Option 3, merge the Peel and Namoi valley pricing for regulated surface water.

Councils preferred option is Option 2, have one single price for each category of water across all valleys in the State. This would benefit valleys in northern NSW which have traditionally paid more for water than in southern NSW. It would also introduce "a level playing field" for water users across NSW.

If Option 2 is not achievable then adopt Option 3, merge the Peel and Namoi valley pricing for regulated surface water. The Peel and Namoi unregulated river and groundwater users already pay the same prices and it would be a sensible approach to extend this arrangement to the prices for regulated river water.

Should Options 1 & 2 not be achievable for the current IPART determination then adopt Option 1 and freeze the price of Peel regulated water until such time as a thorough socio-economic assessment is undertaken.

With respect to increases in water prices in general, any justified increases should be ramped up over a number of years. The proposed increases of up to 180% over four years have a significant impact on water users and should not be approved by the government.

Your representations in this matter would need to take place by early July 2006 before the State Government makes a decision on the draft maximum prices recommended by IPART.

Yours faithfully

Glenn Inglis
General Manager

For further information please contact:-

Glenn Ingis
Telephone:- (02) 6767 4549
Email:- g.inglis@tamworth.nsw.gov.au
Please address all correspondence to:-
The General Manager
Tamworth Regional Council
PO Box 555, Tamworth NSW 2340
OR DX 6125

Please Quote:- File /SF2229

Tamworth Regional Council

437 Peel Street, Tamworth NSW 2340
Telephone:- (02) 6767 5555
Facsimile:- (02) 6767 5499
Email:- trc@tamworth.nsw.gov.au
ABN 52 631 074 450

19 June 2006

The Chair
Independent Pricing and Regulatory Tribunal of NSW
P O Box Q290
QVB Post Office NSW 1230

Dear Sir

Subject: Review of Bulk Water Prices from 2006/07 to 2009/10- Comments on Draft IPART Determination

I refer to your letter of 5 June 2006 advising of the draft IPART determination on the review of bulk water prices proposed by State Water Corporation (SWC) and Department of Natural Resources (DNR) from 2006/07 to 2009/10, and inviting input from interested parties on the draft determination.

Council has considered the draft determination and appreciates the opportunity to comment before the Tribunal brings down its final determination.

Council previously provided detailed written submissions to IPART in letters dated 23 November 2005 and 6 April 2006 on the submissions lodged by SWC and DNR plus subsequent investigative reports commissioned by the Tribunal. I have **ATTACHED** a copy of the submissions for your convenience.

Within the current submission Council does not propose to address every issue raised in the previous submissions, however will comment on certain key aspects relating to the draft determination.

Review by Consultants

It is pleasing that the Tribunal sought additional information from SWC and DNR, and had consultants review issues such as capital expenditure, operating expenditure, water consumption forecasts, cost sharing ratios, discount to wholesalers and impact on farm profitability.

From these reviews it has become very clear to Council that both SWC and the DNR in their proposed price increases before the Tribunal were attempting to recover from water users a level of income far in excess of what can be justified.

Proposed Maximum Bulk Water Prices Peel & Namoi Valleys

The draft determination on the maximum prices for bulk water that may be applied by SWC and DNR over the next four years is complicated by the inclusion of annual price increases plus a Consumer Price Index (CPI) increases.

Water users have had to decipher the expected cost of the draft maximum price increases by assuming a figure for annual CPI increases for the three years beyond 2006/2007.

The Table below summarises the combined SWC and DNR price increases for most categories of water use in the Peel and Namoi valleys, assuming a CPI increase of 3% per annum for regulated surface water plus ground water. (Prices are $/ML except for area based charges which are $/ha)

Catchment/ Water Source	2005/06 Charges	2006/07 Charges	2009/10 Charges	Increase over 4 yrs to 2009/10
Peel Regulated				
H S - Entitlement	$13.93	$12.79	$13.42	-4%
GS - Entitlement	$6.11	$5.34	$3.06	-50%
Usage	$11.11	$15.72	$29.50	+166 %
Namoi Regulated				
H S - Entitlement	$10.66	$10.00	$10.73	+1%
G S - Entitlement	$7.11	$7.19	$7.53	+6%
Usage	$8.51	$9.42	$12.21	+44%
Namoi/Peel Unregulated				
*Area Based **($/ha)***	*$12.26*	*$12.26*	*$12.26*	Nil
Entitlement	$3.82	$3.00	$3.00	-21%
Usage	$1.53	$1.19	$1.19	-22%
Town & Industry with Entitlement - Entitlement	$2.30	$1.81	$1.81	-21%
Town & Industry with Entitlement - Usage	$1.53	$1.19	$1.19	-22%
Namoi/Peel Ground Water				
Entitlement	$0.85	$1.12	$2.38	+180%
Usage	$0.43	$0.56	$1.19	+177%

Prices are $/ML except for area based charges which are $/ha.
Annual CPI increases in charges for Regulated Surface and Groundwater have been included for three year period 2007/08 to 2009/10.

HS = High Security GS = General Security

Impact on Water Users

The proposed maximum price increases for bulk water if applied will have a significant impact on Tamworth Regional Council town water supplies plus other water users in the Peel and Namoi Valleys, and Council is gravely concerned about the consequences of price increases, particularly in the Peel Valley.

The seven town water supplies in the Tamworth Regional Council draw bulk water from various surface and groundwater sources in the Namoi and Peel valleys, and while there has been a proposed reduction in unregulated surface water prices of around 22% over the four years, the increases in regulated surface and groundwater are extremely high (up to 180% over four years including CPI adjustments).

The proposed maximum price increases are considered far too steep and if applied will severely impact water users in the short and longer terms.

The following Table shows the projected impact of the proposed bulk water price increases on Council's town water supplies.

TAMWORTH REGIONAL COUNCIL TOWN WATER SUPPLIES - PROJECTED IMPACT OF BULK WATER SUPPLY PRICE INCREASES 2006/07 TO 2009/10 - DRAFT IPART MAY 2006

					2005-2006			2009-2010			
Town/Village	Supply	Water Source	License Volume (ML's)	Cons. (ML's)	Entitle-ment Charge /ML	Usage Charge /ML	Cost	Entitlement Charge /ML	Usage Charge /ML	Cost	Percentage change
Tamworth	Dungowan Dam	Dungowan Crk - Unreg	5600	3378	2.3	1.53	$18,048	1.81	1.19	$ 14,156	
	Chaffey Dam	Peel River - Regulated	16400	5665	13.93	11.11	$291,390	13.42	29.5	$ 387,206	
Total			**22000**	**9043**			**$309,438**			**$ 401,361**	**30%**
Manilla	Split Rock Dam	Namoi River - Regulated	130	10	10.66	8.59	$1,472	10.73	12.21	$ 1,517	
	Namoi River Weir	Namoi River - Unreg	800	409	2.3	1.53	$2,466	1.81	1.19	$ 1,935	
	Bore	Namoi - Ground water	60	0	0.85	0.43	$51	2.38	1.19	$ 143	
Total			**990**	**419**			**$3,988**			**$ 3,595**	**-10%**
Barraba	Barraba Creek	Namoi River - Unreg		87	2.3	1.53	$133	1.81	1.19	$ 104	
	Manilla River	Namoi River - Unreg	381	80	2.3	1.53	$999	1.81	1.19	$ 785	
	Connor's Crk Dam	Namoi River - Unreg		10	2.3	1.53	$15	1.81	1.19	$ 12	
	Town bore	Namoi - Ground water	40	0	0.85	0.43	$34	2.38	1.19	$ 95	
Total			**421**	**177**			**$1,181**			**$ 995**	**-16%**
Bendemeer	Macdonald River	Namoi Unregulated	74	40	2.3	1.53	$231	1.81	1.19	$ 182	
	Town bore	Namoi Ground water	10	0	0.85	0.43	$9	2.38	1.19	$ 24	
Total			**84**	**40**			**$240**			**$ 205**	**-14%**
Nundle	Town bores	Peel - Ground water	200	136	0.85	0.43	$228	2.38	1.19	$ 638	**179%**
Attunga	Town bores	Peel - Ground water	145	70	0.85	0.43	$153	2.38	1.19	$ 428	**179%**
Moonbi Kootingal	Town bores	Peel - Ground water	530	307	0.85	0.43	$583	2.38	1.19	$ 1,627	**179%**
TOTAL			**24370**	**10192**			**$315,812**			**$408,850**	**29%**
ADDITIONAL ANNUAL COST OF PROPOSED BULK WATER PRICE INCREASES										**$93,037**	

NOTES:

1) License volumes for Tamworth are correct (have volumetric conversions)

2) Other towns and village licence volumes are not all yet finalised with DNR regarding volumetric conversions.

3) All water supply consumptions except Tamworth (10 year average figures) are based on 2004/05 usage.

4) Fees and charges assume all water supply licences in TRC have a volumetric licence.

In summary Council's cost for bulk water will increase from around $316,000 to $409,000, an increase of 29% over four years. This is a large increase in dollar terms on the high prices that Council currently pays.

In drought years when Council draws nearly all of Tamworth's water from Chaffey Dam the cost of bulk water for Tamworth could increase to as high as $500,000 per year taking Councils annual bulk water charges to around $510,000 per year.

In 1997/98 Council was paying $98,000 for access and usage for water from Chaffey Dam, which has progressively increased to around $310,000 in 2005/06.

If the draft IPART determination on maximum bulk water charges was applied, Council's access and usage charges from Chaffey Dam would increase to around $401,000 per year by 2009/10, an increase of $303,000, or 309% over 12 years since 1997/98.

The "percentage" increases in the cost of Peel regulated water may not sound so high when comparing with some other proposed "percentage" price increases, however what the Tribunal needs to be aware of and address is the quantum of the current high prices for Peel regulated water, and if the proposed166% increase for usage is added to the price, the additional cost of water becomes very high. For example the proposed increase in Peel regulated usage from the current $11.16 per ML to around $29.50 per ML represents an increase of $18.30 per ML, which is far in excess of the increase in usage costs of other inland regulated river catchments.

What is of concern to Council and other regulated water users in the Peel valley is that Peel water users are paying usage charges from two to ten times more than most other inland regulated water users. While being forced to pay such high prices for water, the security of regulated water in the Peel valley needs improving by increasing the storage capacity of Chaffey Dam. Any increase in prices beyond the current level are considered untenable.

In announcing the proposed significant increases in bulk water prices up to 2009/10 the Tribunal has indicated that SWC will only be recovering 55% of total costs for the Peel Valley, which means that there will most likely be a continued push from SWC to increase regulated water prices beyond 2009/10, which could see prices for bulk water from Chaffey Dam for town water increase to well over $1million per year.

Within the draft report the Tribunal states that it will not allow SWC to fully recover costs in the North Coast, South Coast and Peel valleys, because users in these valleys currently pay the highest prices of all regulated river valleys. The Tribunal also notes that there is a smaller number of users in these valleys from which to recover costs, and that substantial price increases would have had a significant impact on users.

The Tribunal also notes that the National Water Commission (NWC) has recognized the importance of considering the impact on users in its recent reviews of the NSW compliance with the National Competition Policy. The NWC points out that while achieving full cost recovery is an important tenet of COAG water reforms, provisions are made for community service obligations to those regions where full cost recovery would result in unacceptable community outcomes.

It would appear that the Tribunal is concerned about the price of water in the Peel regulated system, yet is still proposing to allow a significant increase in the prices. Council requests the Tribunal to reconsider the matter and not allow any price increases in the current round of price increases for the Peel regulated system due to the current exceptionally high level of user charges.

Impending Chaffey Dam Capacity Upgrade

The State Government has recognised for many years now that Chaffey Dam (constructed 1979) with a capacity of 62GL was undersized to provide adequate reliability for town water supply, other high security users and general security users.

Planning for upgrading the dam to 100GL capacity was well advanced by 1990, however the government of the day decided not to proceed with the project. This decision by the government to delay the project has now severely disadvantaged regulated water users in the Peel valley.

Chaffey Dam also has inadequate spillway capacity to handle the Probable Maximum Flood (PMF) and requires augmentation to comply with current dam safety requirements. At present SWC in consultation with the local community and water users is considering options for the PMF upgrade including increasing the storage capacity.

An additional concern for regulated water users in the Peel valley is that should Chaffey Dam be augmented to increase capacity to provide greater reliability for water users, under the current arrangements regulated water users in the Peel valley would be required to pay for the cost of these works. The price of this backlog capital works of around $15 to $20 Million to increase the dam capacity is far beyond the ability of Peel regulated water users to pay, particularly with the current high prices being charged for Peel regulated water.

The situation is that Peel regulated water users are not able to absorb the significant price increases proposed for bulk water, and the Tribunal should make it clear to the State government that there are special circumstances relating to the Peel valley, which need to be resolved.

Council Contribution to Construction Cost of Chaffey Dam

IPART and the Government need to take account the fact that Council contributed 25% toward the estimated cost of constructing Chaffey Dam. This needs to be taken into consideration by the State Government when determining user charges that return income on investment to the government.

In fact Council should be receiving a return on the investment in Chaffey Dam, or alternatively a discount on bulk water charges.

IPART needs to indicate its position on this very important matter.

Socio – Economic Impact Assessment

At present water users in the Peel Valley are subject to very high water charges and now faced with the prospect of extremely high water charges without the security of supply being improved. This also needs to be taken into consideration by the Tribunal when considering pricing.

It was drawn to the Tribunal’s attention in Council’s earlier submissions that it is of critical importance that IPART not consent to the introduction of significant price increases within the Peel Valley in the complete absence of some reasonable socio-economic impact assessment.

To date no socio-economic assessment has been undertaken for the Peel Valley (for all classes of water use) and therefore IPART should not allow any price increases in bulk water prices in the Peel Valley until a comprehensive study is undertaken and the implications of the proposed price increases fully understood.

The ABARE report commissioned by IPART consists of essentially a financial analysis to identify the level and relative importance of water costs to irrigation farmers in the main valleys in NSW including the Peel Valley. The report does not present a socio-economic assessment for various reasons as pointed out in Councils submission of 6 April 2006.

As mentioned in Council’s previous submission the context of the Peel Valley is to a degree unique and needs to be recognised in decisions about water supply and pricing. The Peel Valley is one of the few areas without a water sharing plan reflecting in part the complexity of the issues to be considered. Discussion about water allocation has been on-going and has been a major uncertainty facing water users for many years. As a result, irrigators have reacted by operating in a holding pattern until the uncertainty is resolved. That means little new investment, a fall in productivity and diminished farm performance. This is a situation that weakens the financial position of the businesses, their capacity to absorb additional costs and to make adjustments to the way they operate their businesses.

Any socio-economic assessment needs to encompass the above issues specific to the Peel Valley plus changes occurring with groundwater and other water resource and natural resource management issues. The assessment should not be done in isolation as the combined impact of the various changes could have a “multiplier” effect that results in irreversible adverse consequence for the Peel Valley.

A Way Forward for the Peel Valley

Listed below are some suggested options on a way forward to address the unique situation of water pricing in the Peel valley;

Option 1, Freeze Peel Regulated Prices and Undertake Socio Economic Assessment

Freeze existing prices of Peel Regulated water on the basis of the need to undertake a thorough socio-economic assessment of existing and proposed price increases.

Option 2, Adopt State Wide Charges for Bulk Water

Have one single price for each category of water across all valleys in the State. This would even out the costs of access and delivery of water on a state wide basis, and introduce a level playing field for all water users.

The principle of full cost recovery may be acceptable in valleys with large storages, but the Peel valley and Chaffey Dam are too small to apply full cost recovery principles.

This option would meet the requirements of National Competition Policy, COAG water reforms, and the National Water Commission.

Option 3, Merge the Peel and Namoi Valleys

If the valley by valley approach is to be maintained then the Peel Valley, because of its relatively small size, and the fact that it discharges into the Namoi, should be included in the much larger Namoi Valley, rather than treated separately.

Tamworth Regional Council local government area comprises the entire Peel valley and almost all of the Upper Namoi valley (above Keepit Dam, including Split Rock Dam) and it would be a sensible approach to merge the two valleys for water pricing.

In fact the Peel and Namoi valleys have always had the same unregulated surface water and groundwater charges and it would make sense to have common regulated water charges.

The Namoi valley regulated water users benefit greatly from the Peel valley end of stream flows into the Namoi River below Keepit Dam. The inflows from the Peel supplement the Namoi with savings in transmission losses, provide environmental flows, plus supplementary water (off allocation) to regulated water users.

Summary

The proposed draft maximum price increases for bulk water if applied will have a significant impact on Tamworth Regional Council town water supplies plus other water users in the Peel and Namoi Valleys, and Council is gravely concerned about the consequences of price increases, particularly in the Peel Valley.

The reduction in the prices for unregulated river water prices offers some relief to unregulated water users, however this is grossly out weighed by the proposed maximum prices for regulated river water and groundwater. Any increases should be ramped up slowly over a number of years instead of increasing up to 180% over four years.

Council contributed 25% towards the estimated capital costs of Chaffey Dam, which is not being recognised in any price determinations.

Council requests that IPART ensure that a thorough socio-economic assessment be undertaken for the Peel Valley and that Council's concerns be adequately addressed prior to considering any price increases for regulated bulk water in the Peel Valley. To date this has not occurred.

As a way forward to addressing the inequitable pricing issues associated with attempting to apply full cost recovery to regulated water users in small valleys such as the Peel Valley, Council has put forward three options as a way forward for consideration by the Tribunal.

Councils preferred option is Option 2, have one single price for each category of water across all valleys in the State.

If Option 2 is not achievable then adopt Option 3, merge the Peel and Namoi valley pricing for regulated surface water.

If Options 1 & 2 are not achievable for the current determination, then adopt Option 1 and freeze the price of Peel regulated water until such time as a thorough socio-economic assessment is undertaken.

Council trusts that these additional comments provide constructive input to the Tribunal on the draft price determination.

Yours faithfully

Glenn Inglis
General Manager

attach

For further information please contact:-

Michael Bryant
Telephone:- (02) 6767 5517
Email:- m.bryant@tamworth.nsw.gov.au

Please address all correspondence to:-

The General Manager
Tamworth Regional Council
PO Box 555, Tamworth NSW 2340
OR DX 6125

Please Quote:- File MB/SF2229

Tamworth Regional Council

437 Peel Street, Tamworth NSW 2340
Telephone:- (02) 6755 4555
Facsimile:- (02) 6755 4499
Email:- trc@tamworth.nsw.gov.au
ABN 52 631 074 450

6 April 2006

The Chair
Independent Pricing and Regulatory Tribunal of NSW
P O Box Q290
QVB Post Office NSW 1230

Dear Sir

Subject: Review of Bulk Water Prices from 2006/2007- Further Comments

I refer to Council's previous letter of 23 November 2005 and accompanying submission with initial comments to IPART on the review of bulk water prices proposed from 2006/07.

In the submission Council considered that the effectiveness of the phase of public submissions had been restricted by the limited time provided for lodgement. The proposals from State Water Corporation (SWC) and Department of Natural Resources (DNR) are extensive documents with the proposed price increases for bulk water having significant impact on Tamworth Regional Council operations.

Since Council's submission with initial comments was lodged IPART has had several reports undertaken by independent consultants to review issues such as capital expenditure, operating expenditure, water consumption forecasts, cost sharing ratios, discount to wholesalers and impact on farm profitability. These reports were posted on the Tribunal website during March 2006 and Council invited to comment.

The contents of these recent reports have been noted and it has become very clear to Council that both SWC and the DNR in their proposed price increases before the Tribunal are attempting to recover from water users a level of income far in excess of what can be justified.

A copy of Council's earlier Submission dated November 2005 to the Tribunal with initial comments is ATTACHED for your convenience. The comments within the submission are still valid and raise grave concerns about the extremely high price increases proposed for bulk water within the Peel Valley and financial implications on Council operations.

Council is also very concerned with the socio-economic impact that any proposed price changes may have. Apart from the direct economic impact on Council operations, Council is concerned at the possible consequences on commercial users and irrigators in the Peel Valley plus communities within our region.

As mentioned in the earlier submission Council cannot express this key concern strongly enough, that it is of critical importance that IPART not consent to the introduction of such momentous price increases within the Peel Valley in the complete absence of some reasonable socio-economic impact assessment.

To date no socio-economic assessment has been undertaken for the Peel Valley (for all classes of water use) and therefore IPART should not allow any price increases in bulk water prices in the

Peel Valley until a comprehensive study is undertaken and the implications of the proposed price increases fully understood.

The ABARE report recently commissioned by IPART consists of essentially a financial analysis to identify the level and relative importance of water costs to irrigation farmers in the main valleys in NSW including the Peel Valley. The report does not present a socio-economic assessment. As it is presented, there are a number of concerns with the report:

- The sample included 19 farms in the Peel Valley – the representativeness of that sample in relation to irrigation farms, particularly those using regulated surface water is unknown.

- The importance of irrigated lucerne in the Peel Valley is not apparent, further reinforcing the concern about the adequacy of the sample.

- Although the water costs are a small proportion of total costs, the fact that these farms are in a loss situation appears to have been overlooked.

- The high existing water charges in the Peel Valley relative to other valleys is indicated but not taken into account in the analysis.

- The price increase scenarios considered range up to a 50 % increase. When the price for a critical input such as water increases by more than about 25 %, it is very likely that it will lead to changes in farm structure and farm operating systems. ABARE has ignored all of those changes under the assumption that they are only looking at short-run effects on financial performance.

- The long-run considerations are dismissed by suggesting that the impacts on financial performance will be less than they will be in the short run. It is argued that as farms adjust resource use and production programs that costs will be reduced. This is likely to be untrue once the adjustment costs and additional capital investments are taken into account.

- Most of the issues that relate to the security of the supply of irrigation water have been ignored. A critical factor that differentiates water prices is the reliability of supply. Within the Peel Valley, there is an interaction between surface water and ground water that has not been developed in the analysis.

The ABARE report should be recognised for what it is – a simplified analysis of financial impacts. Most of the critical underlying economic analysis that will determine the long-run performance of irrigation farms in the Peel Valley have not been identified or analysed.

The context of the Peel Valley is to a degree unique and needs to be recognised in decisions about water supply and pricing. The Peel Valley is one of the few areas without a water sharing plan reflecting in part the complexity of the issues to be considered. Discussion about water allocation has been on-going and has been a major uncertainty facing water users for many years. As a result, irrigators have reacted by operating in a holding pattern until the uncertainty is resolved. That means little new investment, a fall in productivity and diminished farm performance. This is a situation that weakens the financial position of the businesses, their capacity to absorb additional costs and to make adjustments to the way they operate their businesses.

The State Government has recognised for many years now that Chaffey Dam (constructed 1979) with a capacity of 62GL was undersized to provide adequate reliability for town water supply, other high security users and general security users. Planning for upgrading the dam to 100GL capacity was well advanced by 1990, however the government of the day decided not to proceed with the project. The dam also has inadequate spillway capacity to handle the Probable Maximum Flood (PMF) and requires augmentation to comply with current dam safety requirements. At present SWC in consultation with the local community and water users is considering options for the PMF upgrade including increasing the storage capacity.

At present water users in the Peel Valley are subject to very high water charges and now faced with the prospect of extremely high water charges without the security of supply being improved. This also needs to be recognised by the Tribunal when considering pricing.

Any socio-economic assessment needs to encompass the above issues specific to the Peel Valley plus changes occurring with groundwater and other water resource and natural resource management issues. The assessment should not be done in isolation as the combined impact of the various changes could have a “multiplier” effect that results in irreversible adverse consequence for the Peel Valley.

In summary Council requests that IPART ensure that a thorough socio-economic assessment be undertaken for the Peel Valley and that Council’s concerns adequately and addressed prior to considering any future price increases for bulk water.

Council trusts that these additional comments provide constructive input to the review process and would be pleased to contribute further as the review progresses.

Yours faithfully

Glenn Inglis
General Manager

For further information please contact:-

Glenn Inglis
Telephone:- (02) 6755 4549
Email:- g.inglis@tamworth.nsw.gov.au

Please address all correspondence to:-

The General Manager
Tamworth Regional Council
PO Box 555, Tamworth NSW 2340
OR DX 6125

Please Quote:- File MB/SF2229

TAMWORTH REGIONAL COUNCIL

Submission to:

THE INDEPENDENT PRICING AND REGULATORY TRIBUNAL

BULK WATER PRICES FROM 2005/06

April, 2005

SUBMISSION TO IPART

Council appreciates the opportunity to provide comment at this phase of the review process and would be interested to contribute further as the review progresses

A summary of comments is provided at the conclusion of the submission.

INTRODUCTION

Tamworth Regional Council was proclaimed in March 2004 with the amalgamation of the former Barraba, Manilla, Nundle and Parry Shire Councils and Tamworth City Council.

Tamworth Regional Council covers an area of approximately 9,600 square kilometres and has a population of 54,250. The Council area encompasses all of the Peel Valley and portion of the Namoi Valley (upstream reaches).

The Peel Valley is a sub-catchment within the Namoi River basin but is treated separately in the State Water submission.

Council sources water from regulated rivers, unregulated rivers and groundwater to provide town water supplies to the townships of Attunga, Barraba, Bendemeer, Kootingal/Moonbi, Manilla, Nundle and Tamworth City.

Water for the Attunga, Kootingal/Moonbi, Nundle and Tamworth City water supplies are sourced from the Peel Valley and the other schemes source water from the Namoi Valley.

On average, approximately half of Tamworth City's water is drawn from Council's owned Dungowan Dam (via pipeline to the City) and half from Chaffey Dam via an inlet works on the Peel River. Council has a High Security entitlement of 16,400ML from Chaffey Dam.

Council directly contributed 25% of the original estimated construction cost of Chaffey Dam and was granted a contract for supply of the High Security entitlement from the Dam. This contract represents the long-term secure water supply for Tamworth and was entered into as an alternative to Council constructing its own, stand alone water supply dam.

Council is vitally interested in the significant changes that are occurring with natural resource management (including water resource management) and water reforms, across Federal, State and Regional areas through Catchment Management Authorities, various Commissions, Advisory Councils etc.

Council has undertaken, and will continue to develop water conservation, water efficiency and demand management measures.

As a consumer of regulated, unregulated and groundwater sources, Council's town water supply schemes are impacted by the submissions from State Water and the Department of Infrastructure, Planning and Natural Resources (DIPNR).

Council is obviously concerned with any increases in water prices and charges for water resource management activities. Any increase in charges by external authorities effectively removes that money from the community and reduces the ability of our community to undertake important water and sewerage projects.

Following the amalgamation, Council has identified a number of water and sewerage projects that require construction/upgrading over a relatively short time frame. These works include upgrading of water supply systems to acceptable standards, sewerage augmentation and the provision of sewerage schemes to address health and environmental issues.

Any significant increases in costs, through water charges, will diminish our ability to undertake these works and delay projects. IPART also needs to be aware of and consider that the State Government's reduction/withdrawal of funding through the Country Towns Water Supply and Sewerage Program (CTWSSP) is having a very real impact on Tamworth Regional Council and Council's across the State, to undertake much needed water and sewerage works. The extent of this funding withdrawal is estimated to have cost Council in the order of $21.5M. This has economic, environmental, health and community amenity implications.

In addition to the above, Council is also extremely concerned with the socio-economic impact that proposed price changes may have. Apart from the direct economic impact on our operations we are concerned at the possible consequences on commercial users and irrigators in the Peel Valley and the communities within our Region.

Council is aware of the difficult groundwater reforms and adjustments in adjoining Local Government Areas within the Namoi Valley.

State Water has advised that a socio-economic assessment of the proposed price changes has not been undertaken nor are we aware of any assessment by DIPNR. In light of the extensive increases proposed by State Water and the other Namoi Valley adjustments with groundwater allocations, it is imperative that the impact of these proposed changes be assessed prior to any implementation.

Any socio-economic assessment needs to encompass changes occurring with groundwater and other water resource and natural resource management issues. The assessment should not be done in isolation as the combined impact of the various changes could have a “multiplier” effect that results in irreversible adverse consequence for the northern inland river region of the State.

Council requests that IPART ensure that a thorough socio-economic assessment be carried out. The assessment may reveal that there are particular valley or sub-valley idiosyncrasies that IPART need to consider and provide for.

Comments in respect to IPART’s Issues Paper, State Water’s Submission and DIPNR’s Submission are provided separately for clarity.

IPART ISSUES PAPER – COMMENTS

River operations activities - Section 2.1.1
At Section 2.1.1 it is noted that State Water operates various dams, weirs and associated assets to supply water to its customers. It is also stated that “It also meets community needs by providing water for stock and domestic users. The business is also responsible for delivering environmental flows on regulated rivers.”

What are the costs of providing these services, where are they identified and who meets these costs*?*

State Water - Section 2.1.2
In Section 2.1.2 it is noted that the costs for operating the Murray-Darling Basin Commission (MDBC) and the Dumaresq-Barwon Border River Commission (DBBRC) are jointly paid for by the signatory States and that the NSW share of costs are allocated to State Water. “State Water includes these costs in the cost information it submits to the price review as they can be recovered through its bulk water prices.”

Does State Water distribute these costs across all NSW valleys or only those valleys directly serviced by these Commissions? Are these costs separately identified, as the rivers serviced by MDBC appear to have very low charges relative to other valleys. Similarly how are the WRM cost of the Commissions distributed by DIPNR.

Water resource management activities - Section 2.2
In respect to WRM activities it is felt that many of these activities have very close association/linkages with catchment management functions and natural resource management across the State and thus the Community/Government should accept a greater share of these costs. Since the last IPART determination there has been a substantial shift toward catchment management and natural resource management activities and therefore we request that IPART re-assess the sharing of these costs.

Establishing the underlying principles for bulk water pricing - Section 3.1
In Section 3.1 it is noted that since 1996 the Tribunal has adopted a valley-based approach to pricing. Given the passage of time and the vast water industry changes, there are questions to this approach, particularly with the proposed diverging valley prices in State Water's submission. The Namoi-Peel Customer Services Committee have previously written to IPART (15 July 2004) indicating that they strongly feel that there is greater merit in having a single statewide price for water. Further comment is provided in the submission.

Costs of river operation activities - Section 4.1
Council notes IPART's intention to engage an independent consultant to review State Water's estimates for its projected operating and capital expenditure including associated issues

Council will be interested to see the release of the consultants report and will consider the opportunity to comment pending assessment of IPART's consultants report.

Costs of WRM activities - Section 4.2
In respect to WRM activities it is agreed that "It is often difficult to clearly determine the extent to which the need to undertake WRM activities arises from the actions of water users." Council considers that a very careful assessment is required to ensure that there is a clear connection with WRM activities prior to costs being assigned to water users. There are many other beneficiaries of WRM activities.

Council is of the view that until DIPNR is able to clearly indicate/define its role with WRM activities, given that they are the lead agency in this area, then their charges should not be increased. Further comment is provided later in this submission.

STATE WATER SUBMISSION – COMMENTS

State Water Corporation's objectives and functions - Section 2.1
State Water advises that

> "Negotiations are currently under way with DIPNR about the division of functions between the two organizations. The actions of these negotiations will have an impact on State Water's cost base. Until the relative responsibilities are defined, the full cost of State Water's operations cannot be accurately defined."

Have these negotiations been completed and what are the outcomes and the implications with regard to State Water's operations and their submission?

The ‘Building Block’ Approach – Section 3.2
State Water is recommending that the cost recover approach be base on the “Building Block Approach” and that IPART move away from the annuity approach that was previously considered by IPART to be the more appropriate method.

In view of the complexity of this proposed change by State Water (including a Regulatory Asset Base) it is considered that analysis and subsequent initial comment at this time is beyond the general resources of water users to undertake. Accordingly we would request IPART to undertake or engage independent consultants to review State Water’s proposal and provide objective comment on the proposed “Building Block Approach” as compared with the previously preferred annuity methodology.

It is noted that State Water acknowledge that much effort in time and resources has been devoted to developing the annuity in the first place. State Water need to justify the requirement for this change and demonstrate advantages to be gained by consumers.

Reviewing the Regulatory Asset Base – Section 3.2.3
Following on from the previous comment we found that the information provided on the Regulatory Asset Base (RAB) was “challenging” to follow and without detailed information and background knowledge of State Water’s operations it is extremely difficult to make ‘informed’ comment on this matter.

Council requests that IPART undertake a comprehensive review of State Water’s proposal and provide the results to customers for information and comment. It is indeed difficult to adequately comprehend these pricing reviews if the methodology changes markedly from one review to the next.

We have identified some questions such as:-

- What is an acceptable rate of return for the bulk water industry?
- Is the basis for the RAB split between government and water users fair?
- With respect to Table 2, how was the RAB determined for each valley?
- Could IPART carefully consider the RAB split between valleys as there appears to be anomalies with a low RAB for example in the Murray and higher RAB’s in far smaller valleys.
- What assets are included for each valley and what is the government and water user split for each valley?
- How is the revenue generation for 2005/06 calculated and what is the revenue over this determination period?
- What impact does the RAB have on the proposed prices for each valley?
- Is the valley split the most appropriate approach and what other options should be considered?

High Security and General Security Charges – Section 3.4

State Water proposes to set new High Security to General Security entitlement ratios in all valleys. State Water claim that the basis for this proposed change in ratios is that the High Security Entitlement charge should better reflect the value of High Security water over General Security water.

State Water claim "These changes are revenue neutral to State Water". This being the case, then the proposed change is in effect a shift in entitlement charges from General Security to High Security users.

For the Peel Valley the ratio calculated by State Water is a massive 13.46. As Tamworth Regional Council holds the majority of High Security water in the Peel, this constitutes a major shift in entitlement charges from General Security users to Council. Council is greatly concerned that it appears as if the Council is now being called upon to shoulder an inequitable burden of the costs associated with the provision of water to users within the Peel Valley.

Council rejects this proposal from State Water as totally unacceptable. We believe that the information provided and the methodology used for determining the proposed ratios is flawed and requires careful scrutiny by IPART. Council has a number of doubts as to the validity of the information in this section and provide the following points to highlight our concerns:

- According to State Water the entitlement charges for high security are currently no greater than 1.7 times the charges for general security in any valley. Table 4 indicates a range from 1.1 (Murray and Murrumbidgee) to 1.7 (Peel). The ratio of 1.7 in the Peel was in 2001/02 and the current ratio is 2.28.

  What are the 'current' ratios across the valleys?

- State Water propose that the differential in price between high and general security entitlements be based on the conversion factor in the Water Sharing Plans (WSP) multiplied by the number of years State Water is required to store water for High Security users. Council is aware that whilst the WSP's for the Namoi and Gwydir valleys have been completed there has been no determination of the conversion factor between general and high security licences.

  How has the proposed ratio for these valleys been determined?

  Are the ratios for other valleys correct?

- The Peel Valley (which constitutes approximately 10% of the Namoi river basin) does not have a WSP. Council requested advice from State Water on how the proposed ratio was determined and have been advised as follows:

  > *"The "High Security Access Premium" is the general security entitlement divided by the plan limit available to general security.*

The use of this access premium for water charges would lead to equal charges for equal volumetric access. That is, a licence holder who wanted access to an average 100ML of water in the Peel Valley would need either 100ML of high security, or 100x6.73=673ML of general security licence.

If the high security access charge was set at this ratio then under either licence option the customer would pay the same charges and State Water would recover the same revenue. However, although the volume and charges would be comparable, the high security licence gives access in all years, including drought years, while general security licence would only get an average of 100ML/yr by taking more water in high allocation years to counter the low or nil access in drought years."

The figure of 6.73 is then multiplied by 2 (two years storage) to obtain the proposed ration of 13.46

Council fails to see how "general security entitlement divided by the plan limit available to general security" is a measure of water value. The use of General Security entitlement in this calculation is also an issue, particularly in the Peel Valley which is over allocated. The greater the over allocation, the greater the distortion by using State Waters methodology adopted for the Peel Valley.

The basis for the ratios appears to be based on State Water revenue rather than any real measure of water value.

- Based on the High Security Entitlement prices proposed by State Water, Council would have to bear a massive increase in entitlement charges from $203,000 in 2004/05 to $464,000 in just three years (2007/08).
- Apart from State Water's method for the Peel Valley they also note different approaches in other valleys such as the North Coast and South Coast valleys and the Patterson sub-system. For the Patterson, State Water note that:

  "There is no WSP for the Patterson sub-system, therefore the Hunter Valley WSP cannot be used. State Water proposes a ration of 3:1".

  What is the rationale behind this figure?
- Council also considers that a full explanation should be provided on the additional costs State Water claim are attractable to High Security water i.e. additional evaporation losses, opportunity costs and transmission losses.

- Another question that arises is that if High Security users are to be charged for the period of storage, then is the same principle to be applied to ‘carry-over’ storage for General Security and similarly the additional evaporation and transmission losses?

  To be consistent and fair with all users this would be necessary.

Council believes that the above points highlight just some of the anomalies with State Water’s proposal in respect to the High Security/ General Security ratio. It is requested that IPART have an independent assessment of this issue undertaken and develop an appropriate transparent methodology for determining the ratio for each valley.

Entitlement and Usage charges in Regulated Rivers – Section 3.5
It is interesting to see that State Water proposes to establish a pricing structure whereby the ratio of fixed revenue (or entitlement charges) to variable revenue (or usage charges) will by 60:40 across the State.

This proposal is opposite to most other authorities where they are moving to a lower percentage of revenue from fixed or access charges and a higher percentage of revenue from usage charges. (i.e. electricity and telecommunication industries).

Within NSW the Government’s “Guidelines of Best Practice Management of ‘Water Supply and Sewerage” (May 2004) requires Local Water Utilities to recover at least 75% of residential revenue from usage charges and at least 50% of non-residential revenue from usage charges.

Does the suggested move by State Water send the wrong signal to users in respect to water efficiency, demand management etc.?

What practices are adopted in other States and elsewhere and what alternatives are available and practical?

Wholesale discounts – Section 3.6
The current discounts received by wholesale irrigation customers on their entitlement charges do not appear to be appropriate. At the last determination the former DLWC argued that they were not justified and now State Water holds the same position.

Given that the original grounds for discounting do not apply, removal of the discount would be appropriate and any need for data provision should be via an established commercial agreement with either State Water or DIPNR. Is there a need to eliminate the discount over three years, as water prices in the effected valleys are to fall under the pricing proposal from State Water?

Price path to full cost recovery - Section 3.7

State Water's proposed price path to full cost recovery requires significant changes to the methodology of past price determinations and thus requires close scrutiny by IPART to assess the validity and long term impacts of the proposal.

It is considered that State Water's submission lacks sufficient information for stakeholders to assess the changes and provide informed comment. Water users must rely on IPART to draw this information out and present it in a comprehensible fashion.

As a starting point it is considered that the level of cost recovery for all valleys needs to be documented and that his information should date back to the mid 90's in order to demonstrate what has been achieved following past determinations.

Council also notes IPART's intention to engage an independent consultant to review State Water's estimates for its projected operating and capital expenditure including associated issues.

State Water's proposed price path from 2005 to 2008 is said to reflect cost increases and changes to cost estimates in the Total Asset Management Plan (TAMP). The TAMP needs to be analysed to determine whether it is realistic/ achievable and the assumptions listed in the financial and pricing proposal need to be tested.

The variation in Valley to Valley costs across the State is significant. In the third year of the pricing proposed (2007/08):-

- High Security Entitlement would vary from $3.40 (in the Murrumbidgee) to $31.77 (North Coast)
- General Security Entitlement would vary from $3.04 (Murrumbidgee) to $14.16 (South Coast)
- Usage Charges would vary from $1.56 (Murrumbidgee) to $15.98 (Peel)

Generally Council considers the price increases for 2005 to 2008 to be unacceptable and particularly so in light of State Water's further comment that they "expect that the long-term price path involves annual price increases in the order of 10% per year for ten years, followed by lower annual increases there after."

Projected price increases of this magnitude are alarming.

Also, is this 10% across all valleys or will it vary between each valley? If there is a variation between valleys, could this be documented and provided to water users.

To fully appreciate the financial modelling by State Water in determining the pricing path proposed, Council considered that the modelling figures and assumption used by State Water should be made available through IPART. Council requested information in this regard from State Water.

The information requested included:

- State Water's modelling assumptions
- volumes of high security water
- volumes of general security water
- projected usage for both high security and general security
- projected revenue from each category
- projected revenue for each valley

State Water's response was that this data is 'commercial in confidence'. State Water also advised that:

> *"The modelling will be supplied to IPART as a matter of course for them to use in the pricing determination. The role of IPART is to make sure the prices are equitable".*

It is difficult to appreciate how this information is "commercial in confidence" when State Water is a monopoly supplier and there is no substitute for the product.

Council requests that IPART make this information available so there can be a more informed debate on the whole pricing scenario.

Bearing in mind the data gaps in State Water's submission, Council has reviewed the valley charges over the period 2001/02 to 2007/08 in order to gain an appreciation of the past few years and the projections for the next three years to provide a comparison with the NSW Inland Rivers.

The following points are provided to raise just some issues:

- In respect to the Usage Charges for the Inland Rivers, Graph A has been prepared which shows these charges for each of the Valleys over the period 2001/02 to 2007/08. This indicates the higher current price in the Namoi and Peel Valleys and the significant increases through to 2007/08. State Water's proposed charges will further disadvantage the Namoi/Peel Region.

  In 2007/08 the weighted usage charge (based on Entitlement) for the inland rivers will be in the order of $3.65/ML whereas Peel Valley users would be expected to pay $16/ML and Namoi Valley users nearly $10/ML. The next highest usage charge is $8.45/ML in the Lachlan Valley.

This graph demonstrates the significant divergence in valley prices over the proposed price review period. If the ten year 10% per annum increase flagged by State Water was to eventuate then the variation in prices across the valleys would be massive.

What would be the consequences in the higher priced valleys?

A trend such as this suggests that perhaps we need to reassess the valley based pricing mechanism and consider alternate options.
Should a state wide pricing structure be considered?

In May 2004 the Namoi-Peel Customer Service Committee resolved to push for uniform statewide bulk water pricing. Subsequently the Namoi-Peel CSC wrote to IPART indicating that the CSC was in favour of statewide bulk water pricing.

The letter in part states:-

> *"IPART has made water pricing determinations for each valley and this has shown a lot of variation. Some Valleys such as the Namoi-Peel have had higher price determinations than other valleys.*
>
> *The Namoi-Peel CSC strongly feels there is greater merit in having a single statewide price for water. This includes spreading the cost of delivery of water over all entitlements uniformly.*
>
> *Using this method, operating cost increases can be absorbed with minimum price increases which can be accepted easily by all water users."*

Alternatively, is there merit in a pricing structure for inland valleys and other options for coastal valleys given that State Water have identified cost recovery issues in the North Coast and South Coast Valleys?

- With regard to General Security entitlement prices, Graph B indicates that with the exception of the Namoi Valley the prices are more closely aligned. The proposed General Security charges for the Namoi Valley are significantly higher than the other river systems and would thus place users in the system at a severe disadvantage.
- In respect to the significant increase in price of High Security water from the Peel Valley, a graph has been prepared to show the price levels for High Security water in the NSW inland rivers from 2001/02 through to 2007/08. (Refer Graph C). The graph clearly demonstrates that the Peel and Namoi Valleys prices are substantially higher than the other inland rivers and illustrates the dramatic increase proposed for the Peel Valley

over 2005/06 to 2007/08 and to a lesser extent the increases in the Namoi and Lachlan Valleys.

- As previously mentioned the Peel Valley is a sub-catchment within the Namoi River basin and constitutes approximately 10% of the Namoi River Catchment.

  The following table indicates the comparative charges proposed for the Namoi and Peel Valleys:

	2005/05			2006/07			2007/08		
Valley	**H/S**	**G/S**	**Use**	**H/S**	**G/S**	**Use**	**H/S**	**G/S**	**Use**
Namoi	10.11	6.23	7.29	13.01	7.42	8.48	16.75	8.83	9.87
Peel	14.39	4.50	10.23	20.19	4.50	12.79	28.33	4.50	15.98

  The variations are astounding given that the Peel is a sub-catchment of the Namoi River basin.

- Council pays a High Security Entitlement charge on 16,400ML per annum plus a Usage charge. Based on current charges and the average annual use of water from Chaffey Dam, the 2004/05 cost would be approximately $254,000. Under the proposed price structure the same quantity would cost $548,000 in 2007/08. Costs since 1998 are shown graphically in Graph D.

Water Users' Capacity to Pay Section - 3.7.2

State Water advises that it is aware that water users' ability to sustain the price rises proposed is an important question, but they have "not reinvestigated 'ability to pay', or the impact of price rises on water users."

As a responsible organization this should have been included as part of their price development process. Is State Water relying on IPART in this regard?

State Water also reference the NSW Agriculture study in 2001 and state "There is no reason to believe the validity of that study has changed since it was completed"." Council was of the understanding that this report has been questioned in some quarters.

Has there been any attempt to research more recent reports or verify that the 2001 reports findings are current?

State Water is well aware of the stressed economic situation in many valleys and to propose a pricing structure, which includes some significant price rises, without assessment of the impact is remiss.

Murray-Darling Basin Commission cost and financing basis – Section 4.1
The financing arrangement between the States for the MDBC is relatively complex. It would appear that the Commonwealth Government is funding 25% of the Natural Resource Management and Murray Works Capital Programs, none of which is being recovered or reflected in Murray Valley prices. This is effectively a direct subsidy for Murray Valley users which is not provided to other valleys.

State-wide pricing would eliminate this inconsistency and it is recommended that IPART give further consideration to this matter.

Implications of Corporatisation – Section 4.6
State Water has identified a large additional increase in annual costs attributable to corporatisation. The submission commentary attributes these additional annual costs mainly to new financial arrangements, however, the larger new or additional annual items tabled at Section 4.6.1 are 'Information and Management Staff and Systems' at $1.0M and 'Legal Systems and Staff' at $1.4M. The net increase of $2.7M per annum appears high and warrants review. One would have expected that the corporate governance costs would be reduced through corporatisation.

The application of cost-reflectivity – Section 4.7
State Water discuss the application of cost-reflectivity and note that efficient economic costs may be estimated for the business as a whole or may be applied to particular segments of the business.

It is considered that the question of state-wide versus valley prices should be re-examined. Is the valley prices approach touted by State Water the fairest or should the spreading of costs more widely be considered.

As previously stated the Namoi-Peel CSC is in favour of statewide bulk water pricing.

Given that capital works spending on major assets within valleys tends to be uneven it is suggested that state-wide pricing would be a method of spreading these particular 'spikey' costs across the water users and provide a more even and predictive prices which would facilitate longer term planning.

Other infrastructure dependent industries such as electricity and telecommunications do not fluctuate their prices in areas where major capital or higher operational costs are incurred. Why impose this limitation on the water/irrigation sector, and in time can individual valleys sustain prices to fund uneven capital expenditure on major assets?

A prime example is the dam security upgrade program that is focusing on Keepit and Chaffey dams (both in the Namoi basin). Currently this work is being funded by the Government, but in future it is expected that these costs would be the responsibility of extractive users.

The costs of providing fish passage and mitigating impact of thermal pollution could also be distributed over all valleys as works progressively occur across the State.

Stakeholder consultation – Section 7

Council is indeed very disappointed with the consultation process by State Water. State Water claim that they "undertook comprehensive consultation on the proposed submission and incorporated key elements of input from various stakeholders and sought to reduce impacts as best as possible". Our experience is vastly different than stated.

The Peel Valley is mentioned in a number of sections within the State Water submission and the impact on Tamworth City Council is referenced specifically on a number of occasions, yet there was no direct consultation with Council or request for input.

The shift in Entitlement charges from General Security to High Security users in the Peel Valley, has a very significant impact directly on the supply of water to Tamworth City residents. As Tamworth Regional Council holds the majority of High Security water in the Peel, this constitutes a major shift in entitlement charges from General Security users to Council. Council was not consulted at all in this regard.

Council also believes that State Water's 'consultation' through the Customer Service Committees (CSC's) was also inadequate and the 'feed back' to the Namoi-Peel CSC through the 'Pricing Reference Panel' was ineffective.

Socio-economic assessment

Council has been advised by State Water that a socio-economic assessment of the proposed price changes has not been undertaken. In light of the extensive price increases proposed by State Water and other Namoi Valley adjustments with groundwater allocations, it is imperative that the impact of these proposed changes be assessed prior to any implementation. Any socio-economic assessment needs to encompass changes occurring with groundwater and other water resource management issues. State Water's assessment should not be done in isolation as the combined impact of the various changes could have a "multiplier" effect that results in irreversible adverse consequences for the northern inland river region of the State.

DEPARTMENT OF INFRASTRUCTURE, PLANNING AND NATURAL RESOURCES SUBMISSION - COMMENTS

The DIPNR submission to IPART was submitted over three months after the scheduled submission date and upon review is extremely disappointing as it has not provided any new information or expanded on the current regime to justify its proposed price increase.

The DIPNR submission covers costs associated with water resource management (WRM) and bulk water services to unregulated rivers and groundwater customers. As the lead agency in water resource management in NSW it was expected that the DIPNR submission would provide some direction in this area and lead by example with regard to the price submissions. DIPNR is clearly the worst performer.

DIPNR in its submission to IPART note that institutional and other changes in water management have taken place in NSW. It is stated “these changes have meant that it has not been practical to undertake an updated costing of WRM services for price setting purposes”.

Given these changes, DIPNR contends that it is appropriate for IPART to determine an interim WRM pricing regime to apply for the 2005/06 year, based on existing prices being rolled over and adjusted for affects of inflation.

Increases based on the above need to be contested on the following grounds:-

a) There is no justification given for the increase and it would make a mockery of the IPART process if an increase was given in this situation.

b) DIPNR sets out the WRM operating costs in Table 1 of their submission and this indicates an overall decrease in costs from 2001/02 to 2004/05. This trend information would suggest that DIPNR can operate without an inflation adjusted increase in 2005/06.

c) DIPNR need to provide explanation and justification for price increases as required by IPART with other authorities. They should be given the right incentive to deliver on these requirements and freezing their prices until they can substantiate any cost increases sends the right message.

DIPNR in its submission also advises that it intends to submit a medium term pricing proposal in the second half of 2005 and that “this proposal will provide detailed information on DIPNR’s WRM costs as a basis for IPART to determine WRM charges for the period commencing 1 July 2006”. DIPNR’s commitment to this medium term pricing proposal, given that it is to be provided in the second half of this year, adds further support to Council’s contention that any current increases should be placed on hold, at least until the medium term proposal is released and any price increases justified. Deferral of any increases would also assist with the medium term submission being provided in a timely manner.

In Part C of DIPNR's submission they identify issues of significance with respect to future directions in WRM services. It is noted that there has been significant changes to institutional arrangements for natural resource management, including WRM, across the State as the following paragraph highlights.

> *"DIPNR is currently restructuring its service delivery functions and devolving various responsibilities to Catchment Management Authorities (CMAs), the Natural Resources Commission (NRC), the Natural Resources Advisory Council (NRAC) and the NSW Water Innovation Council (WIC). Whilst this process should yield efficiency gains over the medium term, these entities have yet to be fully established and currently have only limited operational capacity. In addition the NWI requires changes in the way water entitlements are managed and how other WRM activities are undertaken. As these changes are implemented, the impact of DIPNR's WRM activities and costs will become clearer."*

The above adds further support to deferring any consideration of increase in prices until after the medium term pricing submission proposed by DIPNR.

SUMMARY

The following points are provided as a summary to Council's submission:-

- Council considers that the effectiveness of the current review has been restricted by the limited information provided by DIPNR.

- As the lead agency in water resource management in NSW it was expected that the DIPNR submission would provide some direction in this area.

- Given that DIPNR have not provided explanation and justification for price increases, as required by IPART with other authorities, and their advice that they intend to submit a medium term pricing proposal in the second half of 2005, Council considers that any current DIPNR increases should be placed on hold, at least until the medium term proposal is assessed.

- In respect to State Water's submission, Council has identified a number of issues that are considered to require further detail, explanation of assumptions, testing of methodologies, consistent procedures and additional information on expenditure and revenue proposals. Council requests that IPART consider these issues and provide appropriate responses.

- Acknowledging the linkage between State Water's and DIPNR's functions/activities and the fact that DIPNR have noted the significant changes to institutional arrangements for natural resource management responsibilities to Catchment Management Authorities, various Councils and Commissions etc, then it may be prudent to seriously consider maintaining the existing bulk water prices for 2005/06.

  This approach would provide time to resolve the 'unknowns' with water resource management issue and the opportunity to better assess the implications of State Water's proposals.

- Any significant increases in bulk water costs will diminish Council's ability to undertake or delay other water and sewerage projects. The State Government's reduction/withdrawal of funding through the Country Towns Water Supply and Sewerage Program (CTWSSP) is having a very real impact on Tamworth Regional Council and Council's across the State, to undertake much needed water and sewerage works.

- Any increase in costs and funding reductions have economic, environmental, health and community amenity implications

- Concern is expressed at the possible consequences on commercial users and irrigators in the Peel Valley and the communities within our Region, particularly with regard to the difficult groundwater reforms and adjustments in adjoining Local Government Areas within the Namoi Valley

- Council has been advised by State Water that a socio-economic assessment of the proposed price changes has not been undertaken. It is imperative that the likely social and economic impacts of the proposed changes be assessed prior to any implementation.

- There is a need for IPART to identify the costs for providing stock and domestic water and environmental flows and who meets these costs.

- Many Water Resource Management activities have very close linkages with other catchment management and natural resource management functions across the State. It is requested that IPART re-assess the sharing of these costs between water users and Government as there are many other beneficiaries of WRM activities.

- Is the valley-based approach to pricing the most appropriate? Given the passage of time and the vast water industry changes, there are questions to this approach. Should a single statewide price for water be considered, as suggested by the Namoi-Peel Customer Services Committee, or alternate options examined? Council requests that IPART addresses this matter.

- The merit in moving away from the annuity approach to financing to the "Building Block Approach" suggested by State Water is questioned. Significant effort in time and resources has been devoted to developing the annuity methodology. Council requests IPART to undertake or engage independent consultants to review State Water's proposal and provide objective comment on the proposed "Building Block Approach" as compared with the previously preferred annuity methodology.

- Council requests that IPART undertake a comprehensive review of State Water's Regulatory Asset Base proposal and provide the results for further comment. It is difficult to adequately comprehend these pricing reviews if the methodology changes markedly from one review to the next.

- Council rejects the proposal from State Water to set new High Security to General Security entitlement ratios in all valleys, as totally unacceptable. We believe that the information provided and the methodology used for determining the proposed ratios is flawed and requires careful scrutiny by IPART. Council has provided a number of points to demonstrate anomalies and to highlight our concerns. In the Peel Valley the proposal constitutes a major shift in entitlement charges from General Security users to Council (from $203,000 in 2004/05 to $464,000 in 2007/08).
  It is requested that IPART have an independent assessment of this issue undertaken and develop an appropriate transparent methodology for determining the ratio for each valley.

- Generally Council considers the price increases for 2005 to 2008 to be unacceptable and particularly so in light of State Water's further comment that they "expect that the long-term price path involves annual price increases in the order of 10% per year for ten years, followed by lower annual increases there after." Projected price increases of this magnitude are alarming.

- The variation in Valley to Valley costs across the State is significant. In the third year of the pricing proposed (2007/08):-

  - High Security Entitlement would vary from $3.40 (in the Murrumbidgee) to $31.77 (North Coast)
  - General Security Entitlement would vary from $3.04 (Murrumbidgee) to $14.16 (South Coast)
  - Usage Charges would vary from $1.56 (Murrumbidgee) to $15.98 (Peel)

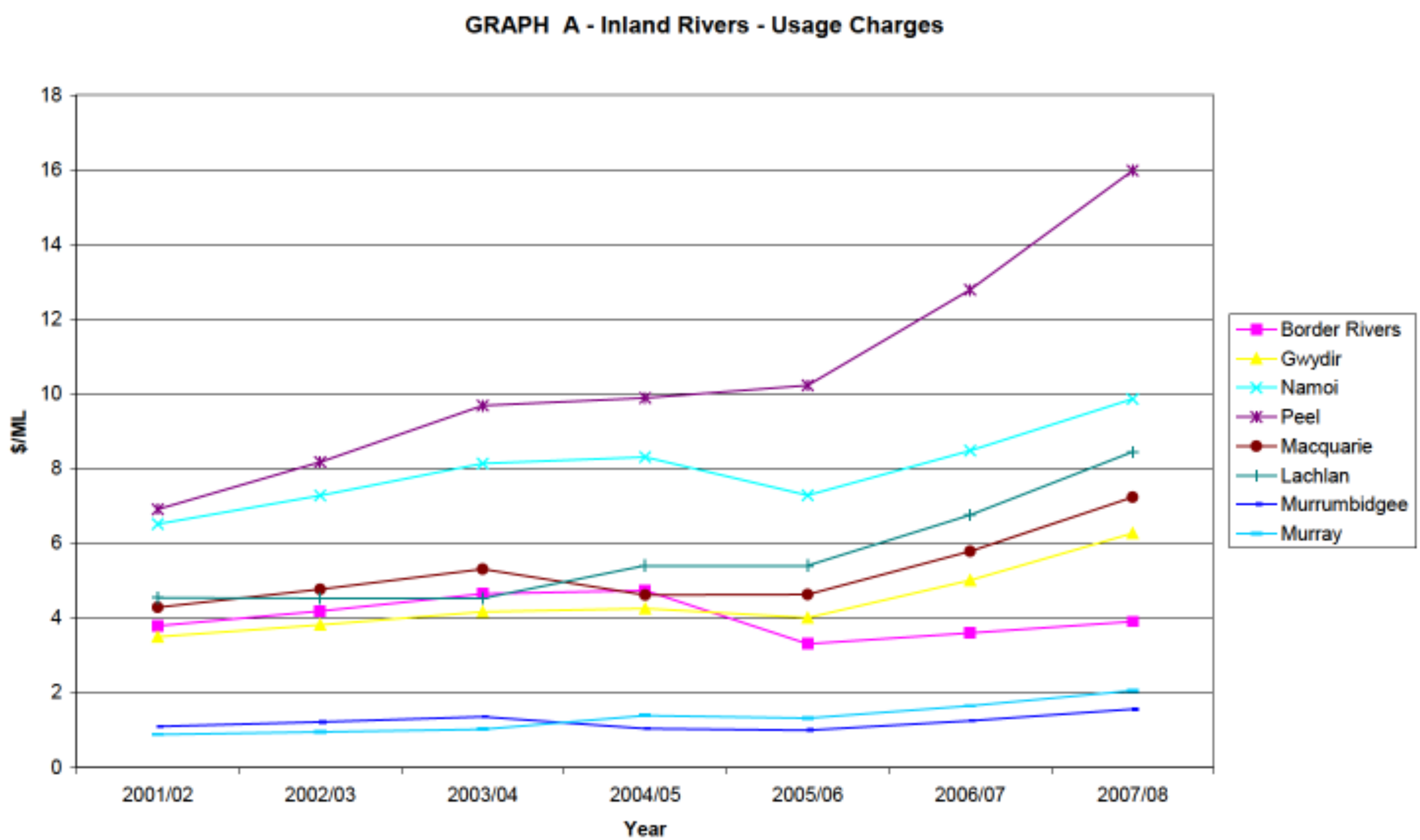
The significant divergence in valley prices over the proposed price review period would trend to suggest that perhaps we need to reassess the valley based pricing mechanism. Should a state wide pricing structure or alternate options be considered? It is requested that IPART assess the options.

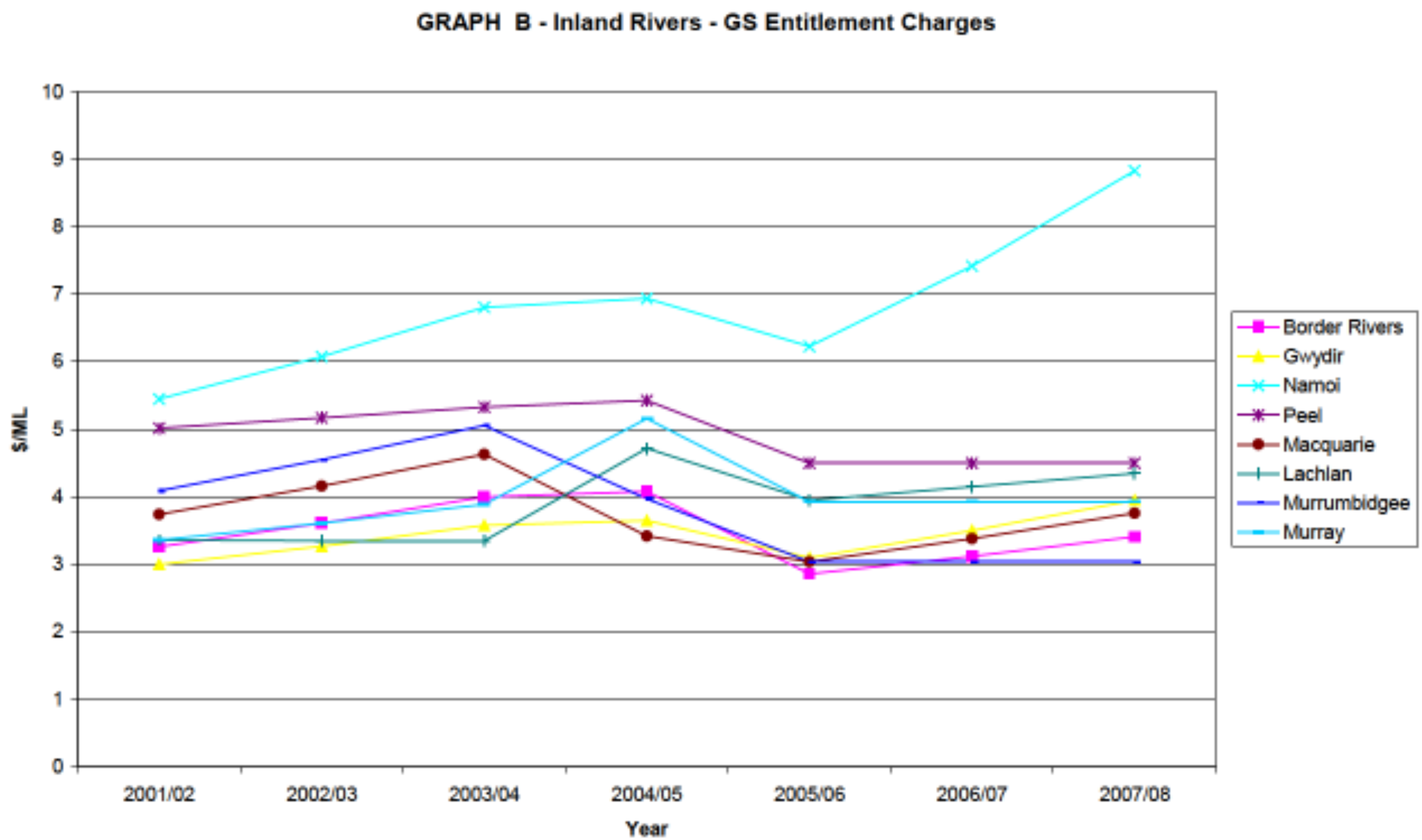
- It is considered that State Water's submission lacks sufficient information for stakeholders to assess the changes and provide informed comment To fully appreciate the financial modelling by State Water in determining the pricing path proposed, Council considered that the modelling figures and assumption used by State Water, including revenue projections, should be made available.
  Council requests that IPART make this information available so there can be a more informed debate on the whole pricing scenario.

- The net increase of $2.7M per annum attributable to corporatisation appears high and warrants review. One would have expected that the corporate governance costs would be reduced through corporatisation.

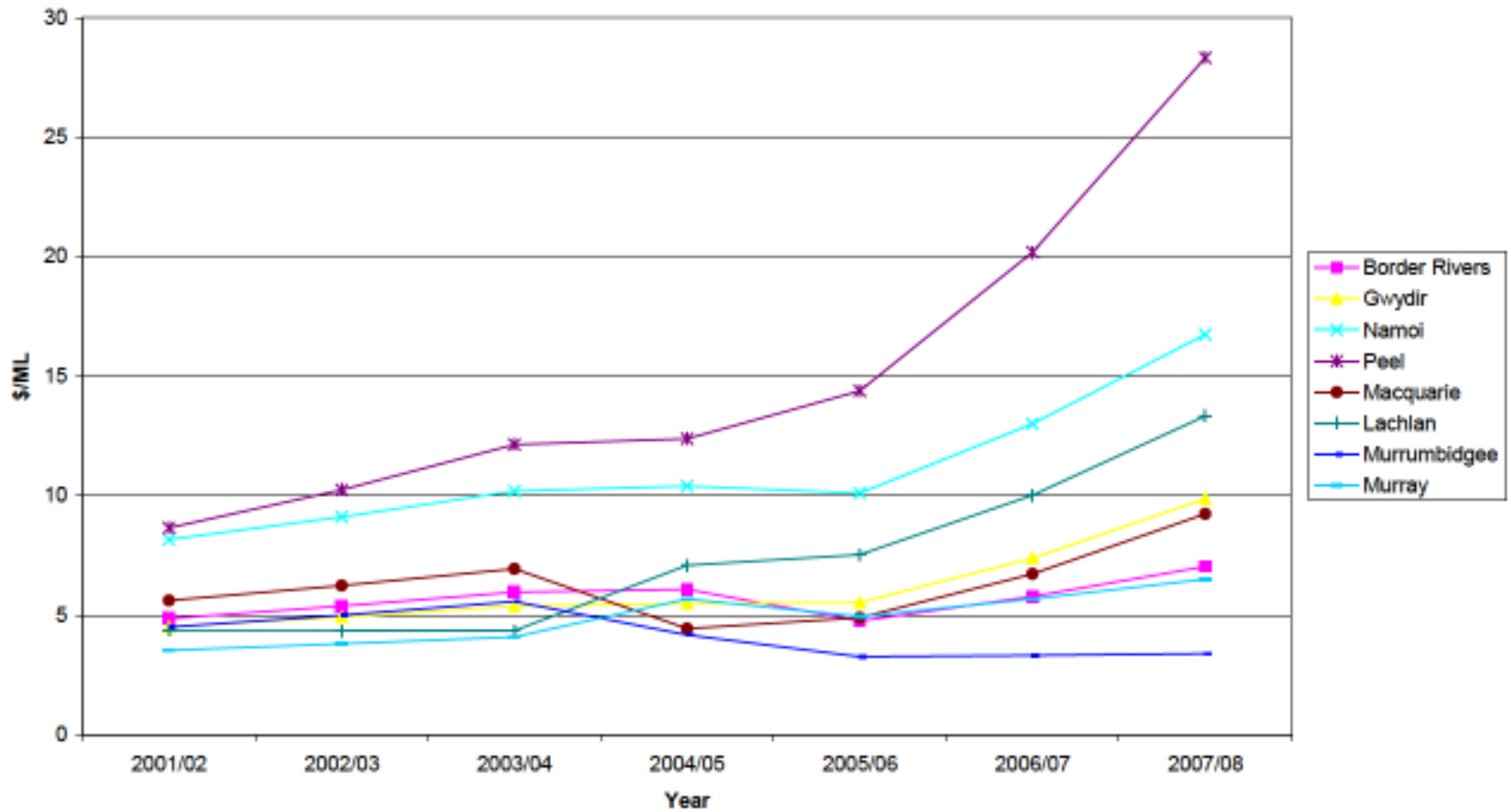
- Council is disappointed with the consultation process by State Water. Whilst State Water indicate that they undertook comprehensive consultation, our experience is vastly different than stated. The direct impact of proposals on Council is referenced specifically yet there was no direct consultation with Council or request for input.

Council trusts that the comments provide constructive input to the review process and would be interested to contribute further as the review progresses.

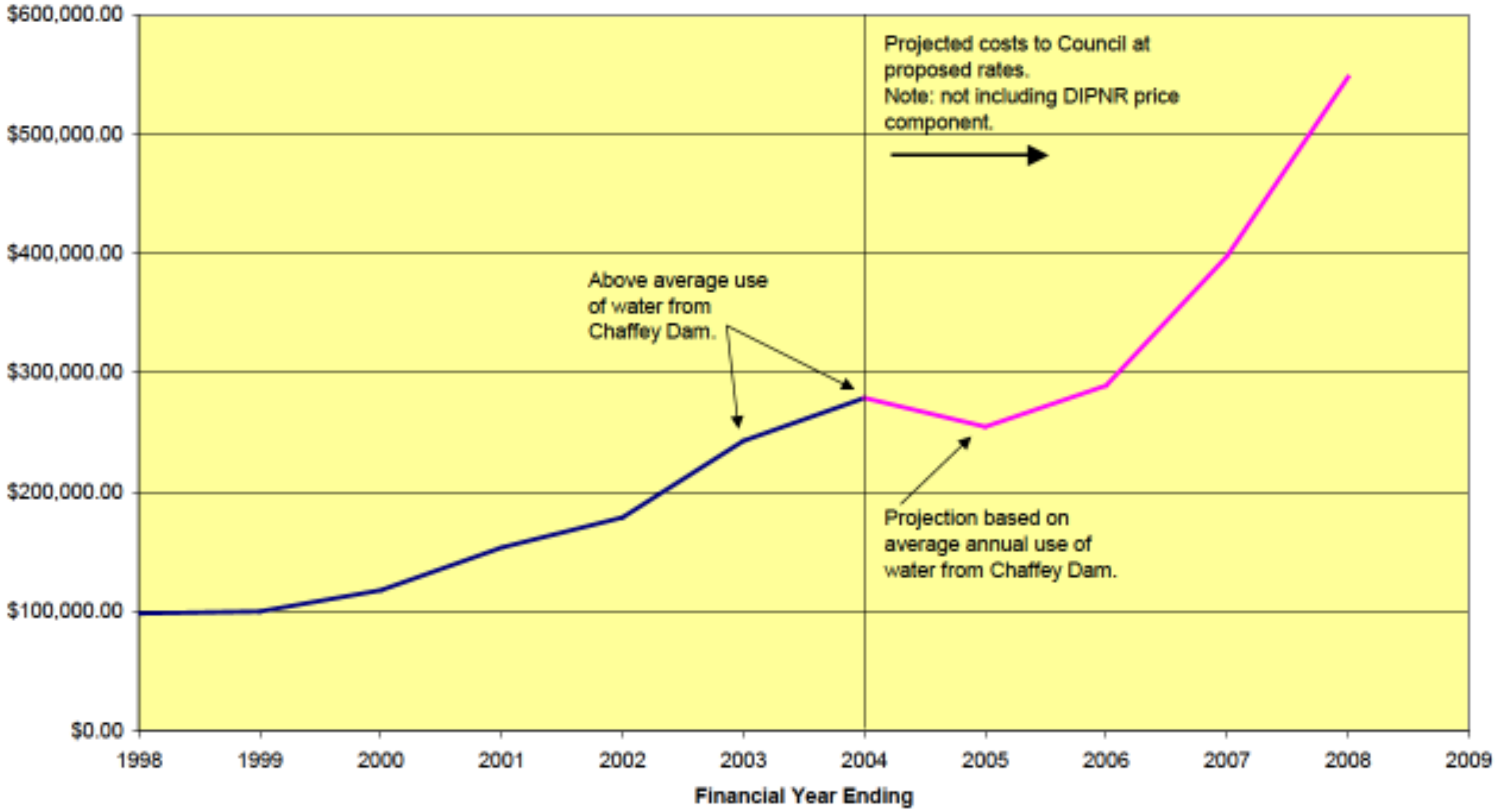

GRAPH A - Inland Rivers - Usage Charges
$/ML
0
2
4
6
8
10
12
14
16
18
2001/02
2002/03
2003/04
2004/05
2005/06
2006/07
2007/08
Year
Border Rivers
Gwydir
Namoi
Peel
Macquarie
Lachlan
Murrumbidgee
Murray


GRAPH B - Inland Rivers - GS Entitlement Charges
10
9
8
7
6
5
4
3
2
1
0
$/ML
2001/02
2002/03
2003/04
2004/05
2005/06
2006/07
2007/08
Year
Border Rivers
Gwydir
Namoi
Peel
Macquarie
Lachlan
Murrumbidgee
Murray

GRAPH C - Inland Rivers - HS Entitlement Charges



GRAPH D - Cost of Water to TRC - from Chaffey



Tamworth Regional Council

Tamworth Bulk Water Supply

Long-Term Augmentation Options Review

Final Report

November 2015

Presented by Hunter H2O

ABN 16 602 201 552

Report Details

Report Title	Tamworth Bulk Water Supply: Long-Term Augmentation Options Review
Project No.	3850-035
Status	Final Report
File Location	\\ho-fs1\Projects\Tamworth RC\3850-035 Tamworth Raw Water Security Sustainability Options\2. Tasks\8. Reporting_Final Report\Tamworth Bulk Water - Long Term Options Review (FINAL REPORT).docx
Enquiries	Daniel Turnbull P: (02) 4941 4819 E: daniel.turnbull@hunterh2o.com.au

Document History and Status

Revision	Report Status	Prepared by	Reviewed by	Approved by	Issue Date
A	Draft Report	Angela Dwyer, Cameron Smith	Daniel Turnbull	Jeremy Smith	13-Oct-15
B	Final Report	Angela Dwyer, Cameron Smith	Daniel Turnbull	Jeremy Smith	16-Nov-15

Executive Summary

A high-level assessment of long-term augmentation options for Tamworth's bulk water supply has been undertaken. The assessment was preliminary in nature and desktop based and therefore did not involve consultation with any stakeholders or government agencies. The assessment was primarily focused on assessing the order of cost of each option, the technical viability and the potential yield benefit. Social and environmental impacts were not assessed in any detail but potential significant impacts have been identified.

The secure yield of the Tamworth bulk water supply system, once the augmentation of Chaffey Dam to 100 GL is completed, will be around 18 GL/a. Median climate change estimates may decrease this yield to around 17 GL/a, while more severe dry climate change estimates could reduce the yield to as low as 14 GL/a. When compared to long-term (50 year) demand projections of 18.1 GL/a based on an average growth scenario and 22.5 GL/a based on a high growth scenario, the yield shortfall at 2065 is estimated to be between 1.1 GL/a and 5.5 GL/a.

A list of viable options to address this long-term bulk water supply yield shortfall has been identified, with the preferred options being (in no specific order):

1. **Keepit Dam Transfers**
    - 62 km long DN500 pipeline
    - 25 ML/d @ 275 m total transfer pump rate and head
    - Up to 6.8 GL/a could be transferred assuming 75% operation time
    - Capital cost estimate of $65.4M (excluding bulk water purchases)
2. **Upgrade Dungowan Dam**
    - 20 – 25 GL dam storage
    - DN600 – DN750 pipeline augmentation
    - Around 6 GL/a increase in bulk water supply yield
    - Capital cost estimate of $150M for dam and incremental cost of $13.6M to $34.8M for DN600 – DN750 pipeline (compared to cost of replacing existing DN500)
3. **Off-River Storage upstream of Tamworth**
    - 10 – 15 GL off-river storage
    - 19 km long DN750 pipeline
    - Around 4.8 GL/a increase in bulk water supply yield
    - Capital cost estimate of $140M
4. **Groundwater (Peel Alluvium)**
    - Utilise existing Scott Rd Drift Wells and augment with additional borefield around 26 km downstream of Tamworth (near Appleby)
    - Eight additional bores, 26 km long DN375 pipeline & 10 ML/d transfer pump station
    - Up to 5.8 GL/a could potentially be transferred via the two 10 ML/d groundwater schemes, assuming 80% operating time
    - Capital cost estimate of $22.0M

Other options considered include: Chaffey Dam upgrade; pipeline from Chaffey Dam; on-river dams in the Cockburn River catchment; transfers from Split Rock Dam and Mooki Valley groundwater; inter-basin transfers from Barnard River and Apsley River; effluent reuse for rural, non-potable and potable purposes; stormwater reuse; and sewer mining. These options are generally not economical or do not provide any advantage over the preferred options but may have a higher social and/or environmental impact.

Based on the assessment of long-term supply options, the following future actions are recommended:

1. The four supply options identified should be investigated further to assess their viability and improve the accuracy of cost estimates. Specific areas for investigation include:
    a. Assessing the viability of acquiring water entitlements in the Namoi Valley (downstream of Keepit Dam) and converting to high security / local water utility licence, including discussions with DPI Water.
    b. Preliminary field investigations of the proposed site for a replacement of Dungowan Dam and assessment of potential property and infrastructure impacts.
    c. A more detailed assessment of potential locations for an off-river storage upstream of Tamworth (in the Peel or Cockburn valleys) and assessing the viability of accessing uncontrolled flows in the Cockburn or Peel Rivers in association with DPI Water.
    d. Modelling and monitoring of the Peel Alluvium aquifer and its interaction with the Peel River to assess the potential yield available for bulk water supply purposes in association with DPI Water, including assessing the viability of transferring entitlements from Chaffey Dam to Peel Alluvium.
2. Further refinement of the Peel IQQM in association with DPI Water (to improve modelling of bulk water supply components in particular) to improve yield estimates and ongoing assessment of climate change scenarios as more accurate estimates become available.
3. Further discussions with DPI Water regarding the resource assessment process for Chaffey Dam and possibility of putting aside the full 16.4 GL local water utility entitlement once the Chaffey Dam augmentation has been completed.
4. Revisit effluent reuse options prior to the negotiation of a new contract for the effluent reuse farm to assess the viability of making better use of effluent to improve bulk water security.

Contents

Exhibits

Appendices

Figures

Tables

1 Introduction

Tamworth Regional Council (TRC) has initiated a review of options to increase the long-term security and sustainability of its bulk water supply. A major upgrade of Chaffey Dam is currently underway which should ensure the security of the Tamworth town water supply (TWS) for around 20 – 30 years under current growth scenarios. In order to ensure that there are sufficient water resources available to service future growth beyond this point, TRC has identified the need to have a preferred strategy in place with a clear path to implementation due to the long timeframes often associated with large bulk water projects. The early development of a preferred strategy will also ensure that Council has sufficient time to identify and assess all issues that are relevant to Council, regulators and community groups.

This report encompasses the first step in determining the preferred long-term augmentation strategy - a high-level assessment of long-term augmentation options for Tamworth TWS. The assessment was preliminary in nature and desktop based and therefore did not involve consultation with any stakeholders or government agencies. The assessment was primarily focused on assessing the order of cost of each option, the technical viability and the potential yield benefit. Social and environmental impacts were not assessed in any detail but potential significant impacts have been identified.

2 Background

2.1 Previous Bulk Water Supply Studies

There have been several previous bulk water studies undertaken on Tamworth TWS. These studies have assessed future demands, system yields and short-term and long-term augmentation options. Key studies are summarised below.

Tamworth Water Supply – Future Yield & Demand Scenarios
(Hunter Water Australia, 2012)

This study estimated future bulk water demands for Tamworth and investigated the sustainable yield for both the current bulk water supply system and the future system, once the planned upgrade of Chaffey Dam from 62 GL to 100 GL was completed. Yield modelling was undertaken using the Peel IQQM, in association with the NSW Office of Water, and the study also considered the potential impacts of climate change on future yields and the potential impacts of decommissioning Dungowan Dam.

Projected bulk water demands were estimated for three demand scenarios (low, average and high) with different dwelling growth and residential usage assumptions, as shown on Table 2.1 below.

Table 2.1 Projected Bulk Water Demands (HWA, 2012)

Demand Scenario	Annual Demand for Bulk Water (ML/a)			
	2010	2020	2030	2040
Low (250kL/a, 0.75%pa)	8,100	9,300	10,500	11,800
Average (300kL/a, 1% pa)	9,000	10,700	12,300	14,400
High (350kL/a, 1.5% pa)	9,900	12,300	14,500	17,000

Town water supply yield estimates were determined for both the existing and future augmented systems, along with several sensitivity scenarios. Existing system yield was estimated to be 11 GL/a, while future system yield (with Chaffey Dam augmented to 100 GL) was estimated to be 18 GL/a. These yield estimates are discussed further in Section 4.1.3.

A key recommendation of the study was the need to commence discussions with relevant State Government Departments/Enterprises (including NSW Office of Water) concerning increasing carry over reserve in Chaffey Dam as Tamworth's demand increases in the future. Yield modelling had shown that significant increases in carry over reserve were required as demands increase to ensure adequate TWS security is maintained into the future.

Tamworth Water Supply - Options to Improve Efficiency & Management of Raw Water Sources (Hunter Water Australia, 2008)

This study identified options to improve the efficiency of Tamworth's bulk water supply from Chaffey Dam. From the period between December 2005 and June 2007, storage levels in the dam dropped from 67% to 15% which triggered the highest water restriction level (Level 5 Emergency). During this period, significant water losses were occurring between Chaffey Dam and the Peel River Intake Works and were determined to be in the order of approximately 50% or more of Chaffey Dam outflows.

The link between surface water and groundwater in the Peel Valley was identified as being the most likely cause of the high transmission losses with illegal surface water and groundwater extractions by irrigators located near the Peel River contributing to these losses.

Options identified to improve water efficiency included:

- Construction of a pipeline between Chaffey Dam and Tamworth
- Local Raw Water Storage at Calala Water Treatment Plant (WTP) or near the Peel River Intake PS
- Recommissioning of Scott Road Drift Wells
- Reinstatement of Paradise Weir
- Various operational Improvements

The preferred drought contingency response at the time was the re-commissioning of Scott Road Drift Wells, which began operating again in the summer of 2007/08. A total of six wells were re-instated to produce up to 10 ML/day of raw water, pumped directly to Calala WTP.

Tamworth Bulk Water Supply Augmentation Options Study (Hunter Water Australia, 2005)

This study identified a broad range of supply side and demand-side augmentation options to improve system yields and water demand efficiencies. Both technical and economic feasibility of various supply side options were assessed, with the following options being considered economically feasible and worth further consideration:

- Upgrade of Chaffey Dam to either 80, 100 or 120 GL, which would result in an increased yield of 7 GL/a, 10 GL/a and >10 GL/a respectively
- Upgrading Chaffey Dam (as above) combined with decommissioning the Dungowan Pipeline
- Augmenting the Peel River Intake Works along with augmentations to Calala WTP and major distribution reservoirs and trunk mains
- Construction of a 100 ML off-river storage near Calala WTP or a 1,000 ML off-river storage near the Peel River Intake Works

Demand side options were also considered, including: pricing; permanent restrictions; residential water efficiency audits and retrofits; rainwater tanks; stormwater reuse; and grey water reuse.

Projected demand scenarios up to 30 years into the future were also presented in this study. The projections were based on an existing demand for bulk water of 9.76 GL/a in 2003 and assumed an annual residential usage of 345 kL/property. Base demand forecasts assumed that no water efficiency targets would be met and existing residential and non-residential usage rates would remain static. Water efficient demand forecasts assumed that a 15% reduction in demand would occur over a 15-year period, with a 5% reduction by 2008, followed by a 10% reduction by 2010 and a 15% reduction by 2018.

Low, average and medium growth rates were applied to both the base demand forecasts and the water efficient forecasts, with additional allowances for residential expansion and non-residential growth. Adopted demand forecasts are summarised in Table 2.2 below.

Table 2.2 Projected Bulk Water Demands (HWA, 2005)

Growth Scenario	Annual Demand for Bulk Water (ML/a)		
	2003 Existing Demand	2033 (+30 years) Base Demands	2033 (+ 30 years) Water Efficient Demands
Low (0.5%pa)	9,760	14,000	11,900
Average (1% pa)		16,900	14,400
High (1.5% pa)		19,900	16,900

Tamworth Water Supply Augmentation – Headworks Augmentation Strategy Study (NSW Public Works Department, 1987)

This report identified and investigated both short-term and long-term augmentation options for Tamworth's headworks. Short-term options focused on augmentations to the key existing bulk water components, including Dungowan Dam and pipeline, Chaffey Dam and the Peel River Intake Works. Short-term options also included consideration of a pipeline from Chaffey Dam to Calala WTP and an off-stream / terminal storage of either 1,000 ML or 10,000 ML located within a few kilometres of the intake works.

Long-term options focused on a major new source or storage and included: Mulla Creek and Swamp Oak Creek Dams (22 to 26 GL on-stream dams located within the Cockburn River catchment); large off-stream storage located upstream of Tamworth and sourcing water from the Peel River; transfers from Split Rock Dam (around 70km pipeline); major bores and transfer system from the Mooki Valley Aquifer (around 60km pipeline); and inter-basin transfers from the Barnard River (including new dam).

The report concluded that the preferred short-term headworks augmentation option was the augmentation of Chaffey Dam to 100 GL. In addition to this, the recommended long-term option (subject to further investigation of the yield and cost estimates) for future augmentation of the headworks was a 10,000 ML off-stream storage located around 2 km south of the existing intake works. The alternative option if the off-stream storage was shown not to be viable was assessed to be the Mooki Valley borefield. Transfers from the Barnard River were not considered to be economically viable.

3 Overview of the Existing Bulk Water Supply System

Bulk water for Tamworth is primarily sourced from two major storages within the Peel Valley; Chaffey Dam on the Peel River and Dungowan Dam on Dungowan Creek. A backup supply is also available via groundwater bores (known as the Scott Road Drift Wells) that access water contained within an alluvial groundwater aquifer that is adjacent to and interconnected with the Peel River.

A general description of the water resources within the Peel Valley is contained below, followed by further details on the key bulk supply components for Tamworth. An overview of the bulk water supply system is provided in **Exhibit 1.**

3.1 Peel Valley Catchment

Tamworth is located on the Peel River, approximately 40 km upstream of its confluence with the Namoi River. The Peel River has a total catchment area of approximately 4,670 km^2 and the key tributaries of the Peel River includes: Duncans Creek, Dungowan Creek, Cockburn River, Goonoo Goonoo Creek, Moore Creek, Timbumburi Creek, Tangaratta Creek and Attunga Creek. In addition to the Peel River, the Cockburn River, Goonoo Goonoo Creek and Dungowan Creek all exhibit perennial flows in most years (NOW, 2010).

The Peel Valley has two storages, Chaffey Dam and Dungowan Dam, which regulate water supplies in the Peel Valley catchment. Chaffey Dam is a major headwater storage located on the Peel River approximately 40 km upstream of Tamworth and Dungowan Dam is a smaller headwater storage located on Dungowan Creek, approximately 60 km upstream of Tamworth.

The average annual discharge from the Peel River at Carroll Gap is 253 GL, with a large variability between wet and dry years. Variability in streamflows also occurs between seasons (with predominate rainfall and irrigation in summer) and across the valley. The Cockburn River sub-catchment contributes around 40% of the average annual streamflows at Carroll Gap, with Goonoo Goonoo Creek and Dungowan Creek both contributing around 10% of streamflows (NOW, 2010).

Groundwater aquifers in the Peel Valley are primarily either fractured rock or alluvial – i.e. Peel Alluvial aquifer and Peel Fractured Rock aquifer. The alluvial aquifer is located adjacent to the Peel River and its major tributaries, predominately along the Peel Valley floor. The Peel Alluvium comprises unconsolidated sand, gravel and clay deposits, usually less than 1.5 km wide but ranging up to 3 km wide between Tamworth and Attunga. The thickness of the alluvial deposits is variable but is generally around 15 m, reaching 20 m near Tamworth. The Peel Alluvial is recharged by rainfall and streamflow and water quality is generally good, suitable for stock & domestic, irrigation and TWS purposes.

The fractured rock aquifer is part of the bigger fractured rock aquifer system of the New England Fold Belt and comprises mainly shale, limestone, sandstone and mudstone rock formations. The fractured rock system contains water of variable yield and quality and is extensively developed for stock & domestic supplies, with some small scale commercial and irrigation development.

The alluvial groundwater and surface water in the Peel River and its major tributaries are intricately linked, with the Peel River losing water to the Peel Alluvium along most of its length, but gaining water from groundwater at the lower end of the valley. The general flow of groundwater is initially away from the river and then down gradients parallel to the river (NOW, 2010).

3.2 Headworks

3.2.1 Dungowan Dam & Pipeline

Dungowan Dam is a dedicated TWS dam that is owned and operated by TRC, with a storage capacity of 6.3 GL and a catchment area of around 125 km^2. Although the dam is relatively small, it typically supplies around 40% of Tamworth's bulk water supply needs. Dungowan Dam is operated by TRC according to licence conditions, which include maintaining a flow of 10 ML/day into Dungowan Creek when inflows exceed 10 ML/day, or passing all inflows as outflows when inflows are less than 10 ML/day. TRC holds a water licence for the extraction of water from Dungowan Dam of 5.6 GL/yr.

Dungowan Dam was constructed by the former Tamworth City Council in 1958 and is an earth fill embankment dam with an impervious core and cut-off trench taken down to rock. The dam catchment drains from the west side of the Great Dividing Range and consists of State Forest, forestry pine plantations, undeveloped council owned land and grazing land for sheep and cattle located in the upper reaches. The majority of the land around the dam is pristine and the catchment area is closed at all times to the general public.

Bulk water from the dam is supplied to Tamworth via the Dungowan Pipeline, a 54 km long DN500/375 gravity main that runs from the dam to Calala WTP, via a route which generally follows Dungowan Creek and then the Peel River downstream of the confluence of the two streams. The pipeline has a capacity of around 22 ML/day and is chlorinated to minimise slime growth and provide some form of disinfection for the rural customers who use the pipeline for stock and non-potable uses. During periods of algal blooms in the storage, protocols exist to warn Dungowan Pipeline customers of the potential health impacts.

The key characteristics of Dungowan Dam and Pipeline are summarised in Table 3.1.

Table 3.1 Dungowan Dam & Pipeline – Key Characteristics

Characteristics	Details
Dam Catchment Area	125 km^2
Full Supply Level (FSL)	RL 682.84 m AHD
Storage Capacity at FSL	6.3 GL
Dead Storage	0.3 GL
Maximum Height of Dam	31 m
Length of Crest	215 m
Spillway Types	Automated Balanced Gate / Auxiliary Ogee Crested Spillway / Fuse Plug Spillway
Spillway Capacity	~ 1×10^{-5} Annual Exceedance Probability (AEP) event
Water Quality	Generally good, with low turbidity & hardness (occasional algal blooms)
Environmental / Operational Requirements	10 ML/d (if inflow > 10 ML/d) Outflow = Inflow (if inflow < 10 ML/d)
Pipeline Length	57 km
Pipeline Diameter / Type	500 mm Cast Iron 54 km / 375 mm Mild Steel 3 km
Pipeline Capacity	22 ML/d

3.2.2 Chaffey Dam

Chaffey Dam is the major in-stream structure in the Peel Valley, with a storage capacity of 62 GL and a catchment area of around 420 km^2. The dam is owned and operated by WaterNSW (formerly State Water) and is a major source of water for both local irrigators and Tamworth, capturing water during times of high flow and releasing it during periods when downstream flows are insufficient to satisfy demands.

Chaffey Dam is located near Bowling Alley Point on the Peel River, was constructed in 1979 by the former NSW Department of Water Resources and is an earth and rockfill embankment. While the current storage capacity is 62 GL, the storage is currently in the process of being augmented by the construction of a reinforced earth embankment and parapet wall along the dam crest to increase the storage capacity to 100 GL. Construction is due to be completed by late 2016.

The dam catchment drains from the west side of the Great Dividing Range and is mainly agricultural land and consequently inflows can carry high nutrient loads. Chaffey Dam is open to the general public for recreational use.

All releases from the dam to satisfy downstream irrigation and town water demands are controlled by WaterNSW. Releases are made directly to the Peel River downstream of the dam and bulk water for Tamworth is extracted from the river via the Peel River Intake Works (refer Section 3.2.3), which is located on the eastern outskirts of Tamworth. The dam currently supplies around 60% of Tamworth's bulk water supply needs. TRC has a high security entitlement of 16.4 GL/yr from Chaffey Dam.

The key characteristics of Chaffey Dam are summarised in Table 3.2.

Table 3.2 Chaffey Dam – Key Characteristics

Characteristics	Details
Catchment Area	420 km^2
Full Supply Level (FSL)	RL 518.6 m AHD (current) RL 525.1 m AHD (2015 upgrade)
Storage Capacity at FSL	61.83 GL (current) 100 GL (2015-16 Upgrade)
Dead Storage	2.36 GL
Maximum Height of Dam	55.8 m (current)
Length of Crest	63.8 m (2015 Upgrade)
Spillway Types	Morning Glory Service Spillway / Broad Crested Auxiliary Spillway with Fuse Plug
Spillway Capacity	Probable Maximum Flood (PMF)
Water Quality	Moderately hard, frequent algal blooms due to high nutrient loadings from catchment
Environmental / Operational Requirements	5 - 10 ML/d Operational target @ Carrol Gap (end of system)
Outlet Capacity	1,100 ML/d

Due to the dual-purpose nature of the dam (irrigation and TWS) and the current WSP rules, which require the dam to be operated, based on annual accounting, the operation of the dam is not optimised for TWS security. Any water that is saved by TRC (either due to demand management measures or due to supplying from an alternative source) is generally shared with irrigators and other high security users as the resource assessment process (which determines irrigations allocation levels) is reset at the start of every water year. In addition, during severe drought periods up to 50% of the water released from the dam for TWS purposes (to be extracted via the Peel River Intake Works) is lost, mostly to groundwater. As minimum groundwater allocations in the Peel Valley are 51%, significant groundwater extractions continue to occur during severe drought periods, including extractions from the Peel Alluvium between Chaffey Dam and Tamworth. This results in major losses from the Peel River between the dam and Tamworth, particularly during severe drought periods. Even when water is not required to be released for irrigation or TWS purposes, water continues to be released (operational flows) during drought periods to satisfy domestic and stock watering requirements between the dam and the confluence with the Namoi River, which further contributes to water losses.

3.2.3 Peel River Intake Works

The Peel River Intake Works comprises a river intake structure and pumping station located on the Peel River and a rising main from the pumping station to Calala WTP. The intake and pumping station are located approximately 1 km upstream of the confluence with the Cockburn River, near the locality of Calala and were constructed in 1980 by Tamworth City Council, in association with the nearby Calala WTP. The intake works includes a screened inlet with a side intake flume on the river bed, a centrifugal type grit separator, a dry well pumping station comprising 3 variable speed centrifugal pumps (nominal station capacity is 80 ML/d) and dual DN600 rising mains.

The intake is prone to a build-up of sediments (generally sand and gravel) in high flow periods, due to the location of the screen inlet on the river bed. Construction of Johnson screens with 6mm openings in the mid-1990s was only effective in reducing larger diameter sediments and the screens are prone to blockage in low flow times. An airlift pump was also installed in the grit chamber to allow frequent removal of material.

The key characteristics of the Peel River Intake Works are summarised in Table 3.3.

Table 3.3 Peel River Intake Works – Key Characteristics

Characteristics	Details
Centrifugal Grit Chamber Dimensions	5 m diameter, 15 m depth
Dry Well Dimensions	7.5 m diameter, 15 m depth
Nominal Capacity of Intake & Grit Chamber	93 ML/d
Duty – 1 Pump (with 2 standby)	40 ML/d (via 1 rising main)
Duty – 2 Pumps (with 1 standby)	80 ML/d (via 2 rising mains)
Rising Main Diameter / Type	2 x 600 mm Mild Steel
Rising Main Length	2.6 km

3.2.4 Scott Road Drift Wells & Transfer System

The Scott Road Drift Wells were originally used to supply water to Tamworth between 1931 and 1980 and are now used as a backup supply to Dungowan and Chaffey Dams. The severe drought experienced in Tamworth between 2003 and 2008 saw a number of drift wells along the Peel River in Scott Road re-commissioned to mitigate falling storage levels in Chaffey Dam. Six wells were re-instated and began operating again in the summer of 2007/08.

The wells are located downstream of the confluence of the Cockburn and Peel Rivers and source surface water from the Peel River as well as groundwater from the Cockburn and Peel alluviums. There are two wells located within the bed of the Peel River, which are connected to TRC's Peel River surface water licence. The wells can deliver up to 5 ML/d, but are limited to 100 ML/month over 12 months. A further four wells are located within the adjacent Peel River floodplain and are connected to a separate groundwater licence. A transfer pumping station delivers all water produced by the drift wells directly to Calala WTP.

The key characteristics of the Scott Road Drift Wells and transfer system are summarised in Table 3.4.

Table 3.4 Scott Road Drift Wells – Key Characteristics

Characteristics	Details
Number of drift wells	6
Transfer Pumping Station Capacity	10 ML/d
Rising Main Diameter / Type	300 mm mPVC Pipe
Rising Main Length	3.6 km

3.3 Water Supply System Security

Hunter Water Australia was engaged by TRC (in association with the Namoi Catchment Management Authority) in 2012 to investigate the sustainable yield for both the current bulk water supply system and the future system, once the planned upgrade of Chaffey Dam from 62 GL to 100 GL was completed. Yield modelling was undertaken using the Peel IQQM, in association with the NSW Office of Water, and the study also considered the potential impacts of climate change on future yields and the potential impacts of decommissioning Dungowan Dam. A key focus of the study was assessing whether TRC's current entitlement of 22 GL/a from both Chaffey and Dungowan Dams could be reliably achieved in practice.

TWS yield estimates determined for both the existing and future augmented system, along with several sensitivity scenarios and are summarised in Table 3.5.

Table 3.5 Future Yield Estimates (HWA, 2012)

Scenarios	TWS System Yield Estimate
Existing System (Chaffey Dam 62 GL)	11 GL/a
Augmented System (Chaffey Dam 100 GL)	18 GL/a
Augmented System / Median Climate Change	17 GL/a
Augmented System / Dry Climate Change	14 GL/a
Augmented System / Decommission Dungowan Dam / Median Climate Change	15 GL/a

Note: TWS System Yield Estimates do not include any contribution from the Scott Road Drift Wells

The table shows that while the augmentation of Chaffey Dam does have a significant impact on TWS security, the current total town water entitlement of 22 GL/a is still not achievable. The increase in TWS yield is likely to be at least partly offset by future climate change conditions, with around 1 GL/a reduction expected under median climate change predictions and around 4 GL/a reduction under dry climate change predictions.

Based on the limited modelling undertaken, decommissioning Dungowan Dam would result in around a 2 GL/a reduction in TWS yield.

TWS yield scenarios were compared to projected TWS demands (estimated in 2012) to assess the potential timing of when demand may outstrip supply. The study concluded that the yield estimate of 18 GL/a for the augmented system was well above all 30-year demand projections. However, the yield estimate under median climate change (17 GL/a) was in line with high growth demand projections for 2040 and under the more severe dry climate change scenario, the yield estimate of 14 GL/a was slightly under the 2040 average growth demand projection.

4 Bulk Water Demands

4.1.1 Historical Demands

Historical water production for Tamworth TWS (based on treated water production data for Calala WTP) provides a reliable estimate of town water demands, as shown on Figure 4.1 below.

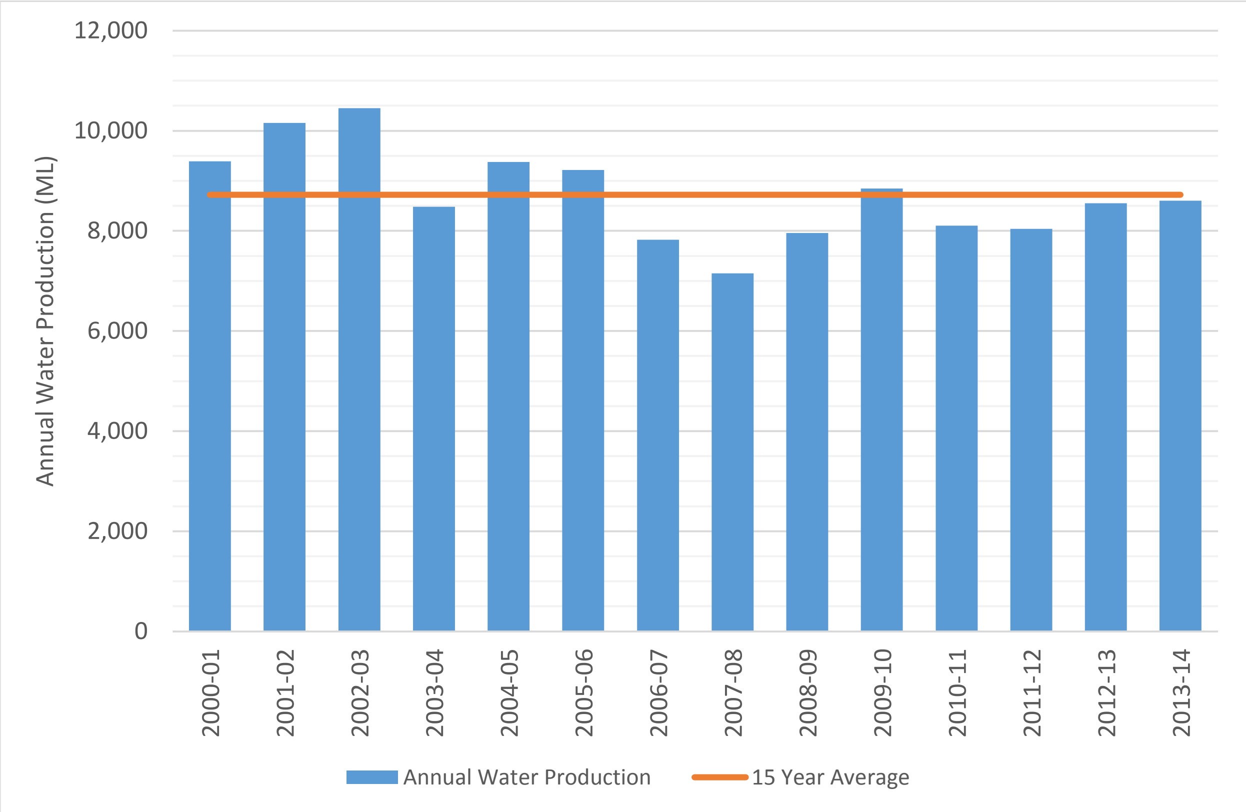


Figure 4.1 Annual Treated Water Production – Tamworth Water Supply (15 years)

Average town water demand / production over the last 15 years was 8.7 GL/a, with demands generally in the range of 8 – 10 GL/a in the majority of years. Demands reduced significantly during and immediately following the severe drought period from 2005 to 2007, with severe level 5 restrictions applying for several months in 2007. Demands have been fairly static since the severe drought event, in part due to the introduction of a comprehensive demand management program in 2007 which has seen significant residential and non-residential water savings through a combination of education and retrofitting with water efficient fixtures.

The impact of the severe drought from 2005 to 2007 combined with the introduction of the demand management program can also be seen in the figure below, which shows how average annual residential water usage per property has changed over the last 10 years. Prior to 2005, residential usage was around 350 kL/a. However, over the last six years residential usage has dropped to around 240 kL/a on average and despite the dry condition over the last two years, residential usage has still not exceeded 300 kL/a.

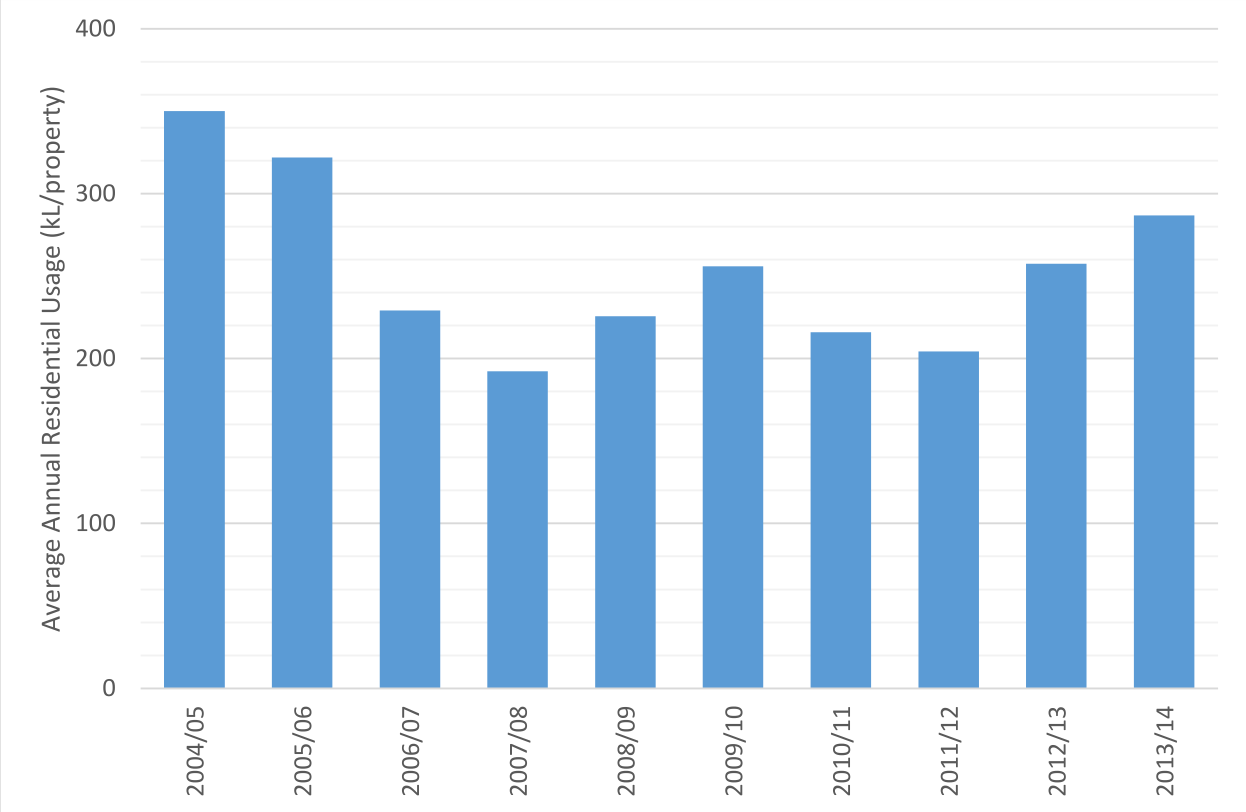


Figure 4.2 Average Annual Residential Usage per Property – Tamworth Regional Council (10 years)

4.1.2 Projected Demands

Projected bulk water demands have been estimated based on assumed future residential usage and growth figures and associated non-residential growth (see Appendix A for more details). Three demand scenarios have been determined – low, average and high.

The average demand scenario has assumed an annual residential usage of 300 kL/property, which is slightly higher than recent residential usage levels but is considered to be a more realistic and sustainable level over the medium to long-term. The lower bound demand scenario adopted 250 kL/property, based on recent residential usage levels being maintained indefinitely, while the higher bound demand scenario adopted 350 kL/property, based on pre-drought demand levels.

In addition to the three residential usage scenarios, three dwellings growth rates have been assumed. The average growth was assumed to be 1.0% pa. A lower bound growth rate of 0.75% pa and a higher bound growth rate of 1.25% pa were also adopted.

The projected bulk water demands shown on Table 4.1 below are based on the residential usage and growth assumptions discussed above and also include allowance for residential expansion (including Moonbi/Kootingal, Attunga plus others), industrial expansion, growth of commercial and institutional demands in line with residential growth and WTP production losses of 10% (see Appendix A).

Table 4.1 Projected Bulk Water Demands – Tamworth Water Supply (50 years)

Demand Scenario	Annual Demand for Bulk Water (ML/a)					
	2015 (Existing)	2025 (+10yr)	2035 (+20yr)	2045 (+30yr)	2055 (+40yr)	2065 (+50yr)
Low 250kL/a, 0.75%pa	8,800	9,800	10,900	12,000	13,100	14,300
Average 300kL/a, 1% pa	9,700	11,200	12,800	14,500	16,200	18,100
High 350kLa, 1.25% pa	10,600	12,700	14,900	17,200	19,800	22,500

The above projections are similar to the projections included in the *Future Yield & Demand Scenarios Study* (HWA, 2012), with the projections at plus 30 years (2045 on the above table and 2040 in the 2012 report) having a less than 2% difference. With demand levels remaining fairly consistent over the last 5 years (between 2010 and 2015) the previous 30-year demand projections have effectively shifted 5 years. While demand levels have been relatively stable in recent years – mainly due to demand management measures combined with the lingering impacts of extended water restrictions – it is considered likely that future demands will start increasing in line with future dwelling growth.

It is worth noting that the 50-year demand projection for the high growth scenario (22.5 GL/a) is only slightly higher than TRC's current combined entitlement to water from Chaffey Dam (16.4 GL/a), Dungowan Dam (5.6 GL/a) and Peel Alluvium at Kootingal (0.4 GL/a), which totals 22.4 GL/a.

4.1.3 Potential Yield Shortfall

The future deficit in TWS yield has been estimated by comparing combinations of 50-year demand scenarios with TWS yield based on various climate scenarios as shown on Table 4.2 below. While the combination of average demand growth and median climate change is considered to be the most likely scenario, the combinations of average demand growth with dry climate change or high demand growth with median climate change should be considered upper limits for long-term planning purposes. The combination of the high demand growth scenario combined with dry climate change is considered to be too conservative for planning purposes. Therefore, the potential yield shortfall at 2065 is between 1.1 and 5.5 GL/a.

Table 4.2 Estimated Yield Shortfall at 2065 (+50 years)

Demand Scenario (GL/a)	TWS Yield based on Climate Change Scenario (GL/a)	Potential Yield Shortfall (GL/a)
Average (18.1)	Median (17.0)	1.1
Average (18.1)	Dry (14.0)	4.1
High (22.5)	Median (17.0)	5.5
High (22.5)	Dry (14.0)	8.5

5 Modelling

Water security has been assessed with the aid of the water resource modelling tool IQQM (Integrated Quantity and Quality Model). The Peel IQQM has been developed by DPI Water over the last 15 years and is used for operational planning purposes. The model has previously been used by TRC to assess TWS and irrigation security based on various demand and climate change scenarios for a variety of different augmentation options. Further details on the Peel IQQM are included in the *Future Yield & Demand Scenarios Study* (HWA, 2012) and an extract from this report is included in Appendix B. The extract in Appendix B also contains an explanation of the resource assessment process, environmental flows for the existing and augmented Chaffey Dam and the current definitions of TWS security and irrigation security, which were used to assess the estimated yield of various augmentation options.

In summary, the key security criteria are:

- **TWS Security**: Total storage should not fall below a minimum total storage equivalent to one years restricted supply (plus any expected inflows and losses) during a repeat of the worst drought on record.

- **Irrigation Security**: Mean and median allocations on 1 October should not drop below 50%

Water restrictions are also included in the Peel IQQM and the current triggers expressed as a percentage of storage and the demand reductions expected under the various restriction levels have been adopted for both the existing and augmented Chaffey Dam storages (see Table 5.1 below).

Table 5.1 TWS Restrictions

Restriction Level	Trigger (% Chaffey Dam Storage)	Demand Reduction Target (% of average daily demand)
1	50%	95%
2	40%	90%
3	35%	85%
4	30%	75%
5	25%	65%

It should be noted that all modelling work was undertaken by Hunter H2O with some technical support from DPI Water modellers. DPI Water provided Hunter H2O with two base models, which represented the existing Chaffey Dam and associated water sharing plan rules and the augmented Chaffey Dam and the modified water sharing rules associated with the 100 GL dam. The base models were then modified by Hunter H2O to assess various augmentation options (not all options have been modelled) and to estimate the TWS yield – ensuring both TWS and irrigation security criteria are satisfied. DPI Water provided limited technical review and support with the modelling in order to ensure the model was used appropriately from an engineering/modelling perspective. Policy advice on the viability of options and on potential future water access rules was not provided by DPI Water and as such these issues would need to be discussed further with DPI Water before considering the options in further detail.

Further details on the modelling work that was undertaken for this study are contained in a background report: *Tamworth Bulk Water Supply: Peel IQQM Model Results* (Hunter H2O, 2015).

6 Overview of Options

An overview of the potential options for augmentation of the bulk water supply is provided in the table below and shown in **Exhibit 2**. The table also lists the options that are considered emergency supply options and could be implemented as an additional water source during prolonged drought conditions. The surface water and dam options are discussed in more detail in Section 7, groundwater options in Section 8 and reuse options are discussed in Section 9.

Surface Water / Dams Options	Emergency Supply Option?
Chaffey Dam Options:	
• Pipeline from Chaffey Dam to Tamworth	Y
• Chaffey Dam Augmentation (120 GL)	N
• Modify resource assessment to consider full 16.4 GL entitlement	N
• Purchase additional water entitlements	N
Dungowan Dam Options:	
• Dungowan Dam augmentation	N
• Dungowan Pipeline augmentation	N
Off-River Storage Options:	
• Small raw water storage at WTP (100 ML)	N
• Large bulk water storage upstream of Tamworth (10 GL)	N
New On-River Storage Options:	
• Swamp Oak Creek Dam	N
• Mulla Creek Dam	N
Transfers for Other WaterNSW Dams Options:	
• Split Rock Dam Pipeline	Y
• Keepit Dam Pipeline	Y
Inter-Basin Transfer Options:	
• Apsley River Scheme	N
• Barnard River Scheme	N
Groundwater Options	
Groundwater Options:	
• Peel Alluvium aquifer	Y
• Peel Fractured Rock aquifer	Y
• Mooki Valley Aquifer	N
Reuse Options	
Recycled Effluent Options:	
• Rural Substitution	N
• Non-potable Substitution	Y
• Indirect potable reuse	N
• Managed aquifer recharge	Y
• Direct potable reuse	Y
Stormwater Reuse	N
Sewer Mining	Y

7 Surface Water / Dams Options

Bulk water supplies for Tamworth are currently dominated by surface water sources, with the two primary sources being Chaffey Dam and Dungowan Dam, both located within the Peel Valley. While average rainfall in the region is substantially lower than rainfall in adjacent coastal catchments, large catchment basins combined with large bulk water storages (dams) are still able to provide relatively secure water supplies.

Surface water options considered in this study include several options within the Peel Valley and some options associated with catchments adjacent to the Peel Valley (both coastal and inland catchments). Options that have been considered within the Peel Valley include augmentations associated with existing sources (Chaffey and Dungowan Dams) and new on-river and off-river storages. Options associated with catchments outside of the Peel Valley include transfers from Namoi River catchment dams (Keepit and Split Rock Dams) and inter-basin transfers from the Macleay River basin (Apsley River) and the Manning River basin (Barnard River).

7.1 Chaffey Dam

There are limited remaining options available to increase extractions from Chaffey Dam. The current augmentation of the dam from 62 GL to 100 GL has previously been identified as the most cost effective way to increase town water security for Tamworth (HWA, 2005) and will significantly improve both TWS and irrigation security. Options considered include construction of a pipeline from Chaffey Dam to Tamworth, further augmentation of Chaffey Dam to 120 GL, increasing the carry over reserve (COR) to the full 16.4GL entitlement and purchasing additional water entitlements.

7.1.1 Pipeline from Chaffey Dam to Tamworth

Key Technical Details	▪ Construction of 38 – 41 km pipeline (depending on selected route) from the outlet of Chaffey Dam to the WTP ▪ DN375 pipeline could transfer 12 ML/d, DN500 25 ML/d and DN600 40 ML/d ▪ The preferred pipeline route would nominally follow the Peel River to its confluence with Dungowan Creek, and then road reserves to the WTP (Tamworth-Nundle Rd and/or Back Woolomin Rd) ▪ One booster pump station would be required between the outlet of the dam and the WTP depending on the pipeline route
Key Benefits	▪ Elimination of transmission losses and travel time between the dam and the intake works (note that these benefits would only be realised if the Peel River Intake Works was maintained and downstream releases to the Peel River from the dam ceased during periods of severe drought)
Key Social / Enviro Impacts	▪ Key social and environmental impact would mainly be associated with pipeline construction ▪ Significant social and environmental impacts could occur downstream of Chaffey Dam if the pipeline was used in severe drought periods as an alternative to releasing flows to the Peel River
Feasibility	▪ The benefits are limited and would not justify the costs involved ▪ The full benefit of constructing a pipeline from Chaffey Dam to Tamworth cannot be realised without preventing all releases from Chaffey Dam during drought periods. This is only likely to be possible during severe drought conditions and would require suspension of the WSP or changes to the rules in future versions of the WSP.
Estimated Timeframes	▪ 1.5 – 2 years
Prelim Capital Cost Estimate	▪ DN500 @ 25 ML/d - $38.4M (route 2) (DN375 $26.0M / DN600 $48.7M)
Estimated Operating Costs	▪ $15/ML plus bulk water charges

This option consists of the construction of a pipeline from the outlet of Chaffey Dam to Calala WTP. Under the current arrangement, a key constraint in obtaining water from Chaffey Dam is the need to release flows into the Peel River before extracting the water via the Peel River Intake Works located around 40 km downstream of the dam. With travel times of approximately two days and a significant number of groundwater bores located within close proximity to the Peel River, transmission losses between the dam and the intake works can be very high, particularly during periods of severe drought (HWA, 2008).

Significant losses (over 50%) were experienced between Chaffey Dam and the Peel River Intake Works during the previous severe drought of 2006/07. The construction of a pipeline between Chaffey Dam and the WTP would look to eliminate these transmission losses and travel time.

Three potential pipeline routes have been investigated at this stage, with the aim of minimising the number and elevation of the high points along the route. It is anticipated that substantial amounts of rock may be encountered upstream of Duncan's Creek for all of the options. A brief overview of each route is shown in **Exhibit 3** and described below:

Route 1 (approximately 38 km length) nominally follows the western side of the Peel River from the dam to downstream of the confluence with Dungowan Creek. It then follows road reserves along Duri-Dungowan Road, Loomberah Road and Calala Lane to the WTP. This route has the shortest length of the three proposed routes but has significant high points approximately 26 km downstream of the dam. It is anticipated that either one or two booster pumps (total pump head approximately 70 m) would be required along this pipeline route.

Route 2 (approximately 40.9 km length) follows the eastern side of the Peel River from the dam to its confluence with Dungowan Creek and then follows Tamworth-Nundle Road to Tamworth. This route has the longest length but the least amount of elevation to overcome. A single booster pump station along the pipeline length (pump head approximately 25 m) would be needed for this pipeline route.

Route 3 (approximately 39.3 km length) follows the eastern side of the Peel River to near its confluence with Dungowan Creek where it then follows to same alignment as the Dungowan pipeline. An opportunity exists to combine the two pipelines at this point and replace the downstream section of the Dungowan pipeline with a larger pipe that has sufficient capacity for flows from both the Dungowan and Chaffey dams. Similar to route 1, there are significant high points along the route, approximately 26 km downstream of the dam. It is anticipated that either one or two booster pumps (total pump head of approximately 70 m) would be required for this pipeline route.

This feasibility of this option has been assessed using the Peel IQQM, assuming the pipeline replaces the existing Peel River Intake Works and all flows are passed directly to the WTP. Under this scenario, there is minimal change in town water security and the overall yield of the system does not increase (effectively providing no benefit). The two primary reasons for this are the substantial reduction in catchment area at the extraction point and the need to always maintain visible flows along the entire Peel River. The effective catchment to the town water extraction point would reduce from 1,230 km^2 (at the existing Peel River Intake Works) to 420 km^2 (at Chaffey Dam) and TRC would no longer be able to extract flows that enter the Peel River downstream of Chaffey Dam. Releases from the dam would also still need to occur during severe drought periods to supply the stock and domestic users along the Peel River (all the way to the confluence with the Namoi River). Unless downstream releases to the Peel River are prevented during drought periods, high losses along most of the length of the Peel River (largely due to losses to groundwater) will continue to occur and the full benefit of the pipeline would not be realised.

7.1.2 Chaffey Dam Augmentation (120 GL)

Key Technical Details	▪ A further augmentation of Chaffey Dam to 120 GL (from 100 GL) would involve the raising of the embankment and spillways a further 2.2 m and would most likely require the abandoning of much of the current augmentation works (construction of a vertical reinforced earth wall on the crest of the dam) in favour of a more conventional embankment raising ▪ Ancillary works likely to be required include road realignments and relocation of recreational facilities (picnic areas, boat ramps, etc.)
Key Benefits	▪ Around 2 GL/a increase in TWS yield
Key Social / Enviro Impacts	▪ A further increase in the full supply level at Chaffey Dam would result in a further 70 ha of vegetation being inundated, including 50 ha of endangered ecological community (EEC), 4 ha of critically endangered ecological community (CEEC) and 1 ha of Booroolong frog habitat (WorleyParsons, 2013) ▪ The increase in the dam full supply level may also impact roads around the dam which are already subject to realignment due to the current dam augmentation
Feasibility	▪ A further augmentation of Chaffey Dam is not likely to be justified due to the reduced benefits associated with increasing the storage beyond 100 GL
Estimated Timeframes	▪ 2 – 3 yrs (minimum based on previous experience with dam)
Prelim Capital Cost Estimate	▪ $51M
Estimated Operating Costs	▪ $115/ML

The current upgrade to Chaffey Dam will increase its storage capacity from 62 GL to 100 GL, resulting in a significant increase in TWS yield (around 7 GL/a increase). A further increase in TWS yield (around 2 GL/a increase) could be achieved by upgrading the dam storage capacity to 120 GL. However, the option of increasing the storage capacity to 120 GL has previously been considered and was dismissed in favour of the current augmentation to 100 GL. The primary reasons given for not augmenting the dam to 120 GL were: the incremental benefit did not justify the additional cost; and the water supply security provided by the 100 GL augmentation was considered to be sufficient for the foreseeable future. More recent modelling results suggest that the 100 GL dam will provide sufficient TWS security to Tamworth for the next 20 – 30 years (HWA, 2012); however, eventually an additional water supply source will be required based on current long-term demand projections.

The current dam augmentation has been designed on the basis that 100 GL will be the maximum storage size and has not considered any future stages for further storage augmentations. Consequently, any further augmentation of the storage beyond 100 GL would require starting again with the design process to assess the augmentation options. For the purposes of this study, it has been assumed that the current augmentation works would not just be able to be extended a further 2.2 m, but rather a full redesign of the embankment and spillway raising would be required and would most likely result in the need to rebuild much of the works that are currently taking place to increase the storage to 100 GL. It has also been assumed that a full embankment raising would be required, as opposed to the current method of building a vertical wall on top of the existing embankment.

The environmental impact assessment (EIS) for the current augmentation project (WorleyParsons, 2012) identified a potential significant adverse impact on a local population of Booroolong Frog and associated habitat along the Peel River upstream of the dam. Consequently, an offset strategy had to be prepared and will be implemented to compensate for biodiversity impacts. It was also identified that an unknown (but significant) number of Border Thick-tailed Geckos live within the dam embankment and construction activities were modified to minimise the impact on this vulnerable species (WorleyParsons, 2013). These environmental impacts, along with other impacts, which were identified as not being significant for the current augmentation, would have to be revisited if a further augmentation of the storage were to occur. It is likely the project would once again be classified as a State Significant Infrastructure project.

Costs associated with augmenting the dam to 120 GL have been adapted from a previous costing that was prepared in the 2006 options assessment study (GHD, 2006). The costing at the time estimated the 100 GL augmentation at $15.1M and the 120 GL augmentation at $19.9M. The current cost estimate for the 100 GL augmentation is now $31.8M and based on a similar scaling of the 2006 cost estimates, it has been assumed that the contract cost for a 120 GL augmentation would be around $42M.

7.1.3 Modify Resource Assessment to Consider Full 16.4 GL Entitlement

Key Technical Details	▪ This option is an operational change only and would involve TRC requesting that DPI Water put aside the full 16.4 GL entitlement for town water supplies in the resource assessment process for the dam ▪ TRC could request that 16.4 GL is put aside for either the current year or the following year (COR) or both ▪ Option is a short-term security option, not a long-term security option
Key Benefits	▪ Total yield for the system does not increase, but TWS security would increase significantly in the short-term ▪ Minimum storage during repeat of worst drought on record increases from 17.7 GL to: – 21 GL (19% increase) with COR set to 16.4 GL – 24.7 GL (40% increase) with COR and current year demand set to 16.4 GL
Key Social / Enviro Impacts	▪ Primary impact would be on irrigators with general security licences, with increased TWS security coming at the expense of irrigation security; however, irrigation security is still considered acceptable and is still improved compared to current security with 62 GL dam ▪ Minimal environmental impact
Feasibility	▪ From a TRC perspective, this option provides a significant improvement in TWS security for essentially no cost and is therefore the easiest way to improve TWS security in the short-term ▪ The viability of the option is dependent on DPI Water's willingness to change the resource assessment process
Estimated Timeframes	▪ N/A (no construction activities)
Prelim Capital Cost Estimate	▪ N/A (operational change only)
Estimated Operating Costs	▪ N/A (operational change only)

TRC has a local water utility access licence with a share component (entitlement) of 16.4 GL/a for the Peel Regulated River Water Source (NOW, 2010). However, due to current TWS consumption being significantly less than this, DPI Water does not put aside the full entitlement in the resource assessment for the dam. Historically this has been justified, as the impact on irrigators while the dam storage capacity was at 62 GL would have been very significant. Following the dam augmentation to 100 GL, there may be an opportunity to revisit this policy, as the impact on irrigators would be far less significant.

It is understood that DPI Water currently puts aside around 10 – 11 GL/a for the current water year (based on recent TWS consumption) and around 11 – 12 GL/a for the next water year – this figure is known as the carry over reserve (COR). Therefore, around 21 – 23 GL is put aside at the start of the water year for TWS purposes. While this represents a significant proportion of the current dam capacity (over one third), the proportion of water put aside for TWS purposes will reduce after the storage augmentation is completed (to less than a quarter) if the current resource assessment allowances stay the same. If DPI Water changed the resource assessment allowances once the dam augmentation is completed and a full 16.4 GL/a was put aside for the current water year and a further 16.4 GL/a was put aside in COR, around one third of the dam storage capacity would again be set aside for TWS purposes at the commencement of each water year.

The estimated impact of increasing the volume of water put aside for TWS purposes in the resource assessment has been modelled and the key results are shown in the table below.

Table 7.1 Peel IQQM Results – Increase COR to 16.4 GL Entitlement

Parameters / Results	Existing Resource Assessment (Existing Dam)	Existing Resource Assessment (Augmented Dam)	Increase COR to 16.4 GL (Augmented Dam)	Increase current year allowance & COR to 16.4 GL (Augmented Dam)
Run #	T070	T071	T083A	T083B
Dam Storage Capacity	62 GL	100 GL	100 GL	100 GL
TWS Demand	9 GL/a	9 GL/a	9 GL/a	9 GL/a
Current Year TWS Volume	11 GL	11 GL	11 GL	16.4 GL
Carry Over Reserve (COR)	12 GL	12 GL	16.4 GL	16.4 GL
Minimum Dam Volume	11.6 GL	17.7 GL	21.0 GL	24.7 GL
Ave Irrigation Diversions	6.04 GL/a	6.25 GL/a	6.21 GL/a	6.17 GL/a
Mean Allocation 1 Oct	60%	90%	88%	86%
Median Allocation 1 Oct	74%	100%	100%	100%

The above table shows both the impact on TWS security (minimum dam volume) and the impact on irrigation security (average irrigation diversions and mean / median allocation on 1 October) if TWS allowances in the resource assessment for Chaffey Dam are increased. While irrigation security is impacted by increases in TWS allowances in the resource assessment, security is still significantly improved when compared to the current situation (run T070). Significant improvements in minimum storage volumes during a repeat of the worst drought on record are achieved under runs T083A and T083B. However, it should be noted that based on TRC's current TWS security criteria, the minimum dam volume needs to be greater than 11.7 GL, which provides around 12 months 'buffer' storage in case of a more severe drought in the future. This 'buffer' storage would increase to around 18 months once the dam is augmented and would further increase to around 21 - 25 months, depending on whether 16.4 GL is set aside for just COR or for both COR and existing year TWS.

7.1.4 Purchase Additional Water Entitlements

Key Technical Details	▪ Purchase of additional high security entitlements and/or general security entitlements (and convert to high security if possible) to improve future TWS security
Key Benefits	▪ The more entitlements for high security and general security water that are purchased and held onto (not retired), the more TWS security will improve due to a reduction in total water extractions downstream of Chaffey Dam ▪ Actual benefit has not been assessed and would depend on the volume of entitlements purchased and whether or not any general security entitlements purchased could be converted to high security (not currently allowed under WSP)
Key Social / Enviro Impacts	▪ Purchase of entitlements on the open water market should ensure social impacts are minimised as irrigators would be willingly selling their entitlements for a fair market price (it is unlikely that sufficient entitlements would be available to make up the maximum yield shortfall of 5.5 GL/a, as TRC would have to effectively purchase all entitlements to water in the Peel Valley to achieve this equivalent high security volume) ▪ Environmental impacts would likely be minimal
Feasibility	▪ This option may be worth exploring further in the future to incrementally improve TWS security if the option of changing the Chaffey Dam resource assessment process to put aside the full entitlement (16.4 GL) is accepted by DPI Water and the benefits are realised
Estimated Timeframes	▪ N/A (no construction activities)
Prelim Capital Cost Estimate	▪ No capital costs (no construction activities) ▪ Current permanent trade price for high security water is around $2K – $3K / ML
Estimated Operating Costs	▪ Bulk water charges for high security water are currently around $34/ML fixed charge and $56/ML usage charge

While seeking to have the full current entitlement of 16.4 GL put aside in the resource assessment for Chaffey Dam could provide improved security in the short-term, in order to provide a long-term improvement in security (as TWS demands increase to beyond 12 – 14 GL/a), TRC could seek to purchase additional entitlements within the Peel Valley. There are around 30,428 units of general security water and 801 units of high security water currently held within the Peel Regulated River Water Source. While purchasing general security water would potentially provide some improvement in TWS security (by preventing future usage under the general security licence), a more significant improvement in TWS security could potentially be achieved if the licences were converted to high security. However, under the current WSP for the Peel Regulated River Water Source, conversion of licences from one category to another is not allowed.

The option of purchasing more entitlements to improve TWS security may be worth further consideration in the future, subject to future WSP rules and the future availability of water entitlements within the valley. However, based on current resource assessment procedures, holding additional entitlements to water doesn't guarantee the water will be put aside in the resource assessment process. Therefore, before considering this option further, it would be prudent to explore the option of increasing the current resource assessment parameters for TWS to the full entitlement of 16.4 GL/a.

7.2 Dungowan Dam

Two options have been identified to potentially increase Council's extraction from Dungowan Dam; replacement of the existing dam with a larger on-stream storage and augmentation of the pipeline between the dam and Calala WTP.

7.2.1 Dungowan Dam Augmentation (22.5 GL)

Key Technical Details	▪ Construction of a 22.5 GL dam on Dungowan Creek, downstream of the existing dam to provide an enlarged storage volume. A Concrete Faced Rockfill Dam (CFRD) has been assumed for costing purposes, with the following key features: – Full Supply Level ~ RL 660 m AHD – Maximum wall height ~50 m / length of Crest ~260 m – Total volume of embankment material ~515,000 m^3 – Spillway cut into rock through an abutment – Approximately 4,700 Ha of land resumed (between existing & new storages) – Catchment area increased from 127 km^2 to 174 km^2 ▪ Flows would gravitate to the WTP via the existing or upgraded pipeline
Key Benefits	▪ Around 6 GL/a increase in TWS yield ▪ May avoid the need for safety upgrades at existing Dungowan Dam
Key Social / Enviro Impacts	▪ Increased extractions from Dungowan Creek, leading to increased hydrological stress ▪ Moderate to major environmental impacts in the vicinity of the dam site due to dam construction and impoundment ▪ Any impact on property owners near proposed dam site
Feasibility	▪ Augmenting Dungowan Dam would provide a significant increase in TWS yield and would resolve any ongoing safety concerns associated with the existing dam ▪ Compared to other new dam options considered, augmenting Dungowan Dam is likely to have a lower social and environmental impact as works would be undertaken within the vicinity of an existing dam and impacts would be incremental
Estimated Timeframes	▪ 5+ years
Prelim Capital Cost Estimate	▪ $150M (excluding new pipeline)
Estimated Operating Costs	▪ $5/ML (bulk water only, no power costs)

This option considers the construction of a new larger on-stream storage to replace the existing Dungowan Dam and is shown in **Exhibit 4**. A potential on-stream storage site has been identified on Dungowan Creek, approximately 3.6 km downstream of the existing dam, or approximately 6km upstream of Ogunbil Bridge (the proposed location is preliminary only and was based on a desktop assessment that considered topography only).

The proposed location is downstream of the Terrible Billy Creek confluence and therefore has a significantly increased catchment area compared to the existing Dungowan Dam site. A storage in excess of 60 GL could be constructed at this site; however, the limiting factor is likely to be the yield. Three different sub-options were modelled to estimate the potential increase in TWS security associated with different dam sizes and locations (see Table 7.2 below). The results of the modelling suggest that a 22.5 GL dam located downstream of the existing dam site would provide a significant improvement in TWS yield. A larger storage at the same site would provide a further increase in TWS yield; however, the marginal benefit is less and a storage this size is not likely to be justified.

Table 7.2 Dungowan Dam Augmentation – Alternative Storage Sizes & Locations

Dam Storage Size	Dam Wall Height	Location	Estimated TWS Yield Benefit
22.5 GL	50 m	Existing dam site	+3 GL/a
22.5 GL	50 m	3.6 km downstream	+6 GL/a
45 GL	65 m	3.6 km downstream	+9 GL/a

Based on the limited modelling that was undertaken for this study, the augmented dam would operate similar to the existing dam while the storage is relatively full (>80%) and would then revert to a drought storage as the level drops below 80% and primary supply would be from Chaffey Dam. An operating regime based on this broad operating philosophy would be required to ensure that TRC gets the full benefit of the augmented dam. If the augmented dam is used as the primary supply and allowed to draw down significantly before resorting to Chaffey Dam as the primary supply, the benefit of water held back in Chaffey Dam is shared with other users and TWS security is compromised. Therefore, while there may be some opportunity to increase the average annual extractions from an augmented Dungowan Dam (including the benefit of generally good quality water gravitating to the WTP), this is likely to be limited by the operating regime required to maximise the benefit of the storage in association with taking water from Chaffey Dam.

Environmental impacts would mainly be associated with construction activities – which would be significant for a dam of this size – and dam impoundment (125 Ha). Dungowan Creek is already impacted by a water storage and environmental flow requirements associated with the new dam will likely ensure downstream flow regimes are no worse than current conditions. Social impacts include the need to acquire properties located between the proposed dam site and the existing dam site, as well as further properties downstream of the new site (total number of potential properties impacted estimated to be less than 5).

7.2.2 Dungowan Pipeline Augmentation

Key Technical Details	▪ Construction of approximately 57 km of gravity main from Dungowan Dam to Calala WTP ▪ The pipeline route would nominally follow the existing pipeline route as much as possible along Dungowan Creek and the Peel River ▪ Pipeline size would be between DN500 and DN750 and would be dependent on future use of Dungowan Dam, including whether or not the dam is augmented
Key Benefits	▪ Elimination of operational problems associated with existing pipeline ▪ Increased pipeline capacity (if replaced with larger diameter pipe) ▪ Would need to be combined with an augmented Dungowan Dam to provide any significant benefit to TWS security
Key Social / Enviro Impacts	▪ Key social and environmental impacts are associated with pipeline construction
Feasibility	▪ Augmentation of Dungowan Pipeline may become necessary in the future as TWS demands increase and particularly if Dungowan Dam is augmented ▪ The current pipeline will need to be progressively replaced over the next 10-20 years, which provides an opportunity to replace the existing pipeline with a larger pipe that is capable of conveying future demands from an augmented dam
Estimated Timeframes	▪ 1.5 – 2 years
Prelim Capital Cost Estimate	▪ DN500 with 25 ML/d capacity - $50.0M ▪ DN600 with 40 ML/d capacity - $63.6M *(additional $13.6M compared to DN500)* ▪ DN750 with 75 ML/d capacity - $84.8M *(additional $34.8M compared to DN500)*
Estimated Operating Costs	▪ N/A

Bulk water from the Dungowan Dam is supplied to Tamworth via the Dungowan Pipeline, a 54 km long DN500/375 gravity main that runs from the dam to the Calala WTP. The route generally follows Dungowan Creek and then the Peel River downstream of the confluence of the two streams. The pipeline has a capacity of around 22 ML/day but is susceptible to breaks due to its age, condition, joint construction and the hydraulic characteristics. Options have been considered to replace the existing pipeline to improve its reliability and to increase the capacity of the pipeline up to 75 ML/day.

While there is no significant benefit to TWS security associated with augmenting Dungowan Pipeline for the current dam storage size and operational philosophy, consideration would need to be given to augmenting the pipeline capacity if the dam is augmented. Depending on the operational philosophy for the dam, an augmentation to DN600 (40 ML/d gravity capacity) or DN750 (75 ML/d gravity capacity) may be warranted. If the augmented dam acted as a drought storage, then the pipeline would need to be able to at least meet Level 4 or 5 restricted demands (say 22.5 GL/a x 65% = 40 ML/d) and so a DN600 would be required. A larger DN750 pipe would be able to meet average demands for 22.5 GL/a (around 62 ML/d), but not necessarily all peak demands.

7.3 Off-River Storages

Two off-river storage options have been considered – a small 100 ML raw water storage adjacent to Calala WTP and a large 10 GL bulk water storage upstream of Tamworth.

7.3.1 Small Raw Water Storage at WTP (100 ML)

Key Technical Details	▪ Construction of a 100 ML capacity earth lagoon to the north of the existing WTP; lagoon would be clay lined using onsite material ▪ Construction of a low lift pump station with VSD; up to 70 ML/day capacity ▪ Construction of new pipeline to connect proposed lagoon with the existing raw water system
Key Benefits	▪ Potential increase in efficiency for the Dungowan pipeline and Peel River intake ▪ Potential decrease in number of Dungowan pipeline breaks by running the pipeline at lower flow rate ▪ Improved short-term water supply security in the event of Dungowan Pipeline or Peel River Intake Works failure ▪ Provides TRC with additional flexibility in running the WTP including during off-peak periods to take advantage of lower electricity tariffs
Key Social / Enviro Impacts	▪ Potential impact on nearby residents during construction ▪ Minimal environmental impacts
Feasibility	▪ A small raw water storage is primarily an operational improvement which mainly affects short-term security and has limited benefit to overall TWS security
Estimated Timeframes	▪ 1 year
Prelim Capital Cost Estimate	▪ $3.3M
Estimated Operating Costs	▪ $10/ML

The construction of a raw water storage at the Calala WTP would allow TRC to improve the operating efficiency of the WTP and reticulation system, as well as increasing the extraction efficiency of water from the Peel River, and providing additional short-term water security in the case of Dungowan Pipeline or Peel River Intake Works failure.

TRC previously assessed the technical feasibility of constructing a raw water storage adjacent to the Calala Lane WTP (HWA, 2014) for the purposes of improving raw water supply security and efficiency. The study assessed the benefits and impacts on the system with the construction of a new 100 ML raw water storage, located adjacent to the Calala Lane WTP. The report assessed the associated benefits with a split storage of 80/20 and 60/40 for the Peel River Intake and Dungowan Dam, respectively.

The report outlines a potential increase in efficiency for the Dungowan Pipeline and Peel River Intake. The raw water storage provides the ability to treat in excess of 22 ML/d of Dungowan water by accessing previously stored water. Based on historical data (2011-2014) a theoretical efficiency increase of 5% was estimated for the Dungowan Pipeline operating at 22 ML/d (40 ML storage at Calala WTP).

The historical data for the Peel River extraction efficiency was available from 2005 to 2008 and 2013. The theoretical extraction efficiency was estimated to be 87% for the period 2005 to 2008 and 96% for 2013. The period between 2005 and 2008 was during the peak of a drought and therefore, it was considered a raw water storage would provide a greater benefit during a drought period. The feasibility study (HWA, 2009) estimated the percentage of total annual order captured may increase from 87% to 99% with a 75 ML storage.

A preliminary cost for the raw water storage and low lift pump station was estimated at $3.3M (HWA, 2014).

7.3.2 Large Bulk Water Storage Upstream of Tamworth (10 GL)

Key Technical Details	▪ Construct a 10 GL off-river storage approximately 5 km east of Piallamore ▪ Reinstate Paradise Weir as off-river storage extraction point ▪ DN750 / 18.9 km pipeline and booster pump station from Paradise Weir to the storage ▪ DN500 / 3.1 km pipeline from Paradise Weir to Calala WTP at the off-river storage site to return water to WTP ▪ Up to around 100 ML/d would be transferred to the storage during periods of median to high river flow
Key Benefits	▪ Up to 4.8 GL/a yield based on 10 GL storage ▪ Storage would be relatively close to Tamworth with direct connection via pipeline
Key Social / Enviro Impacts	▪ Off-river storages generally have lower environmental impacts compared to on-river storages ▪ Most significant environmental impact would be associated with storage construction and impoundment ▪ An unknown number of properties would need to be acquired at the dam site
Feasibility	▪ Subject to finding a suitable site for the storage and negotiating access to uncontrolled flows in the Peel River and/or Cockburn River, an off-river storage would provide a significant increase in TWS yield
Estimated Timeframes	▪ 2 – 3 years
Prelim Capital Cost Estimate	▪ $139M (storage, pipeline & pump stations)
Estimated Operating Costs	▪ $145/ML

The construction of a bulk water storage upstream of Tamworth would allow TRC to extract water from the either the Peel River or Cockburn River during times of high flow and transfer it to an off-river storage.

A potential site for the bulk water storage was identified approximately 5 km east of Piallamore. An alternate location was identified approximately 4 km northeast of Piallamore. Three potential river extractions points were identified. A brief description of each is provided below:

- New extraction point on the Peel River near Piallamore; this extraction point would extract flows from the Peel River only. It would have the shortest pipeline length to the proposed storage but excess flows in the river would be more limited due to Chaffey Dam and a smaller catchment area than the other extraction points.

- New extraction point on the Lower Cockburn River; this would extract flows from the Cockburn River only, which is an unregulated river. It would have a relatively long pipeline to the proposed storage site.

- Reinstate Paradise Weir; this extraction point is located downstream of the confluence of the Peel and Cockburn Rivers. It would have the longest pipeline length to the proposed storage but would have the largest catchment area.

For the purposes of this study, it was assumed that the off-river storage would be located east of Piallamore and that Paradise Weir is the extraction point. An overview of this option is shown in **Exhibit 5.** Preliminary analysis of the benefits of an off-river storage has only been undertaken at this stage and the identified storage locations are based on a desktop assessment, primarily focusing on topography and proximity to Tamworth.

In order to construct a 10 GL storage at the proposed site, a dam with a maximum wall height of approximately 60 m and a crest length of approximately 350 m would be required. An 18.9 km pipeline would be required to transfer flows from Paradise Weir to the proposed dam. The pipeline would need to have sufficient capacity to transfer up to around 100 ML/day from the river to the off-river storage in order to extract water during periods of median to high flow in the river. A DN750 pipeline would be capable of transferring 100 ML/day from the Paradise Weir to the off-river storage with a single pump station (approximate head to overcome is 200 m). The same pipeline would also be used to transfer flows back to Paradise Weir and then a DN500 pipe would be required between the weir and the WTP. The proposed DN750 pipeline route is along the Oxley Highway to Nemingha and then along Nundle Road.

TRC does not currently have access to uncontrolled flows in the Peel River and there are no supplementary water licences in the Peel Valley. Supplementary water (formerly known as off-allocation water) is effectively surplus flow in the river that cannot be utilised due to the high flows greatly exceeding demands for water extractions. General security irrigators in the Peel Valley have access to uncontrolled flows via no-debit substitution access only. TRC would have to negotiate changes to its water access licence to allow access during declared uncontrolled flow events.

7.4 New On-River Storages

Two on-river storage locations within the Cockburn River catchment have previously been identified as potential future dam sites, one on Swamp Oak Creek and the other on Mulla Mulla Creek.

7.4.1 Swamp Oak Creek Dam

Key Technical Details	▪ Construction of a 22 GL dam on Swamp Oak Creek. A Concrete Faced Rockfill Dam (CFRD) has been assumed for costing purposes, with the following key features: – Full Supply Level ~ RL 530 m AHD – Maximum wall height ~30 m / Length of Crest ~875 m – Total volume of embankment material ~765,000 m^3 – Spillway cut into rock through an abutment – Approximately 500 Ha of land resumed – Catchment area 390 km^2 ▪ DN500 / 37.5 km pipeline and booster pump station from the dam outlet to the WTP
Key Benefits	▪ Up to 6.8 GL/a yield based on 22 GL storage ▪ Provides a new source of bulk water on a different sub-catchment
Key Social / Enviro Impacts	▪ Increased extractions from the Cockburn River, leading to increased hydrological stress ▪ Major environmental impact due to dam construction and impoundment ▪ An unknown number of properties would need to be acquired at the dam site and upstream
Feasibility	▪ Option doesn't provide a significant benefit over Dungowan Dam augmentation option or off-river storage option, but is significantly more expensive and will have a major impact on river system within the Cockburn River valley.
Estimated Timeframes	▪ 5 – 10 years (for a new on-river storage)
Prelim Capital Cost Estimate	▪ $260M
Estimated Operating Costs	▪ $25/ML

The Swamp Oak Creek Dam is a potential new on-stream storage that was identified in a 1987 Headworks Augmentation Strategy (Public Works Department, 1987). Swamp Oak Creek is one of two major tributaries of the Cockburn River, and the proposed dam site is located approximately 26 km ENE of Tamworth and about 4.5 km east of Limbri, as shown in **Exhibit 6**. The catchment area upstream of the proposed dam site is approximately 390 km^2, with the 1987 study suggesting that a 22 GL storage would be required in order to obtain a secure yield of 9 GL/a. This yield figure, which was based on an assessment undertaken in 1987, has been discounted by 25% to 6.8 GL/a based on a similar reduction in yield that occurred with the TRC water supply system when the Peel IQQM was recalibrated after the 2006/07 severe drought conditions.

An allowance was made in the original yield calculation for maintenance of minimum streamflows downstream of the storage as required for irrigation and other riparian requirements. Due to the length of time since the previous estimate of yield, the yield figures are preliminary only and would need to assessed in more detail if the option was to be pursued further (unlikely).

In order to construct a 22 GL storage at the proposed site, a dam with a maximum wall height of approximately 30 m and a crest length of approximately 875 m would be required. A 37.5 km pipeline and one booster pump station would be required to transfer flows from the dam to the Calala WTP. A DN375 pipeline would be able to deliver approximately 12 ML/d, a DN500 pipeline up to approximately 25 ML/d and a DN600 pipeline would be capable of transferring up to 40 ML/d.

The quality of water from the dam is expected to be good and the water readily treatable. Treatment costs for Swamp Oak Creek water are therefore not expected to exceed those of Peel River water (Public Works Department, 1987).

Environmental impacts are expected to be quite significant due to the storage being located on-river in a catchment that does not currently have any significant storages. In addition to downstream hydrological, aquatic ecosystems and riparian zone impacts, the dam construction has the potential for significant environmental and social impact due to the scale and footprint of the project and the dam impoundment has the potential to create further significant social and environmental impacts.

7.4.2 Mulla Creek Dam

Key Technical Details	▪ Construction of a 26 GL dam on Mulla Mulla Creek. A Concrete Faced Rockfill Dam (CFRD) has been assumed for costing purposes, with the following key features: – Full Supply Level ~RL 549 m AHD – Maximum wall height ~28 m / length of Crest ~300 m – Total volume of embankment material ~210,000 m3 – Spillway cut into rock through an abutment – Approximately 500 Ha of land resumed – Catchment area of 230 km^2 ▪ A DN500 / 36 km pipeline and booster pump station from the dam outlet to the WTP
Key Benefits	▪ Up to 6.8 GL/a yield based on 22 GL storage ▪ Provides a new source of bulk water on a different sub-catchment
Key Social / Enviro Impacts	▪ Increased extractions from Mulla Mulla Creek/ Cockburn River, leading to increased hydrological stress. ▪ Major environmental impact due to dam construction and impoundment ▪ An unknown number of properties would need to be acquired at the dam site and upstream
Feasibility	▪ Mulla Creek Dam option is more affordable than the Swamp Oak Creek option for similar benefit, but still has major impacts on river system within the Cockburn River valley
Estimated Timeframes	▪ 5 – 10 years (for a new on-river storage)
Prelim Capital Cost Estimate	▪ $165M
Estimated Operating Costs	▪ $12/ML

Mulla Creek Dam is a potential on-stream storage that was also identified in the 1987 Headworks Augmentation Strategy (Public Works Department, 1987). Mulla Mulla Creek is the second major tributary of the Cockburn River, and the proposed dam site is located approximately 24 km ESE of Tamworth, as shown in **Exhibit 7**.

The catchment area upstream of the proposed dam site is approximately 230 km^2, with the 1987 study suggesting that a 26 GL storage would be required to in order to obtain a secure yield of 9 GL/a. This yield figure, which was based on an assessment undertaken in 1987, has been discounted by 25% to 6.8 GL/a based on a similar reduction in yield that occurred with the TRC water supply system when the Peel IQQM was recalibrated after the 2006/07 severe drought conditions.

In order to construct a 26 GL storage at the proposed site, a dam with a maximum wall height of approximately 28 m and a crest length of approximately 300 m would be required. A 36 km pipeline and one booster pumping station would be required to transfer flows from the dam to the WTP. A DN375 pipeline would be able to deliver approximately 12 ML/d, a DN500 up to approximately 25 ML/d and a DN600 would be capable of transferring up to 40 ML/d.

The quality of water from the dam is expected to be good and the water readily treatable. Treatment costs for Mulla Mulla Creek water are therefore not expected to exceed those of Peel River water (Public Works Department, 1987).

7.5 Transfers from Other WaterNSW Dams

Transfers from two existing major WaterNSW dams located within the adjacent Namoi River catchment; Split Rock Dam (397 GL) on the Manilla River and Keepit Dam (425 GL) on the Namoi River. The two dams operate in conjunction with each other, with Split Rock Dam located around 50 km upstream of Keepit Dam.

7.5.1 Split Rock Dam Pipeline

Key Technical Details	▪ Construction of a DN500 / 71 km pipeline from the outlet of Split Rock Dam to Calala WTP ▪ One or two booster pump stations will be required between the outlet of the dam and the WTP depending on the pipeline route due to the high pumping head (around 190 m) ▪ The pipeline route would nominally follow road reserves (Buena Vista Rd and Fossickers Way) before diverting and following the Peel River through Tamworth City
Key Benefits	▪ A 25 ML/d capacity scheme could transfer around 6.8 GL/a (75% operation) ▪ Provides a new source of bulk water to Tamworth
Key Social / Enviro Impacts	▪ Key impacts are associated with pipeline construction and high energy usage by pumping stations during operation ▪ Purchase of entitlements on the open water market would ensure social impacts are minimised as irrigators would be willingly selling their entitlements for a fair market price
Feasibility	▪ A pipeline from Split Rock Dam is a relatively affordable (capital) option that would have a high operating cost due to the high pumping heads involved. ▪ Viability is dependent on the ability to purchase or acquire entitlements and whether or not any general security entitlements purchased could be converted to high security
Estimated Timeframes	▪ 1.5 – 2 years
Prelim Capital Cost Estimate	▪ $69.0M + bulk water purchases (DN500 + 1 Booster)
Estimated Operating Costs	▪ $175/ML

Split Rock Dam is located on the Manilla River approximately 60 km north of Tamworth and 19 km from Manilla. The dam was constructed in 1987 and is owned and operated by WaterNSW. The 66m high concrete faced rockfill dam has a storage volume of 397.4 GL and provides irrigation water to the Namoi Valley, as well as supplying additional water to towns along the Namoi River. The dam also provides water to the town of Barraba via a pump station and pipeline, and backup supply to the town of Manilla via the Manilla River

A pipeline constructed from Split Rock Dam would enable flows to be pumped back up the Peel Valley to Tamworth. The proposed pipeline is approximately 70 km in length. The pipeline route would nominally follow road reserves (Buena Vista Rd and Fossickers Way) before diverting and following the Peel River through Tamworth City. The pipeline would need to overcome a total head of approximately 190 m in order to provide water to Tamworth. This could be achieved with either one or two booster pumping stations. An overview of this option is shown in **Exhibit 8.**

An alternative way to access water from the Split Rock Dam is to increase the transfer of water from Split Rock Dam to Keepit Dam via releases to the Manilla River, and to construct a pipeline from Keepit Dam to Tamworth. This would reduce the required length of pipe to supply water to Tamworth, but would increase the pumping head.

7.5.2 Keepit Dam Pipeline

Key Technical Details	▪ Construction of a DN500 / 62 km pipeline from the outlet of Keepit Dam to Calala WTP ▪ Two or three booster pump stations will be required between the outlet of the dam and the WTP depending on the pipeline route due to the high pumping head (around 275 m) ▪ The pipeline route would nominally follow road reserves (Keepit Dam Rd and Oxley Highway) before diverting at Taminda (Bass Street, Jewry Street) and following the Peel River through Tamworth City
Key Benefits	▪ A 25 ML/d capacity scheme could transfer around 6.8 GL/a (75% operation) ▪ Provides a new source of bulk water to Tamworth
Key Social / Enviro Impacts	▪ Key impacts are associated with pipeline construction and very high energy usage by pumping stations during operation ▪ Purchase of entitlements on the open water market would ensure social impacts are minimised as irrigators would be willingly selling their entitlements for a fair market price
Feasibility	▪ A pipeline from Keepit Dam is a relatively affordable (capital) option that would have a very high operating cost due to the high pumping heads involved ▪ Viability is dependent on the ability to purchase or acquire entitlements and whether or not any general security entitlements purchased could be converted to high security
Estimated Timeframes	▪ 1.5 – 2 years
Prelim Capital Cost Estimate	▪ $65.4M + bulk water purchases (DN500 + 2 Boosters)
Estimated Operating Costs	▪ $190/ML

Keepit Dam is located on the Namoi River approximately 48 km northwest of Tamworth, 25 km northeast of Gunnedah. The dam was initially completed in 1960 and is owned and operated by WaterNSW. The 55 m high mass-concrete gravity dam with earth fill abutment has a storage volume of 425 GL, which provides irrigation water to the Namoi Valley, as well as town water supply for Walgett. The dam also serves a flood mitigation role. It does not currently provide water supply to the towns and villages within TRC's area.

A pipeline constructed from Keepit Dam would enable flows to the pumped back up the Peel Valley to Tamworth. The required pipeline length is approximately 62 km, and it would have to overcome a total head of approximately 275 m between the dam outlet and the Calala WTP. This could be achieved with either two or three booster pumping stations. An overview of this option is provided in **Exhibit 9.**

7.6 Inter-Basin Transfers

This section discusses two inter-basin transfer options; the Apsley River scheme and the Barnard River scheme.

7.6.1 Apsley River Scheme

Key Technical Details	▪ A major water diversion and hydropower generation scheme on the Apsley River (originally investigated by the NSW Electrical Commission in the early 1980's) comprising four water storages, two power stations and major pipelines linking them ▪ The hydropower scheme would require three storages: a large lower storage (295 GL) on the Apsley River within Apsley Gorge; a small intermediate storage (2 GL) located on Budds Mare Creek around 680 m above the lower storage; and a large upper storage (275 GL) located on the Moona Plains around 150 m above the intermediate storage ▪ The lower power station would contain two 200 MW tandem power turbine generating units and the upper power station would contain two 95 MW reversible pump turbines ▪ The original water diversion component included an additional large storage (160 GL) on the MacDonald River and a pump station and pipeline to transfer water from the upper storage to the MacDonald River ▪ In order to provide water to Tamworth, an additional pump station and pipeline would be needed to transfer water from the 160 GL storage on the MacDonald River into the Cockburn River catchment and water would then need to be extracted from the lower Cockburn River or the Peel River at Paradise Weir via a new river intake, pump station and pipeline to the WTP
Key Benefits	▪ 155 GL/a was originally to be diverted to the Namoi River catchment to provide water to the Gunnedah Region for development of coal resources for power generation ▪ TRC could potentially divert up to say 10 GL/a of this water into the Cockburn River catchment for the purposes of improving Tamworth TWS security
Key Social / Enviro Impacts	▪ Most of the proposed infrastructure would be located within Oxley Wild Rivers National Park, large sections of which are declared wilderness areas within the Gondwana Rainforests of Australia World Heritage Area ▪ Increased extractions from Apsley River, leading to increased hydrological stress ▪ Major environmental impacts from multiple dams and power stations construction
Feasibility	▪ The original scheme had a prohibitively high cost at the time and would now cost around $3,200M (based on CPI adjustment of original costs). Additional costs would also be required for the diversion works to transfer the water to Tamworth. ▪ Due to the excessive costs involved, this option could only be considered if the state and federal governments were to consider moving ahead with the original scheme (or something similar) and the major environmental constraints could be overcome
Estimated Timeframes	▪ 5 – 10 yrs
Prelim Capital Cost Estimate	▪ $3,200M for the original combined hydropower generation and water diversion scheme
Estimated Operating Costs	▪ Not determined

The original scheme proposed by the NSW Electrical Commissions in the early 1980's was primarily a "pumped storage" project with a focus on using excess energy during off-peak energy periods to pump water from storages within the Apsley Gorge to upstream of Apsley Falls and then releasing this water back down the gorge via a hydropower station to generic electricity again during peak periods (Electricicty Commission of NSW, 1983) (SMEC, 1983). The proposed hydropower scheme included three storages (two large and one small) and two power stations. An option of transferring excess water into the Namoi River catchment via the MacDonald River was also considered. The combined project cost estimate from the early 1980's was around $1,060M - around $3,200M in 2015 dollars. An overview of the proposed scheme in shown in **Exhibit 10.**

Most of the proposed infrastructure would now be located within Oxley Wild Rivers National Park and large sections of the area impacted by the proposed scheme are now declared wilderness areas and are a part of the Gondwana Rainforests of Australia World Heritage Area. On environmental grounds alone, it would appear that it is very unlikely that the project in its current form would get through the environmental assessment process. Major modifications would be required to the proposal, which would likely result in increased costs, further reducing the viability of the project.

While it was not within the scope of this project to consider alternative combined hydropower generation and diversion schemes, a brief assessment of alternative diversion schemes was undertaken. Due to the topography of the Apsley River catchment, the preferred diversion point for transferring water to Tamworth would be upstream of the Apsley Falls. However, the water supply available from the Apsley River at this point is not significant – with the 80th percentile flows around 3 ML/d at Apsley Falls (gauge station 206018). Around 60 km further downstream within the Apsley Gorge, 80th percentile flows increase to around 60 ML/d (gauge station 206033); however, river levels have dropped to around RL 250 m at this point in the river, compared to around RL 1,000 m just upstream of the falls. Therefore, there is unlikely to be sufficient water upstream of Apsley Falls to support a diversion scheme and the pumping heads required for a diversion scheme further downstream would be too high to make a diversion scheme viable.

7.6.2 Barnard River Scheme

Key Technical Details	▪ Construct weir on the Barnard River (downstream of Back River / upstream catchment area of 280 km^2) to allow diversion of flows to Peel River upstream of Chaffey Dam ▪ Construction of a DN750 / 30 km pipeline from the weir on the Barnard River to the Peel River, including a 11 km tunnel through the Great Dividing Range at around RL 750 m ▪ Two booster pump stations would be required between the weir and the tunnel (70 ML/d, with a combined head of around 330 m) ▪ The pipeline route would nominally follow the Barnard River for 13 km prior to passing through a 11 km tunnel and then a further 6 km to the Peel River, at a point around 4 km upstream of Nundle
Key Benefits	▪ Transfer up to 10 GL/a (yield benefit not modelled but estimated to be up to 5 GL/a)
Key Social / Enviro Impacts	▪ High pumping costs (energy usage) ▪ Potential risks to aquatic ecosystems associated with inter-basin transfers ▪ Construction impacts associated with weir and pipeline
Feasibility	▪ The viability of transferring water from the Barnard River is highly dependent on AGL Macquarie relinquishing or selling its Major Utility entitlements which may not occur until after 2050 ▪ Transfer costs are very high due to the high pumping heads and water transferred into Chaffey Dam may still be subject to current annual accounting process and therefore provide benefit to all users, not just Tamworth (thereby reducing the overall TWS security benefit to Tamworth)
Estimated Timeframes	▪ 2 – 3 years ▪ May not be viable until after 2050
Prelim Capital Cost Estimate	▪ \$148M + bulk water purchases
Estimated Operating Costs	▪ \$230/ML (of water transferred – effective cost may be up to double this)

The existing Barnard River Scheme was constructed in the mid 1980's to improve drought security for the Upper Hunter power stations and is able to transfer up to 30 GL/a (20 GL/a on average based on five year rolling average) from the Manning River Catchment to the Hunter River Catchment at a point above Glenbawn Dam (Oaky Creek). The existing scheme consists of weirs on the Barnard River (Barnard Weir) and Orham Creek (Orham Dam), a 260 ML/day transfer pumping station and a 17.5 km tunnel. The scheme is used as a backup water supply for both Bayswater and Liddell Power Stations.

AGL Macquarie has recently proposed to close down these power stations by 2050 (AGL, 2015), which may provide an opportunity for TRC to investigate purchasing the entitlements. It is unlikely that diversions from the Barnard River would be viable until AGL Macquarie relinquish or sell its water access entitlements.

Assuming TRC was able to acquire entitlements to water from the Barnard River at some point in the future, the preferred option would be to construct a new weir on the Barnard River, around 20 km upstream of the existing weir (just downstream of Back River) and divert water via a 30 km pipeline to the Peel River, upstream of Chaffey Dam. The proposed pipeline route through the Upper Barnard River catchment has a total elevation gain of more than 700 m; therefore, it is proposed that approximately 11 km of the pipeline would be a tunnel through the Great Dividing Range at an elevation of around RL 750 m. The total pumping head is still in excess of 300 m and it is anticipated that two booster pump stations would be required; one located at the weir and a second one located approximately 4 km east of Barry. An overview of the proposed transfer scheme in shown in **Exhibit 11.**

The water available at the proposed weir location would be less than what is available at the current weir location (280 km^2 compared to 620 km^2). However, the current scheme was designed to transfer up to 30 GL/a and around 20 GL/a on average. It is assumed that around 10 GL/a (i.e. around 27 ML/d on average) would need to be transferred to Chaffey Dam to provide a yield benefit of up to 5 GL/a. The 80th percentile flow at the proposed weir location is around 30 ML/d, while the 50th percentile flow is around 70 ML/d. Therefore, around half the median flow would need to be transferred on average and higher flows would need to be transferred during periods of high river flows to make up for the 20% of the time when flows are less than 30 ML/d. A DN750 pipeline would allow up to 70 ML/d to be transferred during periods of medium to high river flow, with lower transfer rates during periods of low to medium river flows.

Both the weir and the booster pump stations would be relatively isolated and the pipeline route does not follow any major roads or easements. The first part of the pipeline route, which initially follows the Barnard River, also follows Barry Road (a minor unsealed road) for a few kilometres before the road again diverts away from the river. The route would follow the river for a further 2 km before entering an 11 km tunnel at around RL 750 m. The final part of the route is through around 6 km of open grazing land, with the pipeline discharging into the Peel River, around 4 km upstream of Nundle.

Field investigation of tunnelling conditions would be required to determine the viability of constructing a tunnel in the proposed location. These investigations may lead to an alternative tunnel location and could potentially lead to a longer tunnel option being considered, with a resulting reduction in total pumping heads. For example, a 19 km tunnel at around RL 650 m would reduce pumping heads by 100 m.

Environmental and social impacts are not likely to be significant and would mainly be associated with construction. Water is already diverted from the Barnard River to the Hunter River catchment and it is unlikely that the volume of water diverted from the Barnard River would be significantly different under a modified scheme that pumps water to the Peel River catchment. The new weir on the Barnard River would most likely need to incorporate a fish ladder to minimise impacts on fish movement. There is a potential risk to aquatic ecosystems associated with inter-basin transfers (from coastal to inland) that would need to be investigated during the environmental assessment stage.

8 Groundwater Options

Groundwater was previously a primary supply source for Tamworth, prior to the construction of Dungowan Dam. The Scott Road Drift Wells were constructed in the 1930's and consisted of 18 wells located within the floodplain immediately downstream of the confluence of the Peel River and Cockburn River (near Paradise Weir). The drift wells resorted to being a secondary or backup supply source in the mid 1950's, after Dungowan Dam and the Dungowan Pipeline were commissioned. The drift wells were eventually decommissioned around 1980, when Chaffey Dam, the Peel River Intake Works and Calala WTP were all commissioned.

Six drift wells were recommissioned in 2007 due to the prevailing severe drought conditions that saw Chaffey Dam levels drop to historic low levels. Despite being an emergency supply source for Tamworth, TRC only has a 10 ML of high security entitlement and 108 units of general security entitlement for the operation of the bores and would need to seek DPI Water approval and likely seek the suspension of the WSP before the drift wells can be activated as an emergency supply.

Groundwater options considered in this report include further use of the Peel Alluvium aquifer, development of the Peel Fractured Rock aquifer and accessing groundwater from the Mooki Valley groundwater source (i.e. from outside of the Peel Valley).

The Peel Alluvium aquifer is an existing backup supply for Tamworth via the Scott Road Drift Wells, as well as the existing primary source for Moonbi/Kootingal and Attunga, while the Peel Fractured Rock aquifer is the primary source for Nundle. The alluvial aquifer occurs along the valley floors associates with the rivers and creeks within the Peel Valley and overlies the fractured rock aquifer. The fractured rock aquifer forms the valley slopes, the hills and ranges and covers most of the catchment.

The Mooki Valley groundwater source is a potential source of inter-basin transfers and would be the closest, viable groundwater source outside of the Peel Valley.

The above groundwater options are considered further in the following sections.

8.1 Peel Alluvium Aquifer

Key Technical Details	▪ Expanded use of Peel Alluvium aquifer either via existing / expanded Scott Road Drift Wells or via further development of groundwater bores upstream or downstream of Tamworth ▪ Would need to negotiate an expanded local water utility access licence with DPI Water and assess impacts on other groundwater users ▪ Eight additional wells with a capacity / sustainable yield of 15 L/s per bore would be required to provide around 2.9 GL/a. Additional infrastructure required would include a collection well / storage, transfer pump station (10 ML/d) and pipeline to Calala WTP (DN375 / up to 26 km)
Key Benefits	▪ Existing drift wells can supply up to 10 ML/d (around 2.9 GL/a assuming 80% operation) ▪ Expanded Scott Road Drift Wells could potentially supply up to 20 ML/d (5.8 GL/a) ▪ Existing Scott Road Drift Wells plus additional borefield downstream of Tamworth (near Appleby) could potentially supply up to 20 ML/d (5.8 GL/a)
Key Social / Enviro Impacts	▪ Likely impacts on nearby groundwater users (mostly irrigators), which would need to be monitored ▪ Environmental impacts would need to be further assessed but should be minimised if extractions remain well below recharge rates
Feasibility	▪ **Expanded use of groundwater from the Peel Alluvium aquifer would be subject to negotiation with DPI Water, extensive field testing of test bores in various locations and monitoring of impacts to other groundwater users.** ▪ **If an expanded local water utility licence and associated entitlements to groundwater was viable, and assuming water quality was acceptable (in line with existing groundwater), the development of a groundwater scheme would most likely be the lowest cost option for improving TWS security.**
Estimated Timeframes	▪ <12mths
Prelim Capital Cost Estimate	▪ Existing infrastructure could provide up to 2.9 GL/a ▪ $22.0M to expand the groundwater scheme to include an additional 8 bores up to 26 km downstream of Tamworth (to achieve a total capacity to 5.8 GL/a)
Estimated Operating Costs	▪ $80/ML

The Peel Alluvium groundwater source includes the alluvial aquifers adjacent to the Peel River and other major tributaries, including Cockburn River, Dungowan River, Duncans Creek and Goonoo Goonoo Creek (see Figure 8.1 below). The aquifer is generally shallow and ranges in thickness from 7 to 40 m but is more typically not much greater than 15 m thick. It consists of gravels, sands, clays, silts and cobbles up to 150 – 200 mm in diameter. The top 1 to 4 m is generally clay rich with the major water bearing sediments underlying the clay (O'Rourke, 2010).

The aquifer is recharged from both direct rainfall and the adjacent rivers / creeks. The general direction of the groundwater flow in the alluvial aquifer is parallel to the direction of the river flow. Groundwater monitoring data indicates that the Peel River is mainly a losing system along most of its length. At the bottom end of the catchment where the alluvium becomes restricted, groundwater discharges back into the river and it becomes a gaining river upstream of Carroll Gap to where the Peel River exits the catchment (O'Rourke, 2010).

Modelling work conducted by the former NSW Office of Water (Broadstock, 2009) confirms the interconnectivity of the surface water and the groundwater. The modelling work shows that about 70% of the groundwater pumped from bores close to the Peel River is by direct leakage from the Peel River. The modelling work confirms that further out from the river the amount of surface water contributing to the groundwater pumped from groundwater pumping bores decreases with time and distance.

The Peel Water Sharing Plan (WSP) Background Report (NOW, 2010) estimates that the annual recharge volume for the Peel Alluvium aquifer is around 20 GL/a, while average annual use is around 8.4 GL/a from a total entitlement of 51.4 GL/a. The long-term average annual extraction limit (LTAAEL) has been set at 9.3 GL/a, which is only slightly higher than current average annual usage. However, this is only based on estimated historical usage and when the WSP was prepared, the former NSW Office of Water followed standard NSW policy of setting LTAAEL equal to the current average usage for alluvial groundwater systems in the MDB that are highly connected.

While there has been an embargo in place preventing additional applications for groundwater licences from the Peel Alluvium since 1999, the WSP does prescribe a number of different types of specific purpose access licences for which application may be made, including local water utility access licences.

Before considering this option further, extensive field testing of test groundwater bores would most likely be required, including extensive monitoring of impacts associated with other groundwater bores. The development of a groundwater model for the Peel Valley would also assist with understanding the groundwater system further and would greatly assist with determining the optimum strategy for making better use of groundwater for TWS purposes.

It has been assumed that the existing Scott Road Drift Wells could be used to supply up to 2.9 GL/a and that an additional borefield up to 20 km downstream of Tamworth (near Appleby) would be required to double the capacity of the existing system (i.e. 20 ML/d and up to 5.8 GL/a). An overview is shown in **Exhibit 12.**

8.2 Peel Fractured Rock Aquifer

The Peel Fractured Rock groundwater source covers the majority of the Peel Valley, with the exception of the areas designated as the Peel Alluvium groundwater source (see Figure 8.1 below). The fractured rock aquifer is located within the consolidated rocks that form the valley slopes and underlie the alluvium and is part of a much bigger system associated with the New England Fold Belt (NOW, 2010). The source is relatively undeveloped due to the variable yields and quality associated with groundwater bores, with yields and water quality being less reliable than bores located in alluvial areas. There are no DPI Water monitoring bores located within the facture rock aquifer and therefore historical knowledge of the performance of the groundwater system is fairly poor.

The source of the groundwater in the fractured rocks is from rainfall. Due to the high variability of rainfall in the region, groundwater levels are likely to be variable and generally responsive to climatic conditions. Groundwater in fractured rock aquifers is stored within the fractures of the rock and therefore the greater the number of fractures the larger the amount of storage that is available. Permeability is determined by the interconnectivity of the fractures, with the frequency of fractures usually diminishing with depth.

While the Peel Fractured Rock groundwater source area is much larger than that of the Peel Alluvium and therefore annual recharge volumes are very high (estimated to be around 140 GL/a), groundwater bores located within the fractured rock are generally of variable yield and quality and are not likely to be sufficient to provide a significant source of water for Tamworth. It is likely that a large number of bores would be required over a large area in order to obtain a reasonable yield.

Based on the limited, anecdotal information about the Peel Fractured Rock aquifer and the characteristics of fractured rock aquifers in general, this option has been dismissed as a viable option.

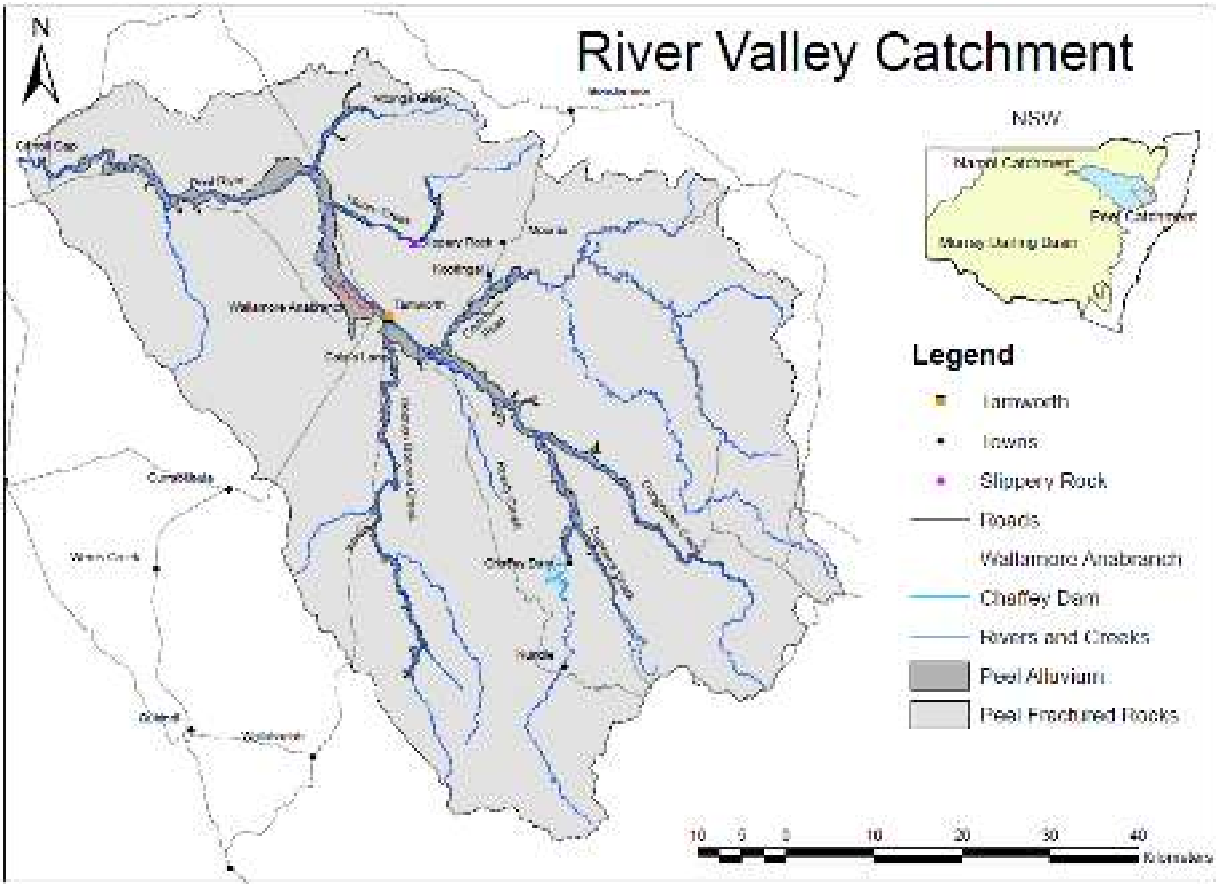


Figure 8.1 Location of Peel Alluvium and Peel Fractured Rock Aquifers – from (O'Rourke, 2010)

8.3 Mooki Valley Aquifer

Key Technical Details	▪ Mooki Valley aquifer Zones 6 & 10 are significantly underutilised and could be a potential source of groundwater ▪ Potential transfer scheme would entail groundwater bores (6-10), a 10 ML raw water storage, a 25 ML/d transfer pumping station (plus two booster stations) and 93 km of DN500 pipeline. Very high pumping heads (around 550 m) ▪ Would need to negotiate a local water utility access licence with DPI Water and assess impacts on other groundwater users
Key Benefits	▪ A 25 ML/d capacity scheme could transfer around 6.8 GL/a (75% operation) ▪ Provides a new source of bulk water to Tamworth
Key Social / Enviro Impacts	▪ Potential impacts on nearby groundwater users (mostly irrigators), which would need to be monitored ▪ Environmental impacts would need to be further assessed but should be minimised if extractions remain well below recharge rates
Feasibility	▪ Use of groundwater from the Mooki Valley aquifer would be subject to negotiation with DPI Water, extensive field testing of test bores in various locations and monitoring of impacts to other groundwater users. ▪ Transfer scheme from Mooki Valley is very expensive due to long pipeline length and very high pumping heads involved.
Estimated Timeframes	▪ 2 years
Prelim Capital Cost Estimate	▪ $107M + bulk water purchases (DN500 + 3 Boosters)
Estimated Operating Costs	▪ $410/ML

A potential source of inter-basin transfer is the Mooki Valley, which is located within Namoi River catchment, adjacent to the Peel River catchment (southwest). The Mooki River is located within the Liverpool Plains region and discharges into the Namoi River near Gunnedah. The Mooki River has highly variable flow and is an ephemeral system, with streamflow ceasing during extended dry periods. However, there is an extensive alluvial groundwater system within the valley, which supports a significant amount of agriculture in the region.

While much of the Mooki Valley groundwater system is highly developed, there are parts of the system that could potentially be further developed based on a comparison of average annual extractions versus average annual recharge. The two most viable areas that could be considered as a potential water supply source for Tamworth are Zones 6 and 10, as defined by the *Water Sharing Plan for the Upper and Lower Namoi Groundwater Sources 2003*. These two zones are located in the upper reaches of the Mooki River catchment, west of Quirindi. The combined annual recharge for these two zones is around 18.5 GL/a, while the current average usage is around 1.3 GL/a (NOW, 2012).

For the purposes of this study, it has been assumed that groundwater bores could be established in the vicinity of Pine Ridge, which is approximately 20 km west of Quirindi. It has been assumed that groundwater would have to be pumped from a depth of up to 30 m to a raw water storage at Pine Ridge, before being transferred via pipeline to Tamworth (approximately 93 km via road). The assumed pipeline route is along Bundella Rd, Kamilaroi Highway, through Quirindi via road reserves, and then along Wallabadah Rd and the New England Highway to Tamworth. In addition to the bore pumps, three booster pump stations would be required along the proposed pipeline route in order to overcome a total pumping head of approximately 550 m. The preliminary locations for the booster pump stations are at Pine Ridge, Quirindi and near Wallabadah. An overview of this scheme is shown in **Exhibit 13.**

It is likely that the transfer systems costs alone (capital plus operating) would make this option not economically viable. In addition, the viability of purchasing / acquiring licences from this groundwater system to be used as a backup supply source for Tamworth is uncertain, with the potential for competing interests, including agricultural and mining related developments.

9 Reuse Options

Effluent reuse, stormwater reuse and sewer mining all have the potential to provide alternative supply sources for bulk water. Key advantages of these potential supply sources are they are local sources that are generally located within a relatively short distance of the WTP and in the case of effluent reuse and sewer mining; they are sources that are independent of rainfall. However, unlike other raw water supply sources, these reuse sources require significantly more treatment to make them suitable for TWS purposes and historically in Australia they have been primarily utilised for non-potable supply purposes via a third pipe system (i.e. independent to the potable reticulation system) or via a location irrigation system.

The above reuse options are considered further in the following sections.

9.1 Recycled Effluent

Westdale Wastewater Treatment Plant (WWTP) services the whole of Tamworth and receives around 10 ML/d (around 3.6 GL/a) dry weather inflows from the wastewater transportation system that services Tamworth. In 2010/11 the treatment plant was upgraded to 61,000 EP with secondary treated effluent being transferred to a large effluent reuse pond (1,500 ML), where the effluent is then used for commercial irrigation. The scheme is a 100% effluent reuse scheme that supplies irrigation water to a 1,500 Ha effluent reuse farm located around 8 km south of Westdale WWTP.

While 100% of the current effluent volumes is committed to the effluent reuse farm under a commercial contract with the operator, there is a clause in the contract that allows TRC to redirect up to 20% of the effluent for other purposes at some time in the future. The operation contract is a 10 year contract that is due to expire in 2021 and after this time TRC would be free to negotiate different contact conditions to access more effluent and could eventually choose to stop making effluent available to the effluent reuse farm so that it could be used for other purposes. Therefore, it has been assumed that TRC could access up to 100% of the effluent to use as a potential bulk water supply source in the medium to long-term (say in 20 – 30 years).

Assuming the proportion of dry weather wastewater inflows to average day water demands stays the same into the future, the effluent that is potentially available for reuse purposes is shown below on Table 9.1. The table shows 5.8 GL/a of effluent could be available for reuse purposes in 2045, increasing to 7.2 GL/a in 2065, assuming an average demand growth scenario. This is a significant potential water resource that is independent of rainfall.

Table 9.1 Projected Average Dry Weather Effluent Volumes – Westdale WWTP (50 years)

Demand Scenario	Annual Demand / Effluent Volume (ML/a)					
	2015 (Existing)	2025 (+10yr)	2035 (+20yr)	2045 (+30yr)	2055 (+40yr)	2065 (+50yr)
Average Water Demands (Ave Growth Scenario)	9,700	11,200	12,800	14,500	16,200	18,100
Dry Weather Effluent Volume	3,900	4,500	5,100	5,800	6,500	7,200

The following effluent reuse options have been identified as potential options to improve TWS security and have been considered further in the following section:

- Rural Substitution – use of effluent to substitute existing Peel River irrigation demands
- Non-Potable Substitution – use of treated effluent to supply existing open spaces and commercial / industrial users for non-potable use via a third pipe system
- Indirect Potable Reuse – transferring treated effluent to the back end of Chaffey Dam
- Managed Aquifer Recharge – injection of treated effluent into an aquifer for later reuse
- Direct Potable Reuse – transferring treated effluent directly to Calala WTP for potable reuse

9.1.1 Recycled Effluent – Rural Substitution

Key Technical Details	▪ Use existing Westdale WWTP treatment process and effluent storage dam (1,500 ML) ▪ Construct two effluent transfer pump stations adjacent to existing effluent storage (25 ML/d) ▪ Construct 42 km of DN500 recycled effluent network (northern & southern irrigation schemes) to supply existing irrigators on the Peel River between Piallamore and Attunga.
Key Benefits	▪ Preliminary modelling resulted in a 1 GL/a improvement in TWS yield, based on supplying around 2.5 GL/a (on average) to irrigators that currently extract water from the Peel River between Piallamore and Attunga.
Key Social / Enviro Impacts	▪ Use of recycled effluent for an extended irrigation scheme with multiple users carries various risks related to both human contact with irrigation water and the impact of the recycled effluent on various crops. ▪ Social attitudes to the use of crops that have been irrigated with recycled effluent ▪ The potential for build-up of nutrient, sodium and heavy metal concentrations in soils
Feasibility	▪ This option is basically an extension of the existing 100% effluent reuse scheme that targets existing irrigators holding general security licences on the Peel River and as such its viability is dependent on permanently reducing irrigation diversions from the river ▪ The improvement to TWS security is not likely to be significant based on the scheme considered
Estimated Timeframes	▪ 1.5 – 2 years
Prelim Capital Cost Estimate	▪ $41.8M
Estimated Operating Costs	▪ $70/ML (of water transferred – effective cost may be over double this)

Average irrigation diversions from the Peel River downstream of Chaffey Dam are around 6 GL/a (based on baseline Peel IQQM) and it is estimated that around 2.5 GL/a is used within around 20 - 25 km of Tamworth between Piallamore and Attunga. There is the potential to supply these irrigators with effluent directly from the Westdale WWTP effluent reuse pond. Effluent from the reuse pond is currently used for farm irrigation (under controlled irrigation practices) and could potentially be used for a larger scale scheme similar to the Northern Shoalhaven Reclaimed Water Management Scheme (REMS) that is operated by Shoalhaven Water.

Recycled effluent would be transported via a recycled effluent pipe network to farms located up to 20 km upstream and downstream of Tamworth, as shown in **Exhibit 14**. A pump station located at the effluent reuse pond would provide the system pressure required to feed the farms and each farm would need to have a small effluent storage to ensure that all farms do not attempt to use water at the same time.

In order to provide the benefit to TWS security, TRC would need to acquire the general security irrigations licences to ensure the entitlements were not traded. The irrigators would in return receive a guaranteed supply of effluent that would not be subject to reduced allocations during periods of drought.

9.1.2 Recycled Effluent – Non-Potable Substitution

Key Technical Details	▪ Construction of a 4 ML/d tertiary membrane filtration plant and recycled water mains to supply predominantly public open space irrigation and some industrial users ▪ Negotiate access to effluent of an average of at least 2.1 ML/d ▪ Reuse of abandoned potable water reservoirs ▪ Recycled water reticulation network and pump station
Key Benefits	▪ Drought proof green spaces ▪ Increased amenity of sporting fields; financial benefit & improved community morale ▪ Yield: best case ~780 ML/a, likely ~ 520 ML/a (estimate based on 1/3 of the irrigation demand being groundwater)
Key Social / Enviro Impacts	▪ Relatively minor construction impacts mainly associated with pipelines ▪ Potential community opposition to use of effluent ▪ The potential for build-up of nutrient, sodium and heavy metal concentrations in soils
Feasibility	▪ The concept for a non-potable substitution scheme is primarily an open spaces irrigation scheme, which will reduce TWS consumption most years, but critically will not reduce consumption during periods of moderate to severe restrictions. ▪ The viability of the scheme may be impacted by recent investigations by TRC to expand the use of groundwater for open space watering.
Estimated Timeframes	▪ 1.5 – 2 years
Prelim Capital Cost Estimate	▪ $24.9M
Estimated Operating Costs	▪ $350/ML

The use of recycled effluent for urban non-potable substitution was the focus of the 2012 report, *Westdale Recycled Water Concept Design* (HWA, 2013). The concept produced was for a scheme to provide “unrestricted irrigation” quality water for council owned green spaces, private and institutional green spaces, the golf course and some industrial users. The study concluded there was an opportunity to supply a total of 778 ML/a with the scheme delivered in three stages. The effective potable substitution and benefit to TWS security is not clear as a number of the proposed site have groundwater for irrigation, and there is a high likelihood that irrigation would be discontinued during periods of water restrictions.

The higher value in this type of scheme is typically the ability to continue to irrigate through extended dry periods which increases the amenity of the field/area. An example would be the ability to maintain sporting surfaces for junior sport that may otherwise have to be closed due to hard/dry surfaces. This can also have a financial benefit through the ability to attract regional sporting carnivals, as the grounds are drought proofed.

The only significant industrial user identified in the 2012 study was the Tamworth hospital laundry. The laundry had an average metered usage of 79 ML/a and if serviced would be a true substitution of potable water. However, that usage would be considered dual reticulation and would therefore have a higher quality requirement than that for open space irrigation. There may also be associated issues given that it is for an end user that may be immuno-compromised.

There are limited opportunities for true potable substitution, as the same benefit can be achieved through a ban on irrigation with potable water. This option has minimal impact on water security despite its other benefits for the community.

The 2012 study by HWA considered access to 20% of the effluent as this volume is discussed in the contract specification and is superficially the easiest water to access.

TRC has recently started investigating the option of using more groundwater for open spaces irrigation, which would impact the viability of the effluent reuse scheme, which primarily provides water for open space watering.

9.1.3 Recycled Effluent – Indirect Potable Reuse

Key Technical Details	▪ Advanced treatment of wastewater effluent from Westdale WWTP (additional process units include advanced MF/RO and advanced oxidation) 16 ML/d ▪ Effluent transfer pump station at Westdale WWTP (20 ML/d) ▪ DN450 / 53 km transfer rising main from Westdale WWTP to Chaffey Dam (back-end of storage)
Key Benefits	▪ Up to 2.9 GL/a increase in TWS yield ▪ Rain independent source of water
Key Social / Enviro Impacts	▪ Relatively minor construction impacts mainly associated with pipeline ▪ Likely significant community opposition to reuse of effluent for potable purposes ▪ Risks to the community if multiple process barriers fail
Feasibility	▪ Recycled effluent would provide a reliable, rainfall independent source of water to Tamworth that would diversify the cities supply sources and provide more robust TWS security. However, indirect potable reuse via a surface water storage is untested in Australia and has historically faced strong community opposition
Estimated Timeframes	▪ 2 – 3 years
Prelim Capital Cost Estimate	▪ $172M
Estimated Operating Costs	▪ $1,235/ML (of water transferred – effective cost may be up to double this)

Indirect potable reuse would involve transferring highly treated recycled effluent into Chaffey Dam. Treated effluent from Westdale WWTP would be further treated in an Advanced Water Treatment Plant (AWTP) located adjacent to the WWTP before being pumped to the back end of the dam via a transfer pipeline, as shown in **Exhibit 15**. The AWTP would most likely include micro-filtration (MF), reverse osmosis (RO), advanced oxidation and ultraviolet disinfection. The dam storage acts as an environmental buffer and allows mixing with natural inflows. The Peel River would also act as an environmental buffer with additional natural inflows downstream of the dam providing further mixing and the river providing some level of further treatment.

The *Australian Guidelines for Water Recycling* were developed and endorsed by all Australian governments and provide a sound management framework that ensures effluent that is reused in this way is safe and reliable. However, indirect potable reuse via a surface water storage has not previously been implemented in Australia, although several schemes have been proposed. South East Queensland adopted the concept during severe drought conditions in 2007-2008, however drought conditions abated and the scheme was never commissioned.

An alternative to transferring the water in Chaffey Dam would be to inject the water into an aquifer, which is considered in the next section.

9.1.4 Recycled Effluent – Managed Aquifer Recharge

Recycled water can be used as a resource in combination with groundwater/aquifers in four main ways;

1. A confined aquifer can be used as storage where excess water (typically in winter) is injected and the level of the aquifer rises and is then drawn down over peak periods (typically summer irrigation), similar to a large storage dam.
2. Water can be put into an aquifer "upstream" to replace water that is removed thereby acting as a replacement to maintain a given aquifer level and purpose. For example, to prevent salt-water intrusion or to maintain a groundwater dependent eco-system when the 'natural' groundwater is being withdrawn.
3. Water can be put into an aquifer that is a raw water source for supply of potable water to assist in maintaining the aquifer level.
4. As a disposal mechanism, such as in dune disposal for coastal wastewater treatment plants.

For TRC options 2 and 3 would be the most likely as disposal is not required, and can actually be frowned upon, and there is no information at this stage of a specific 'confined' aquifer for dedicated storage and recovery.

Managed aquifer recharge has gained momentum in Australia over the last 5 years and will continue to do so with the construction and soon to be operation of a large scheme in Perth (with water from the Beenyup WWTP). Depending on the final use of the water this type of project can also be referred to as planned potable reuse as there is a plan to extract the water to augment drinking water supplies.

The guideline to be used in delivering these schemes is the "Australian Guidelines for Water Recycling Managing Health and Environmental Risks (Phase 2), Managed Aquifer Recharge" July 2009.

Of most relevance, trialling for a managed aquifer recharge project near Perth W.A, was undertaken over 2 years in 2011/2012 where an average of 3.22 ML/d was injected into a confined aquifer. In this particular aquifer, a distance of 300 m gave a residence time of approximately 3 years. The project is now in construction and will treat and inject up to 40 ML/d into one of Perth's raw water aquifers being recovered and used as a drinking water source.

The option considered for Tamworth would involve injecting highly treated effluent into the Peel Alluvium somewhere upstream of Tamworth and then extracting the effluent via the Scotts Road Drift Wells. The scheme would be smaller than the indirect potable reuse scheme discussed in the previous section, with up to 10 ML/d (say 3,000 ML/a) injected into the aquifer. However, the viability of a MAR scheme is currently unknown due to limited knowledge of the Peel Alluvium aquifer. Based on anecdotal information, the aquifer is highly connected to the Peel River and has a relatively high permeability and therefore relatively low travel time. These characteristics are likely to make a MAR scheme unviable due to the relatively short storage time before recovery.

Due to the uncertainties associated with this option, it has not been costed or considered further.

9.1.5 Recycled Effluent – Direct Potable Reuse

Key Technical Details	▪ Advanced treatment of wastewater effluent from Westdale WWTP (additional process units include advanced MF/RO and advanced oxidation) 16 ML/d ▪ Maintain existing effluent storage as 95 day maturation pond ▪ Effluent transfer pump station at Westdale effluent storage (20 ML/d) ▪ DN450 / 12 km transfer rising main from Westdale effluent storage to Calala WTP (blend with raw water)
Key Benefits	▪ Up to 5.8 GL/a
Key Social / Enviro Impacts	▪ Relatively minor construction impacts mainly associated with pipeline ▪ Likely major community opposition to direct reuse of effluent for potable purposes ▪ Risks to the community if multiple process barriers fail
Feasibility	▪ Direct potable reuse is not considered to be viable at present, mainly due to the level of community opposition across Australia and the lack of experience internationally. However, this is likely to be a future option that could be revisited at some point in the future.
Estimated Timeframes	▪ 1.5 – 2 years
Prelim Capital Cost Estimate	▪ $133M
Estimated Operating Costs	▪ $1,040/ML

Direct potable reuse involved treated effluent being used to directly supplement drinking water supplies, without return to an environmental system. Whilst internationally direct potable reuse is gaining momentum, with a number of projects being constructed in America and South Africa, this form of reuse has the highest level of community opposition and is not currently undertaken anywhere in Australia. Compared to managed aquifer recharge or indirect potable reuse via a surface storage, direct potable reuse has the advantage that it does not require an understanding of complex groundwater eco-systems or involve a long pipeline to transfer flows to a water supply dam. The time taken to implement a direct potable reuse scheme should therefore be less than for a managed aquifer recharge scheme or indirect potable scheme via a surface storage. However, the largest challenge in the implementation of direct potable reuse is community acceptance rather than technical challenges.

The option considered for Tamworth would be similar to the option of indirect potable reuse, with effluent taken from the AWTP and transferred directly to Calala WTP, as shown in **Exhibit 16,** before being blended with existing raw water sources. The level of treatment would be similar.

9.2 Stormwater Reuse

Stormwater reuse has gathered momentum in Australia over the last 10 years and, as with managed aquifer reuse, has its own section of the AGWR released in 2009, to assist in the implementation of schemes.

The simplest schemes that are being developed are those in built up areas where there are green spaces that can benefit from irrigation. The quality requirements for irrigation are lower and so ultimately cheaper to implement and more cost effective to maintain. In addition, these green spaces often have obvious locations to store water for later use.

The biggest stumbling block for stormwater reuse is the volume of water that can be effectively captured and stored for later use. Inherently, the volume of water available may be reasonable when averaged over 12 months but practically the collection of water is over very short periods.

The use of harvested stormwater for non-potable substitution in Tamworth was the focus of the 2011 report prepared by GHD (GHD, 2011). The report assessed stormwater harvesting as a potential option for satisfying the irrigation demands for reserves within the Tamworth LGA. The study assessed three sites in Tamworth, one site in Barraba and one site in Manilla.

A spreadsheet based Australian Water Balance Model (AWBM) was developed for each option to determine the likely amount of runoff available for yield and to simulate the potential storages, which include the modelling of the effects of evaporation and drawdown of irrigation practices (GHD, 2011).

The potential sites for construction of stormwater storages in Tamworth were located at the Racecourse, the Sporting Fields and Bicentennial Park. The three sites were nominated to have an open water storage or dam to contain the harvested stormwater, which would then be used to supply irrigation water to nearby sporting fields, parks and other green spaces. The estimated combined storage capacity of the three sites was 167 ML, and it was estimated that the storages could meet the irrigation demands with between 56% and 100% reliability based on allowing the dam to empty completely.

The report identified that each of the potential storage options would require the following supporting infrastructure:

- Upstream gross pollutant trap or other filtration system to remove rubbish and coarse materials
- Water quality treatment
- Pump unit to extract water for irrigation, plus pipe network between the storages and designated irrigation areas
- Emergency overflow spillway
- Perimeter bunding

Operations and maintenance costs for the proposed storages include water treatment costs, pumping costs, and storage pond maintenance and monitoring.

Given the present availability of bore water for green space irrigation, low average rainfall and the difficulty in achieving any substantial yield from stormwater, a large-scale stormwater scheme is not considered to be viable for Tamworth. This is not to say that smaller local and dedicated stormwater capture and reuse should not be considered to assist with the management of stormwater and improving local environmental outcomes. However, these should be considered in light of a specific business case.

9.3 Sewer Mining

Sewer mining involves sewage being intercepted on its way to an existing centralised WWTP and treated through a process suitable to produce water to be irrigated. Typically, this is undertaken with a Membrane Bio-Reactor (MBR) followed by UV and Chlorination.

The key advantage of sewer mining is realised when there are long pipelines required to have a remote AWTP that sends water back to the location of the end user. Golf courses in metropolitan areas are the primary example. These have a base load requirement for irrigation and in built up areas the cost of piping water from the existing WWTP is significant.

Whilst the operating costs of a sewer mining facility are much greater than a tertiary treatment plant, these costs are not true costs, as the energy requirement of the existing WWTP would be reduced in line with the load taken off the WWTP.

Sewer mining was considered in the *Report on Tamworth Green Space Water Options* (GHD, 2007). The report included the following budget costs (in 2007 dollars) for a 2 ML/d recycled water plant for sewer mining purposes:

- Capital Cost: $2.4M – 4M
- O&M Costs: $200 - $450 /ML

The option of sewer mining could potentially be considered as an alternative to a recycled effluent scheme for non-potable substitution. The scheme outlined in Section 9.1.2 included a centralised AWTP and a $10M reticulation network to distribute the recycled effluent to the users. A decentralised scheme could include multiple sewer mining schemes located near major users – e.g. Tamworth Golf Course – and reticulation network costs would therefore be minimised. However, this is not essentially potable replacement (as the golf course currently uses groundwater) and whilst sewer mining offers an opportunity to supply reuse water to the golf course, it is not assisting in water security as it is not replacing potable water.

Sewer mining is at best a small-scale reuse option that could supply recycled effluent for the irrigation of large open spaces such as large recreation field or gold courses. As noted previously, TRC is currently investigating using more groundwater for open space irrigation due to the significantly lower capital and operating costs compared to alternatives such as effluent reuse or sewer mining.

10 Options Assessment

10.1 Comparison of Annualised Unit Costs

A summary of the capital and operating costs for the viable options is included on the table below, along with the potential yield benefit and an overall assessment of the annualised unit cost of each option. Details and assumptions associated with cost estimates and annualised costs are included in Appendix C.

Table 10.1 Comparison of Options – Annualised Unit Cost

Option	Capital Cost $M	Operating Cost * $/ML	Yield Estimate ML/a	Annualised Unit Cost $/ML
SURFACE WATER / DAMS OPTIONS				
Chaffey Dam Upgrade (62 GL to 100 GL)	*31.8*	*115*	*6,000*	*595*
Chaffey Dam Upgrade (100 GL to 120 GL)	50.8	115	2,000	2,415
Dungowan Dam Upgrade (22.5 GL)	150.0	5	6,000	2,270
Dungowan Dam Upgrade (22.5 GL) + DN750 u/g	184.8	5	6,000	2,795
Off-River Storage (10 GL)	138.6	145	4,850	2,735
On-River Storage – Mulla Ck Dam (26 GL)	164.9	12	6,750	2,225
On-River Storage – Swamp Oak Ck Dam (22 GL)	259.7	25	6,750	3,510
Keepit Pipeline + Entitlements	86.0	230	6,850	1,370
Split Rock Pipeline + Entitlements	89.6	175	6,850	1,360
Barnard River Transfers	147.6	250 **	5,000	3,155
GROUNDWATER OPTIONS				
Scott Road Drift Wells (10 ML/d)	-	60	2,900	60
Peel Alluvium Expansion (10 ML/d)	22.0	80	2,900	770
Mooki Groundwater Transfers + Entitlements	121.5	410	5,000	2,610
EFFLUENT REUSE OPTIONS				
Rural Substitution	41.8	70 **	1,000	3,960
Urban Non-Potable Substitution	24.9	350	520	4,690
Indirect Potable Reuse	171.6	1,235	2,900	7,830
Direct Potable Reuse	132.6	1,040	5,800	3,115

*Note: * Operating Cost includes power costs, bulk water charges & advanced water treatment of effluent*
*** Effective operating costs are higher as a larger volume of water has to be transferred to achieve yield*

Surface Water / Dams Options

The current augmentation of Chaffey Dam to 100 GL has been included in the table for comparison purposes and it can be seen from the annualised unit cost ($595/ML) that the current upgrade is the most economical surface water / dams option, with other options having an annualised unit costs 2 – 6 times higher. While a further upgrade of Chaffey Dam to 120 GL is potentially feasible, the additional yield benefit of only 2 GL/a would not justify the costs involved.

Dungowan Dam upgrade to 22.5 GL, a new 10 GL off-river storage and a new on-river storage (22 – 26 GL) all have a relatively similar annualised unit costs. While Swamp Oak Creek Dam is significantly more expensive than Mulla Creek Dam, the range of costs provided by these two options provide an indication of the potential costs for an on-river storage. With the on-river storage options providing a similar benefit to replacing Dungowan Dam with a similar size storage for a similar cost, the Dungowan Dam upgrade should be investigated further before considering an on-river storage in the Cockburn River catchment due to the significant environmental impacts associated with building a new dam on a previously unregulated river. The ultimate costs of replacing Dungowan Dam will be highly dependent on finding a suitable downstream site for the dam and the ability to minimise / manage the impacts associated with properties, roads and other infrastructure that are upstream of the new dam site. The key alternative surface water option within the Peel Valley would be an off-river storage, assuming a suitable site could be found within a reasonable distance of Tamworth for a 10-15 GL storage.

While there are some major unknowns associated with availability and cost of water entitlements in the Namoi Valley, transfers from either Keepit or Split Rock Dams are the most economical surface water options. Transfer from Keepit Dam is likely to be more viable due to the large number of water licences downstream of Keepit and Split Rock Dams and would involve a slightly shorter pipeline but higher pumping heads. However, prior to considering this option any further, the viability of acquiring enough entitlements and then converting them into a local water utility licence would need to be assessed.

Barnard River transfers are not considered to be an economical option due to the high capital and operating costs and the benefits to Tamworth TWS are reduced as the water needs to be transferred via Chaffey Dam rather than directly to Tamworth.

Groundwater Options

Utilising Scott Road Drift Wells to supply up to 10 ML/d is by far the most economical option to improve TWS security, but is subject to DPI Water negotiation and approval, with no success to-date. The next most economical option would be to expand the Peel Alluvium groundwater scheme to include a second borefield downstream of Tamworth. Again, this is subject to negotiation and approval from DPI Water. While these options appear to be the most economical compared to all other options (including surface water and effluent reuse options), there is still a significant knowledge gap with the Peel River alluvium and further investigation and modelling of the aquifer is necessary in order to further assess the potential viability of the options.

Mooki Transfers have a relatively high cost, in part due to the very high pumping heads involved. When considering other options to transfer water from outside of the Peel Valley, it would be more economic to transfer from Keepit Dam or Split Rock Dam.

Effluent Reuse Options

Effluent reuse is in general not economical based on current costs. This may change in the future as the technology continues to develop and community attitudes change, particularly in regards to direct potable reuse which has the lowest annualised unit cost of the four effluent reuse options considered.

10.2 Preferred Options

Based on the high-level assessment of long-term augmentation options undertaken in this study, the following options are recommended for more detailed assessment:

1. **Keepit Dam Transfers (DN500 / 25 ML/d)**
   - This is the most viable option for sourcing water from outside of the Peel Valley and could potentially be the most economical long-term augmentation option.
   - The viability of acquiring water entitlements and converting to high security needs to be assessed first.
2. **Upgrade Dungowan Dam (20 – 25 GL)**
   - This is the preferred on-river storage option as it is likely to have a significantly reduced environmental and social impacts compared to an on-river storage in the Cockburn River catchment.
   - Replacement of Dungowan Dam also has the advantage of dealing with the ongoing dam safety concerns associated with the dam.
   - This option is also independent of other users and dam owners (WaterNSW) and TRC would have full control of the operation of the dam.
   - Augmentation of Dungowan Pipeline would also need to be considered.
3. **Off-River Storage upstream of Tamworth (10 – 15 GL)**
   - This is a potential alternative to upgrading Dungowan Dam, subject to finding a suitable location for the storage.
   - TRC would need to negotiate access to uncontrolled flows in the Cockburn and/or Peel River, which may require changes to the current WSP.
4. **Groundwater (Peel Alluvium)**
   - Utilising the Scott Rd Drift Wells to access groundwater is by far the most economical option to improve TWS security / yield. Expansion of the groundwater scheme to include a second borefield downstream of Tamworth would also be worth investigating further.
   - Further investigation, modelling and monitoring of the Peel Alluvium aquifer and its interaction with the Peel River (and major tributaries) is required.
   - TRC would need to acquire additional groundwater licences and negotiate with DPI Water to transfer entitlements to water from Chaffey Dam to Peel Alluvium.

Effluent reuse should be considered again in the future; particularly once direct potable reuse has gained more acceptance in Australia and has become a proven technology with manageable risks and lower costs.

Options that could also be considered viable drought response options include:

1. Groundwater (Peel Alluvium): This water source has been used previously as an emergency supply source and is the easiest to implement.
2. Effluent Reuse: Smaller scale package treatment plants could be used to provide up to 5 ML/d of highly treated effluent for either non-potable purposes or worse case, direct potable reuse.
3. Keepit Dam transfers: Assuming there is water available in either Keepit or Split Rock Dams, this is the most viable option for sourcing water outside of the Peel Valley.

11 Conclusions & Recommendations

Long-term demand projections for Tamworth indicate that bulk water supply demands may reach 22.5 GL/a by 2065 (assuming a high growth scenario) or more realistically could reach 18.1 GL/a (assuming an average growth scenario). When this is compared to the system yield based on various climate change estimates, the yield shortfall at 2065 is estimated to be between 1.1 GL/a and 5.5 GL/a.

A list of viable options to address the long-term bulk water supply yield shortfall has been identified, with the preferred options being (in no specific order):

1. **Keepit Dam Transfers**
    - 62 km long DN500 pipeline
    - 25 ML/d @ 275 m total transfer pump rate and head
    - Up to 6.8 GL/a could be transferred assuming 75% operation time
    - Capital cost estimate of $65.4M (excluding bulk water purchases)
    - Most viable option for sourcing water from outside of the Peel Valley but the viability of acquiring water entitlements needs to be assessed further
2. **Upgrade Dungowan Dam**
    - 20 – 25 GL dam storage
    - DN600 – DN750 pipeline augmentation
    - Around 6 GL/a increase in bulk water supply yield
    - Capital cost estimate of $150M for dam and incremental cost of $13.6M to $34.8M for DN600 – DN750 pipeline (compared to cost of replacing existing DN500)
    - Preferred on-river storage option and has the advantage of dealing with the ongoing dam safety concerns association with the existing dam (depending on timing)
3. **Off-River Storage upstream of Tamworth**
    - 10 – 15 GL off-river storage
    - 19 km long DN750 pipeline
    - Around 4.8 GL/a increase in bulk water supply yield
    - Capital cost estimate of $140M
    - Potential alternative to Dungowan Dam upgrade, subject to finding suitable site close to Tamworth
4. **Groundwater (Peel Alluvium)**
    - Utilise existing Scott Rd Drift Wells and augment with additional borefield around 26 km downstream of Tamworth (near Appleby)
    - Eight additional bores, 26 km long DN375 pipeline & 10 ML/d transfer pump station
    - Up to 5.8 GL/a could potentially be transferred via the two 10 ML/d groundwater schemes, assuming 80% operating time
    - Capital cost estimate of $22.0M
    - By far the most economical option to improve bulk water security, assuming entitlements to groundwater can be obtained and subject to an assessment of the long-term sustainable yield of the water source.

Based on the assessment of long-term supply options, the following future actions are recommended:

1. The four supply options identified should be investigated further to assess their viability and improve the accuracy of cost estimates. Specific areas for investigation include:
    a. Assessing the viability of acquiring water entitlements in the Namoi Valley (downstream of Keepit Dam) and converting to high security / local water utility licence, including discussions with DPI Water.
    b. Preliminary field investigations of the proposed site for a replacement of Dungowan Dam and assessment of potential property and infrastructure impacts.
    c. A more detailed assessment of potential locations for an off-river storage upstream of Tamworth (in the Peel or Cockburn valleys) and assessing the viability of accessing uncontrolled flows in the Cockburn or Peel Rivers in association with DPI Water.
    d. Modelling and monitoring of the Peel Alluvium aquifer and its interaction with the Peel River to assess the potential yield available for bulk water supply purposes in association with DPI Water, including assessing the viability of transferring entitlements from Chaffey Dam to Peel Alluvium.

2. Further refinement of the Peel IQQM in association with DPI Water (to improve modelling of bulk water supply components in particular) to improve yield estimates and ongoing assessment of climate change scenarios as more accurate estimates become available.

3. Further discussions with DPI Water regarding the resource assessment process for Chaffey Dam and possibility of putting aside the full 16.4 GL local water utility entitlement once the Chaffey Dam augmentation has been completed.

4. Revisit effluent reuse options prior to the negotiation of a new contract for the effluent reuse farm to assess the viability of making better use of effluent to improve bulk water security.

12 References

AGL. (2015, October). AGL Greenhouse Gas Policy. Retrieved from AGL Corporate Website: http://www.agl.com.au/~/media/AGL/About%20AGL/Documents/Media%20Center/Corporate%20Governance%20Policies%20Charter/1704015_GHG_Policy_Final.pdf

Broadstock, B. (2009). Impact of Groundwater Pumping on a River Systems - A Conceptual Model of a Shallow Highly Connected Aquifer-stream System: Regulated and Un-regulated Rivers (DRAFT). Parramatta: NSW Office of Water (Unpublished).

Electricicty Commission of NSW. (1983). Review of Apsley River Water Supply and Pumped Storage Project. Sydney: The Electricity Commision of NSW.

GHD. (2006). Chaffey Dam Upgrade: Need for Augmentation. GHD: State Water Corporation.

GHD. (2007). Report on Tamworth Green Space Water Options. GHD: Tamworth Regional Council.

GHD. (2011). Tamworth Regional Council Report for Stormwater Harvesting Options Assessment. Newcastle.

Hunter H2O. (2015). Tamworth Bulk Water Supply: Peel IQQM Model Results. Tamworth Regional Council: Hunter H2O.

HWA. (2005). Tamworth Bulk Water Supply Augmentation Options Study. Hunter Water Australia: Tamworth Regional Council.

HWA. (2008). Tamworth Water Supply - Options to Improve Efficiency & Management of Raw Water Sources. Hunter Water Australia: Tamworth Regional Council.

HWA. (2009). Calala WTP Raw Water Storage - Feasibility Study. Hunter Water Australia: Tamworth Regional Council.

HWA. (2012). Tamworth Water Supply - Future Yield & Demand Scenarios. Tamworth Regional Council: Hunter Water Australia.

HWA. (2013). Westdale Recycled Water Scheme. Hunter Water Australia: Tamworth Regional Council.

HWA. (2014). Calala Lane WTP Raw Water Storage Investigation. Hunter Water Australia: Tamworth Regional Council.

NOW. (2010). Water Sharing Plan: Peel Valley Regulated, Unregulated, Alluvial and Fractured Rock Water Sources - Background Document. NSW Office of Water.

NOW. (2012). Upper Namoi Groundwater Source – Status Report 2011. Tamworth: NSW Office of Water.

O'Rourke, M. (2010). Peel Valley Catchment; Groundwater Status Report - 2010. Sydney: NSW Office of Water.

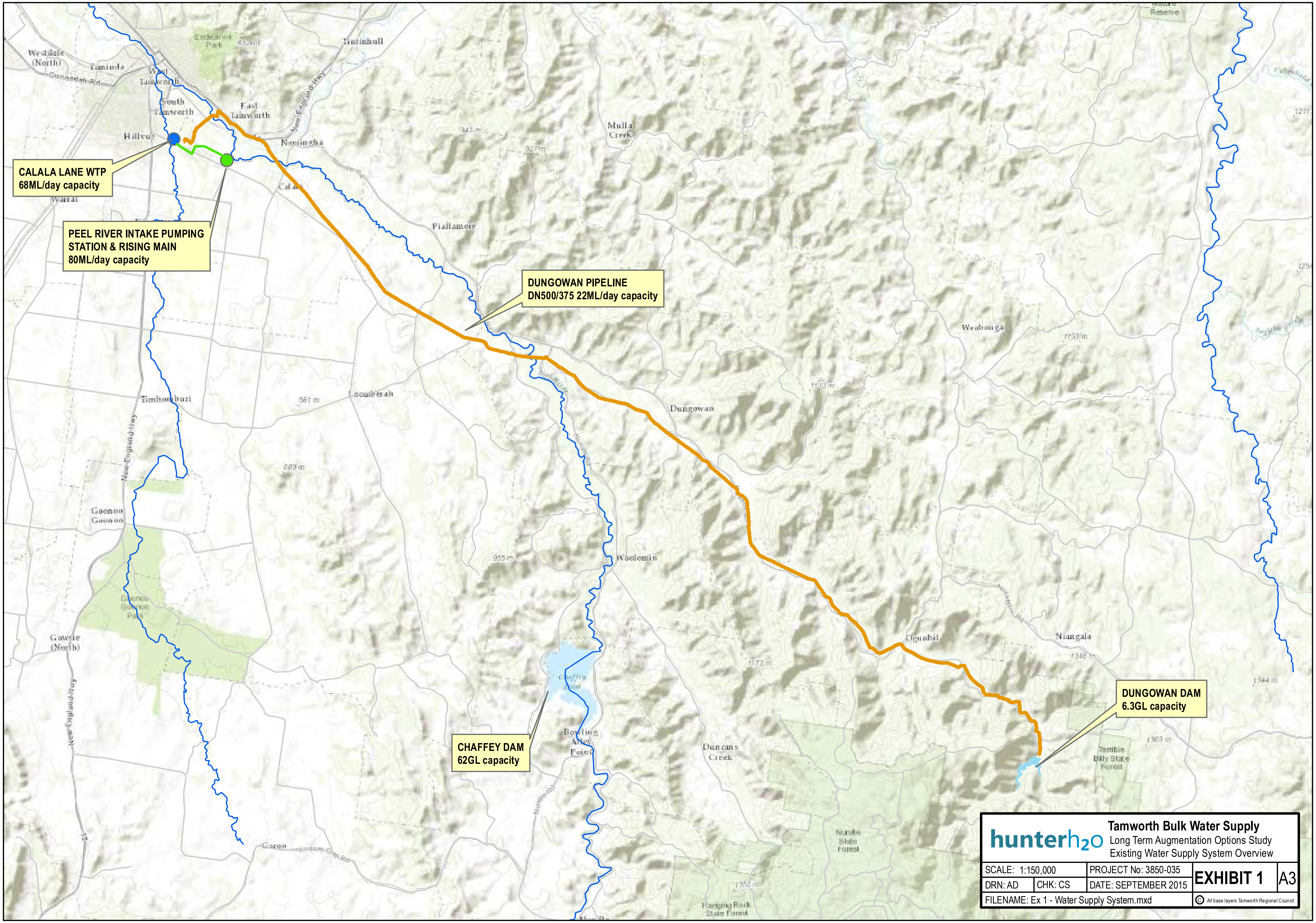
Public Works Department. (1987). Tamworth Water Supply Augmentation - Headworks Augmentation Strategy Study (Report No. 320).

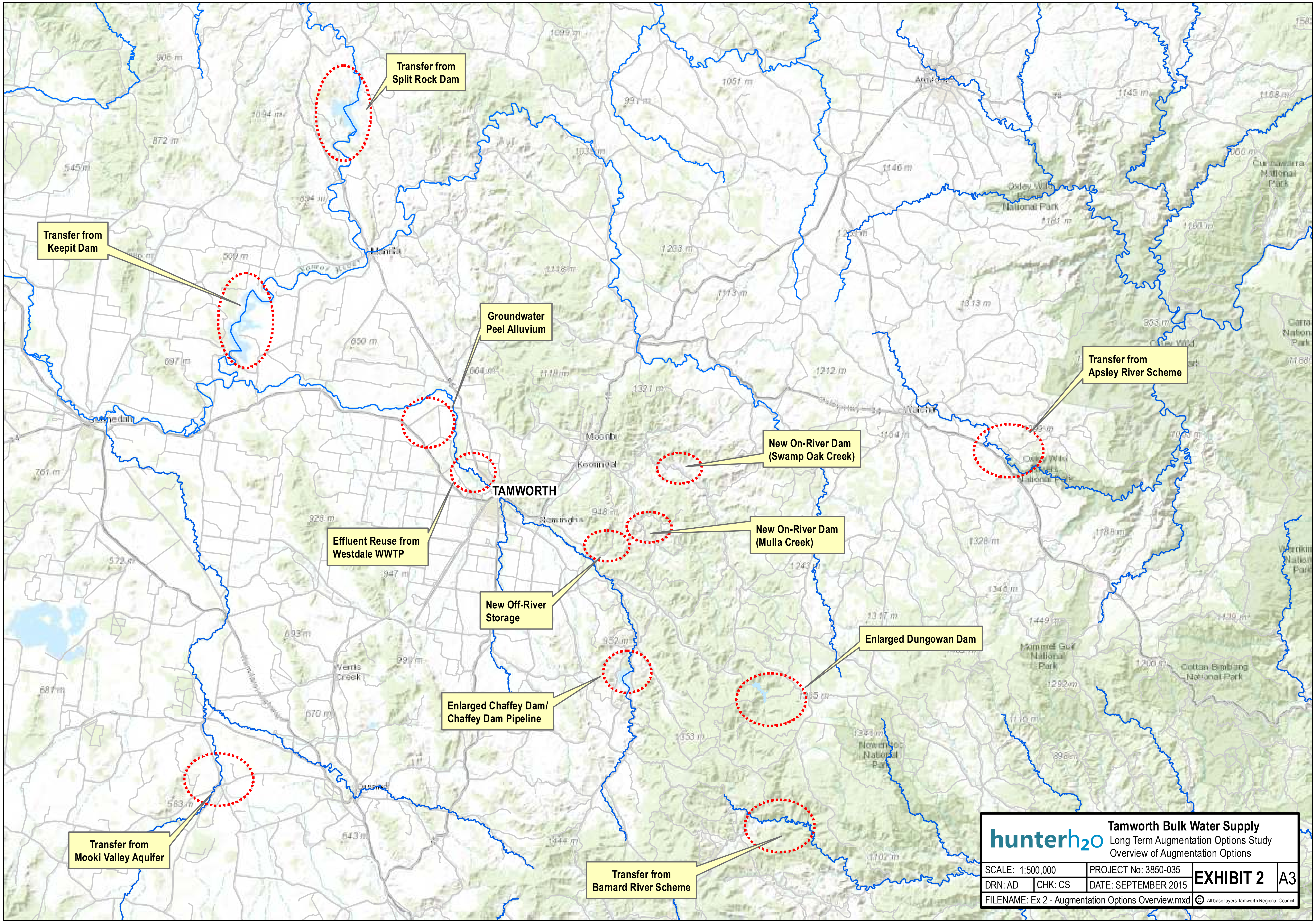
SMEC. (1983). Apsley River Scheme - Report on Engineering Feasibility, Volume 1, Summary.

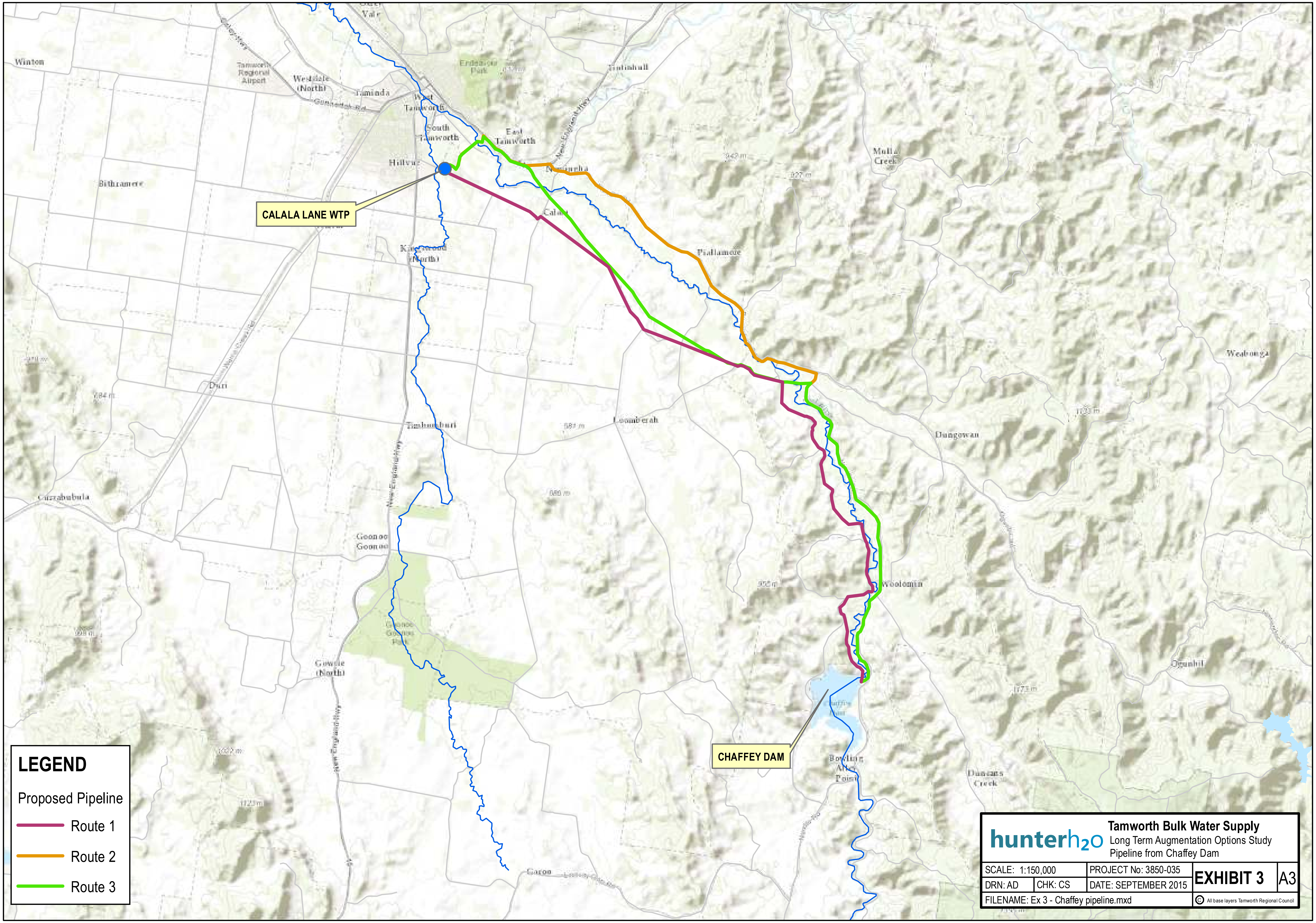
WorleyParsons. (2012). Chaffey Dam Augmentation and Safety Upgrade: EIS State Significant Infrastructure. WorleyParsons Services: State Water Corporation.

WorleyParsons. (2013). Chaffey Dam Augmentation and Safety Upgrade: Preferred Infrastructure Report. WorleyParsons Services: State Water Corporation.

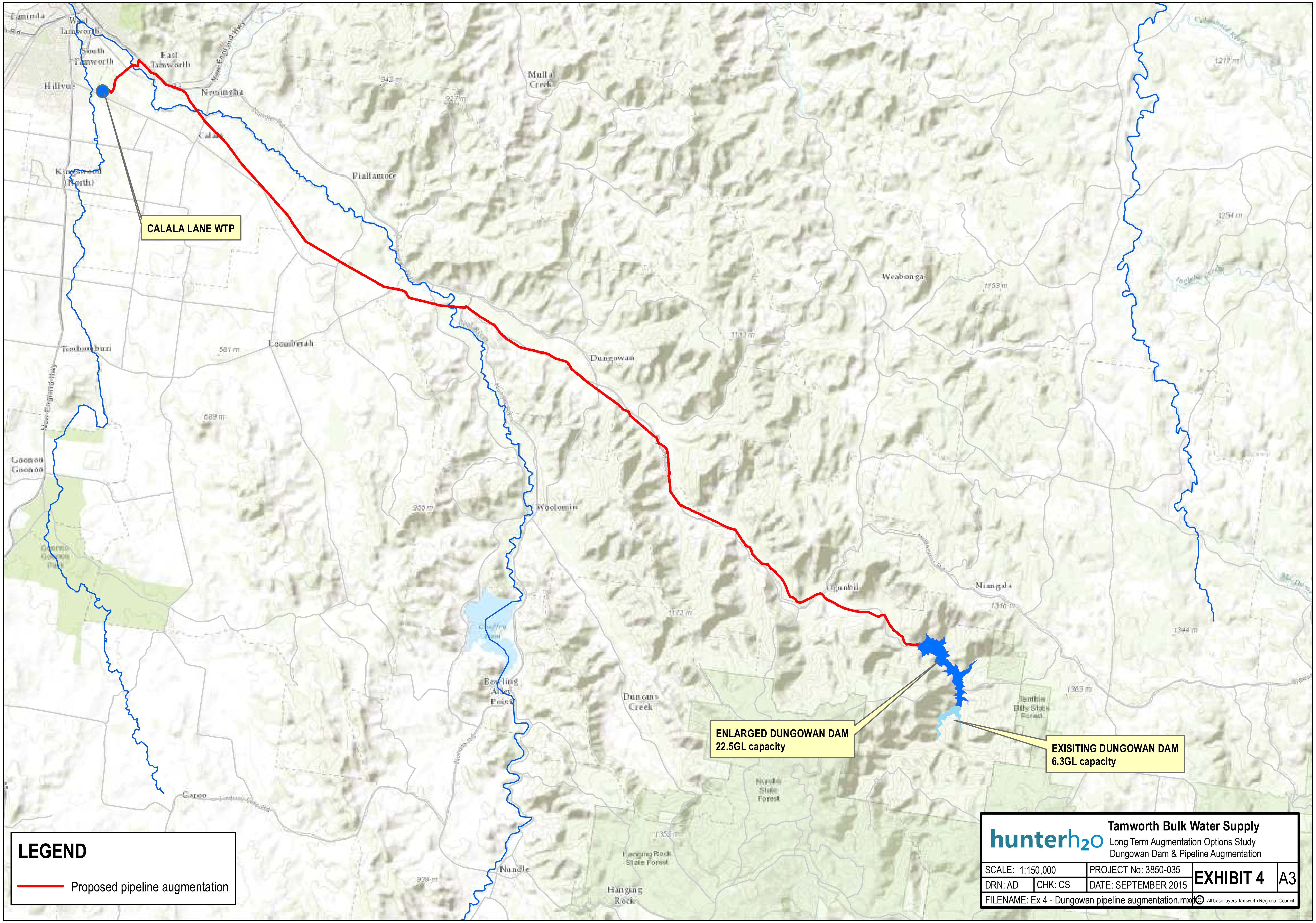
Exhibits

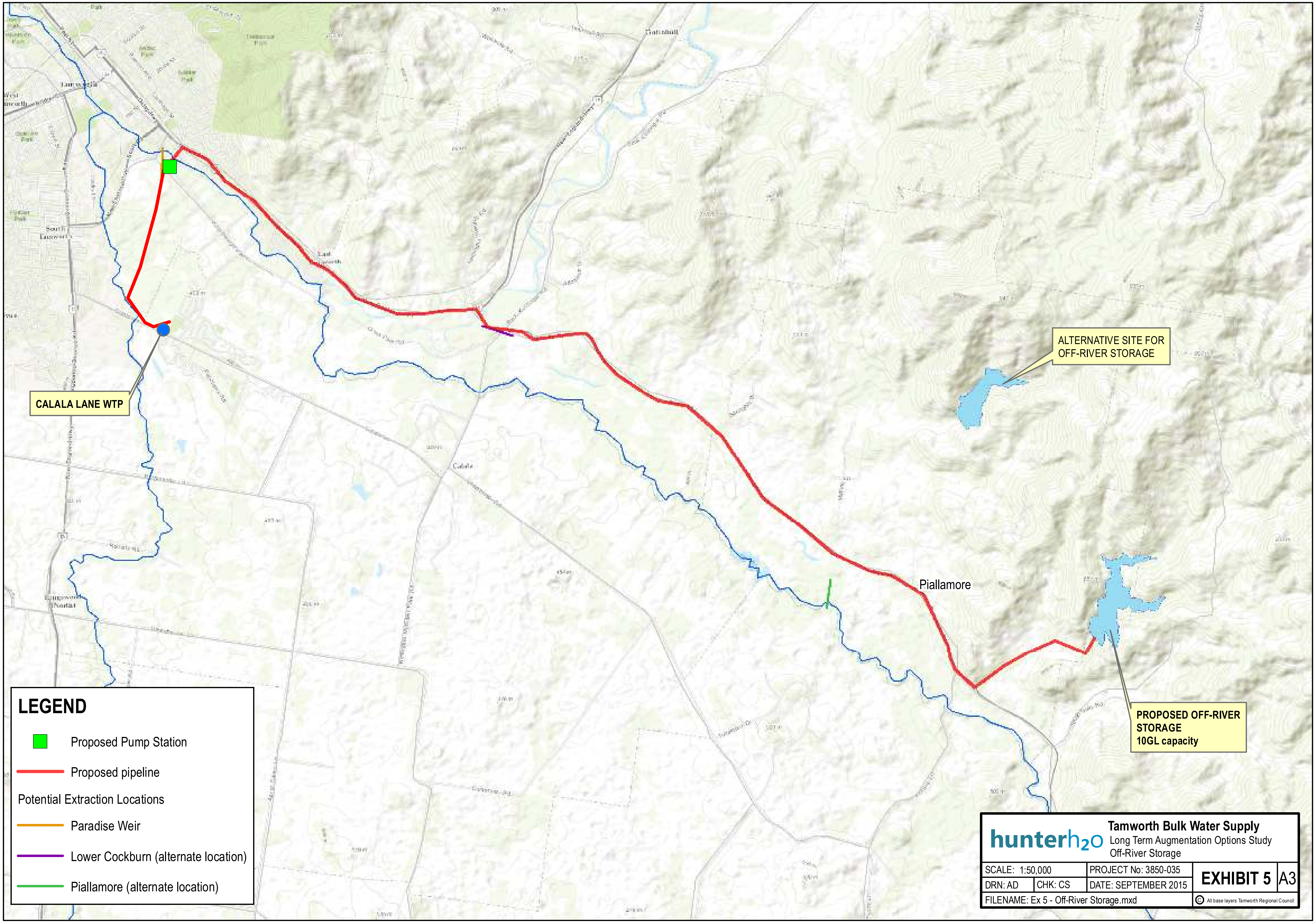

CALALA LANE WTP
68ML/day capacity
PEEL RIVER INTAKE PUMPING STATION & RISING MAIN
80ML/day capacity
DUNGOWAN PIPELINE
DN500/375 22ML/day capacity
CHAFFEY DAM
62GL capacity
DUNGOWAN DAM
6.3GL capacity
Westdale (North)
Taminda
West Tamworth
South Tamworth
East Tamworth
Hillvue
Nemingha
Calala
Piallamore
Mulla Creek
Dungowan
Weabonga
Timbumburi
Loomberah
Goonoo Goonoo
Gowrie (North)
Woolomin
Bowling Alley Point
Duncans Creek
Ogunbil
Niangala
Tamworth Bulk Water Supply
Long Term Augmentation Options Study
Existing Water Supply System Overview
SCALE: 1:150,000
PROJECT No: 3850-035
DRN: AD
CHK: CS
DATE: SEPTEMBER 2015
EXHIBIT 1
A3
FILENAME: Ex 1 - Water Supply System.mxd
All base layers Tamworth Regional Council


Transfer from
Split Rock Dam
Transfer from
Keepit Dam
Groundwater
Peel Alluvium
TAMWORTH
Effluent Reuse from
Westdale WWTP
New On-River Dam
(Swamp Oak Creek)
New On-River Dam
(Mulla Creek)
New Off-River
Storage
Transfer from
Apsley River Scheme
Enlarged Dungowan Dam
Enlarged Chaffey Dam/
Chaffey Dam Pipeline
Transfer from
Mooki Valley Aquifer
Transfer from
Barnard River Scheme
hunterh2o
Tamworth Bulk Water Supply
Long Term Augmentation Options Study
Overview of Augmentation Options
SCALE: 1:500,000
PROJECT No: 3850-035
DRN: AD
CHK: CS
DATE: SEPTEMBER 2015
EXHIBIT 2
A3
FILENAME: Ex 2 - Augmentation Options Overview.mxd
All base layers Tamworth Regional Council

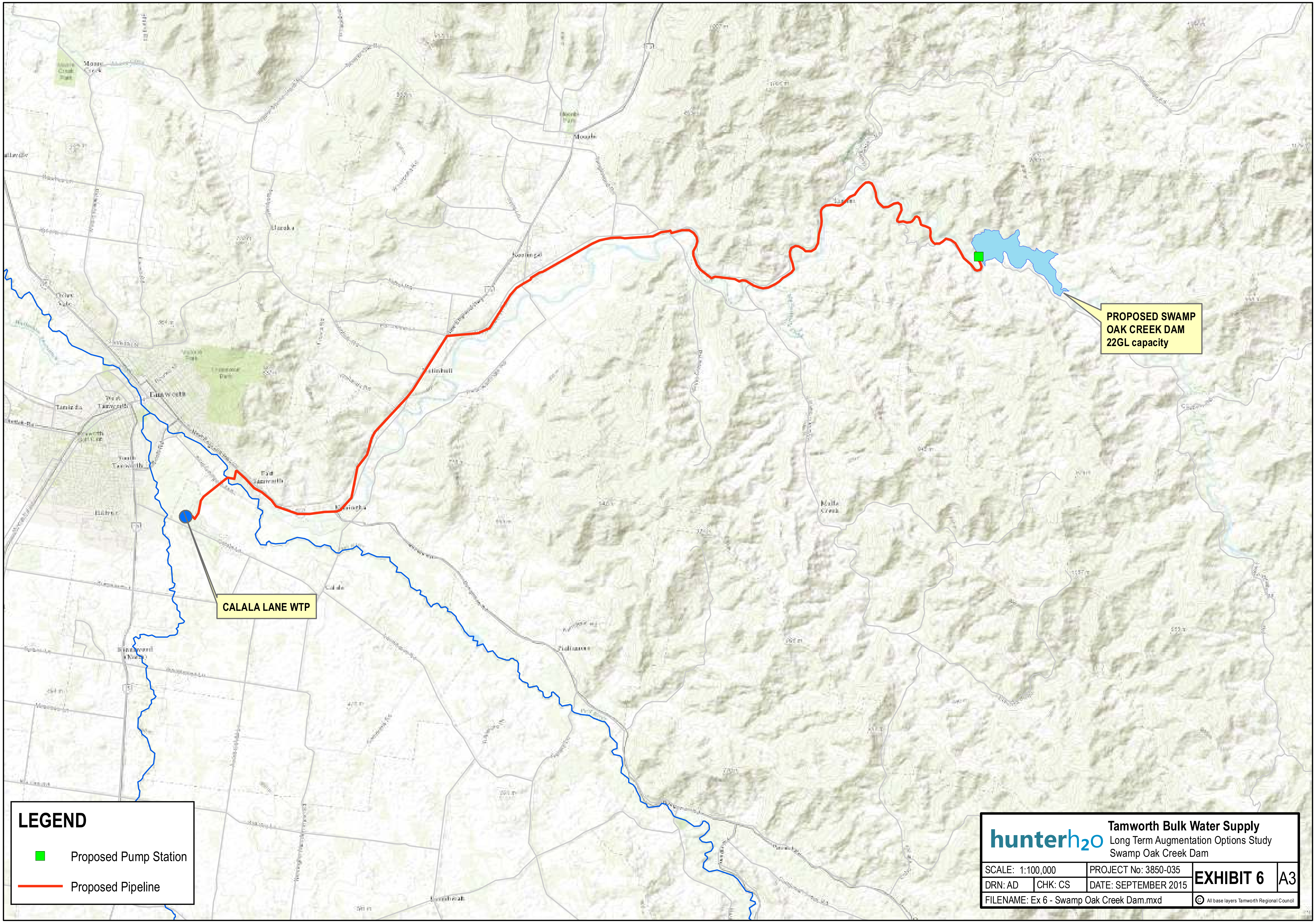


CALALA LANE WTP
CHAFFEY DAM
LEGEND
Proposed Pipeline
Route 1
Route 2
Route 3
Tamworth Bulk Water Supply
Long Term Augmentation Options Study
Pipeline from Chaffey Dam
hunterh2o
SCALE: 1:150,000
PROJECT No: 3850-035
DRN: AD
CHK: CS
DATE: SEPTEMBER 2015
EXHIBIT 3
A3
FILENAME: Ex 3 - Chaffey pipeline.mxd
All base layers Tamworth Regional Council
Winton
Westdale (North)
Taminda
West Tamworth
South Tamworth
East Tamworth
Hillvue
Bithramere
Calala
Nemingha
Piallamore
Kingswood (North)
Timbumburi
Loomberah
Duri
Currabubula
Goonoo Goonoo
Gowrie (North)
Woolomin
Dungowan
Weabonga
Ogunbil
Duncans Creek
Bowling Alley Point
Moonbi
Nundle
New England Hwy
Garoo


West Tamworth
South Tamworth
East Tamworth
Hillvue
Nemingha
Calala
Piallamore
Kingswood (North)
CALALA LANE WTP
Weabonga
Timbumburi
Loomberah
Dungowan
Goonoo Goonoo
Woolomin
Ogunbil
Niangala
Bowling Alley Point
Duncans Creek
ENLARGED DUNGOWAN DAM
22.5GL capacity
EXISITING DUNGOWAN DAM
6.3GL capacity
Garoo
Nundle
Hanging Rock
LEGEND
Proposed pipeline augmentation
hunterh2o
Tamworth Bulk Water Supply
Long Term Augmentation Options Study
Dungowan Dam & Pipeline Augmentation
SCALE: 1:150,000
PROJECT No: 3850-035
EXHIBIT 4
A3
DRN: AD
CHK: CS
DATE: SEPTEMBER 2015
FILENAME: Ex 4 - Dungowan pipeline augmentation.mxd
© All base layers Tamworth Regional Council



ALTERNATIVE SITE FOR OFF-RIVER STORAGE
CALALA LANE WTP
Piallamore
PROPOSED OFF-RIVER STORAGE 10GL capacity
LEGEND
Proposed Pump Station
Proposed pipeline
Potential Extraction Locations
Paradise Weir
Lower Cockburn (alternate location)
Piallamore (alternate location)
hunterh2o
Tamworth Bulk Water Supply
Long Term Augmentation Options Study
Off-River Storage
SCALE: 1:50,000
PROJECT No: 3850-035
EXHIBIT 5
A3
DRN: AD
CHK: CS
DATE: SEPTEMBER 2015
FILENAME: Ex 5 - Off-River Storage.mxd
All base layers Tamworth Regional Council



LEGEND

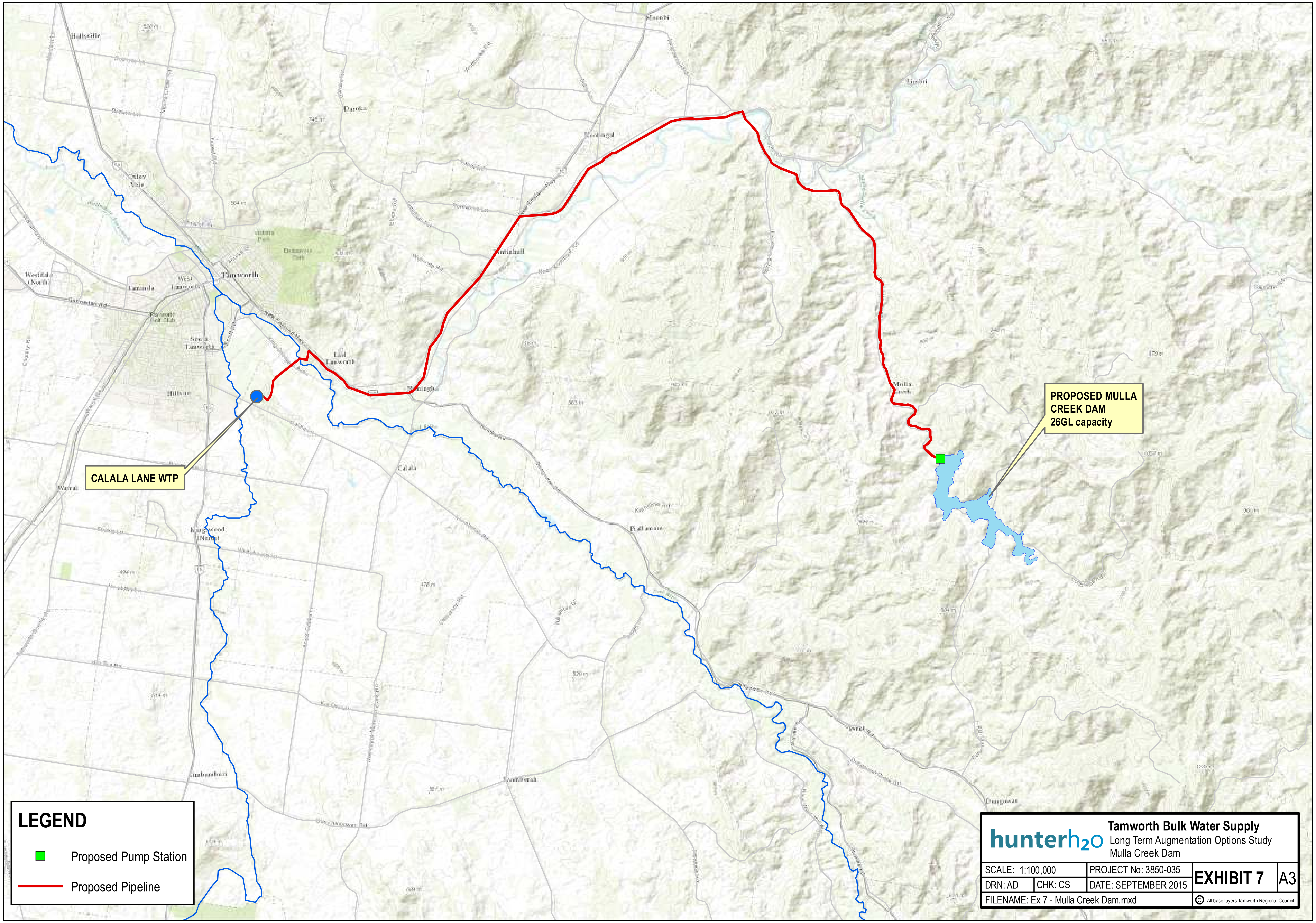
Proposed Pump Station

Proposed Pipeline

hunterh2o

Tamworth Bulk Water Supply
Long Term Augmentation Options Study
Swamp Oak Creek Dam

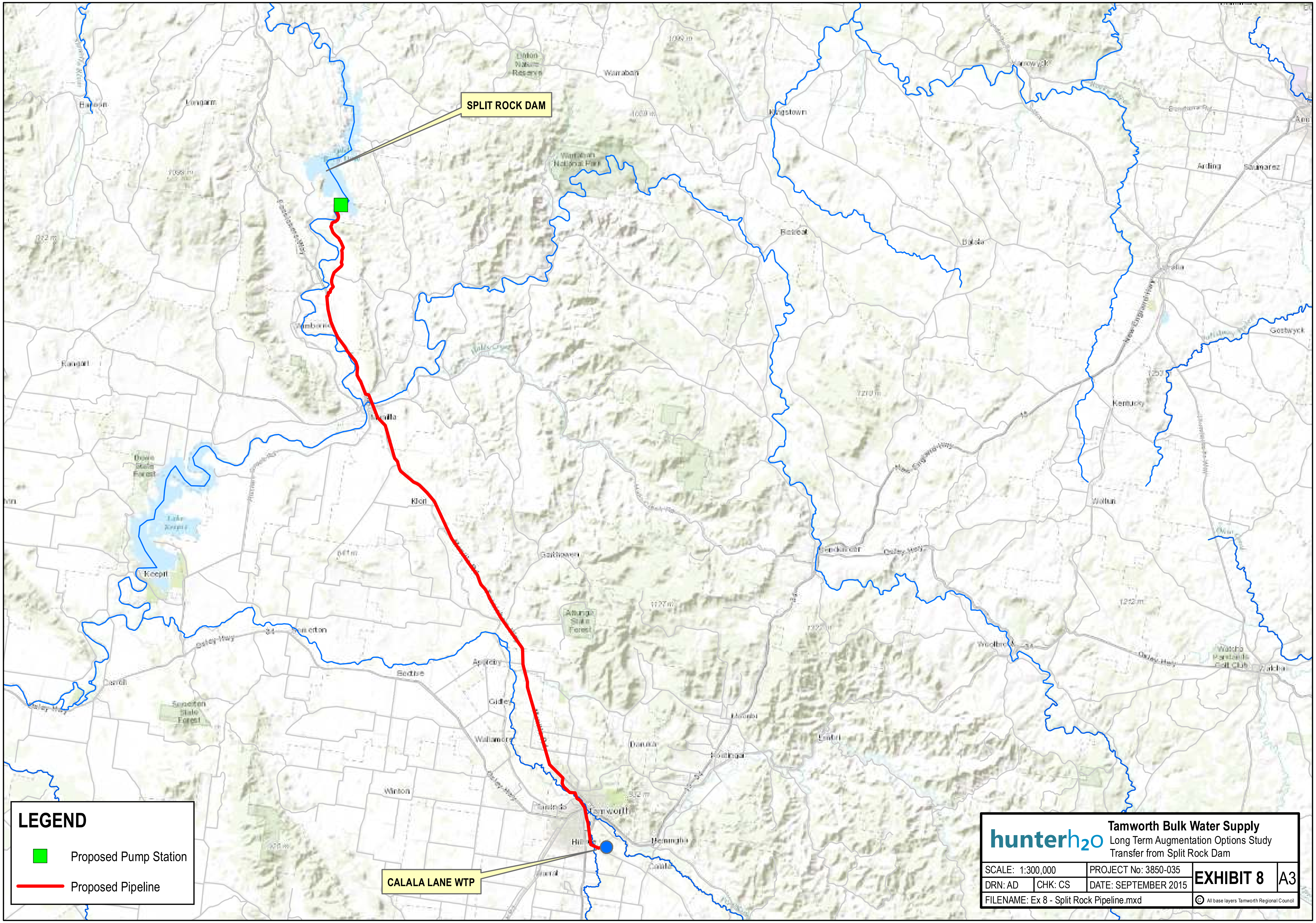
SCALE: 1:100,000	PROJECT No: 3850-035	EXHIBIT 6	A3
DRN: AD / CHK: CS	DATE: SEPTEMBER 2015		
FILENAME: Ex 6 - Swamp Oak Creek Dam.mxd		© All base layers Tamworth Regional Council	

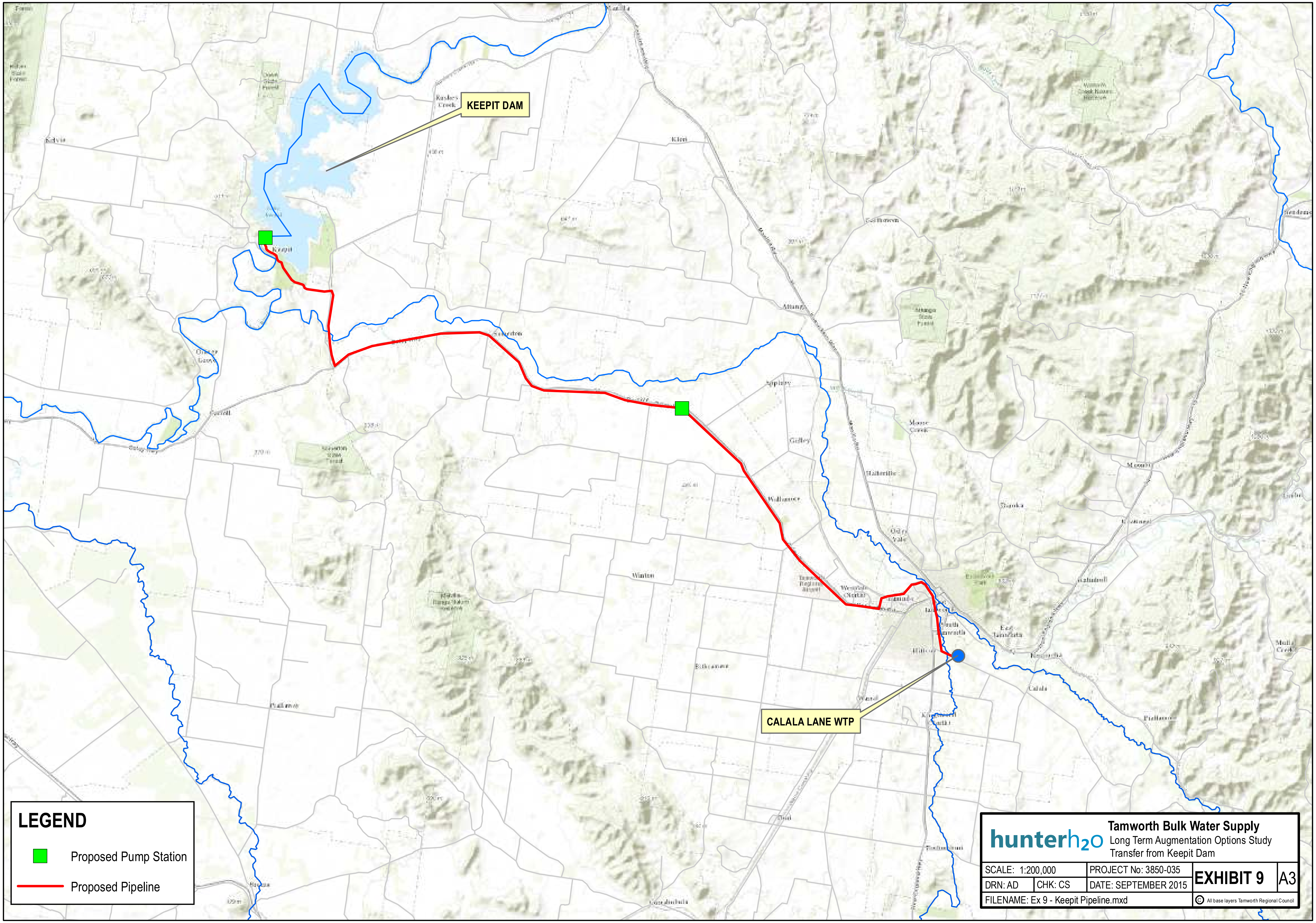


hunterh2o

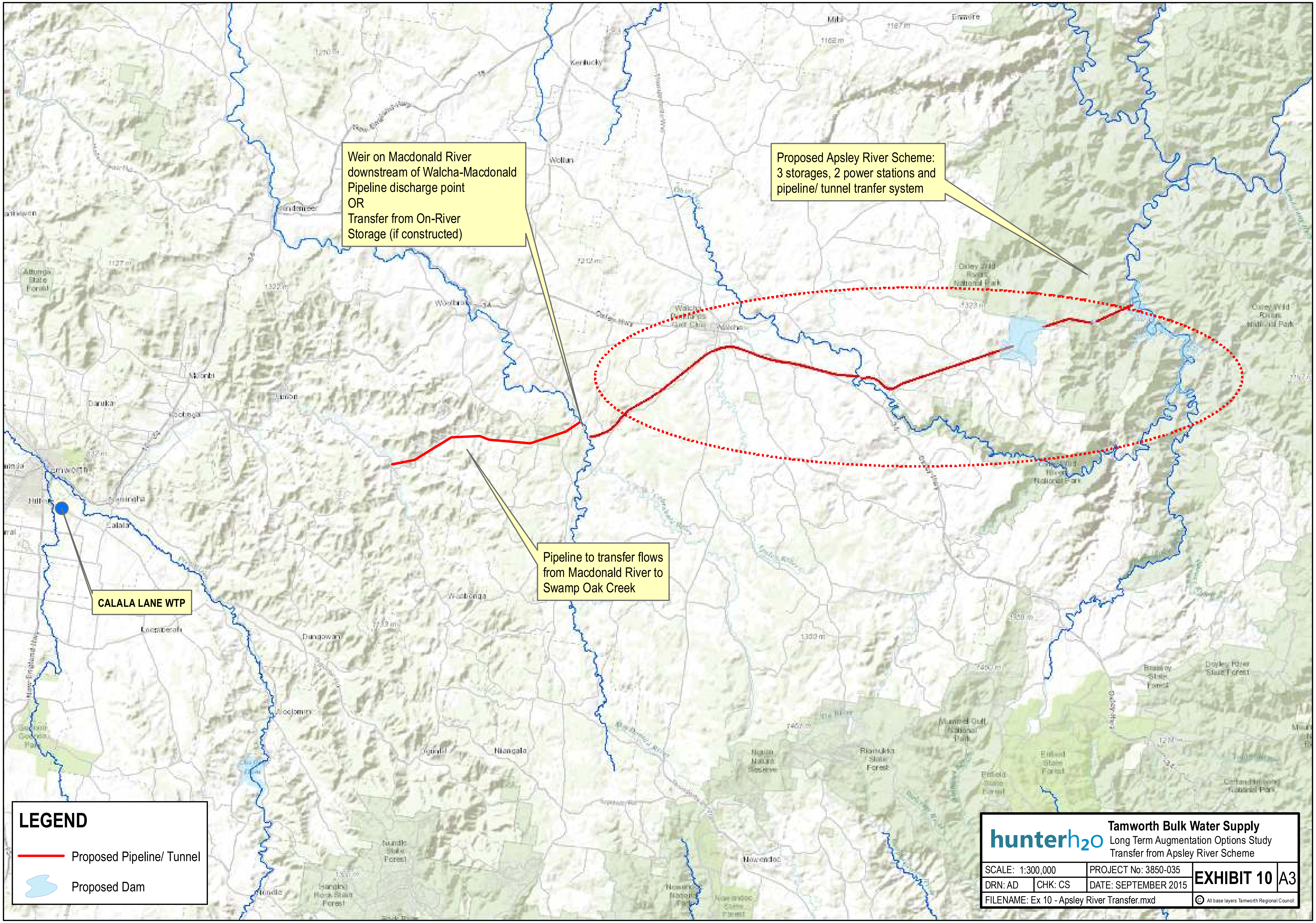
Tamworth Bulk Water Supply
Long Term Augmentation Options Study
Mulla Creek Dam

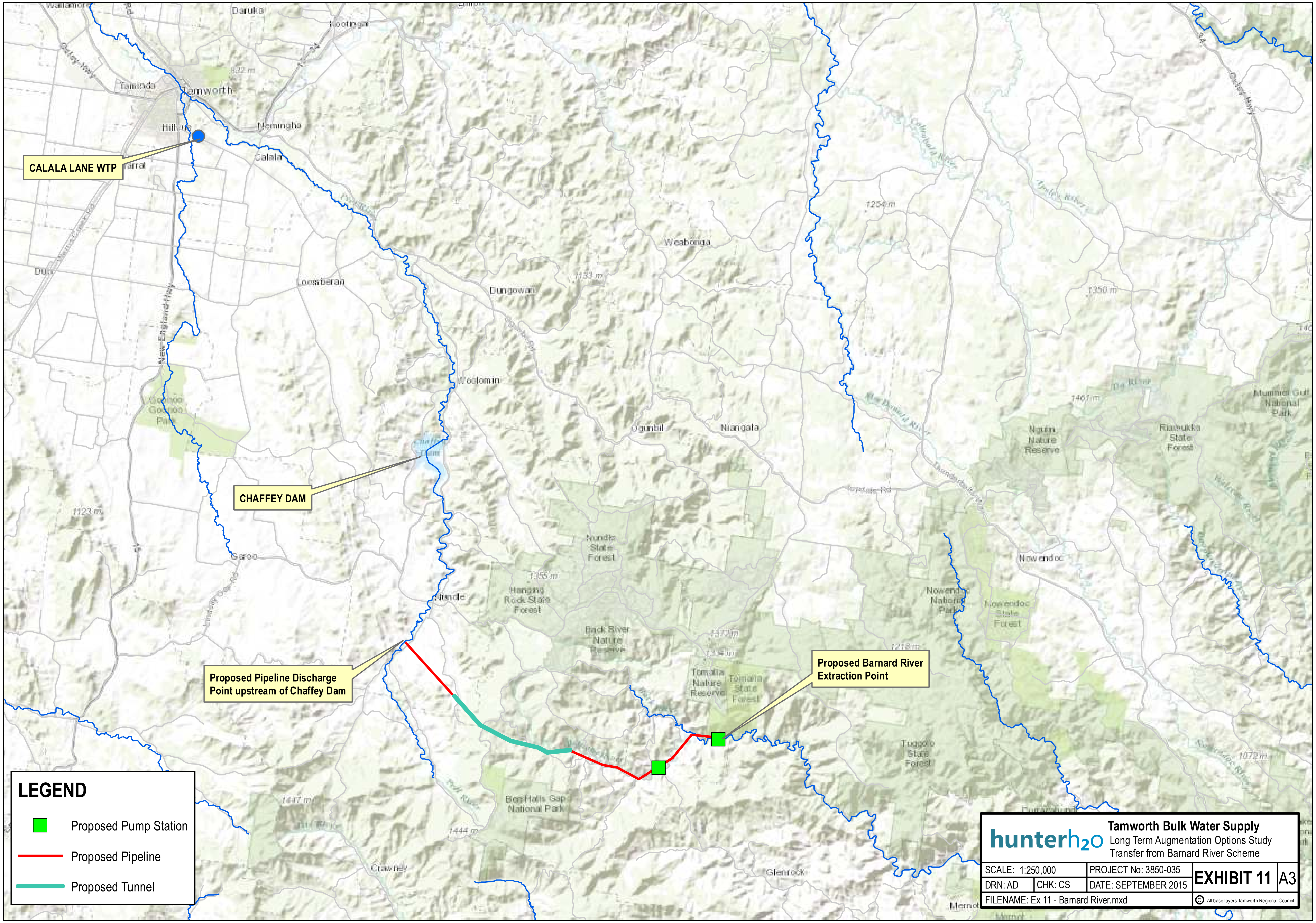
SCALE: 1:100,000		PROJECT No: 3850-035	EXHIBIT 7 A3
DRN: AD	CHK: CS	DATE: SEPTEMBER 2015	
FILENAME: Ex 7 - Mulla Creek Dam.mxd			© All base layers Tamworth Regional Council

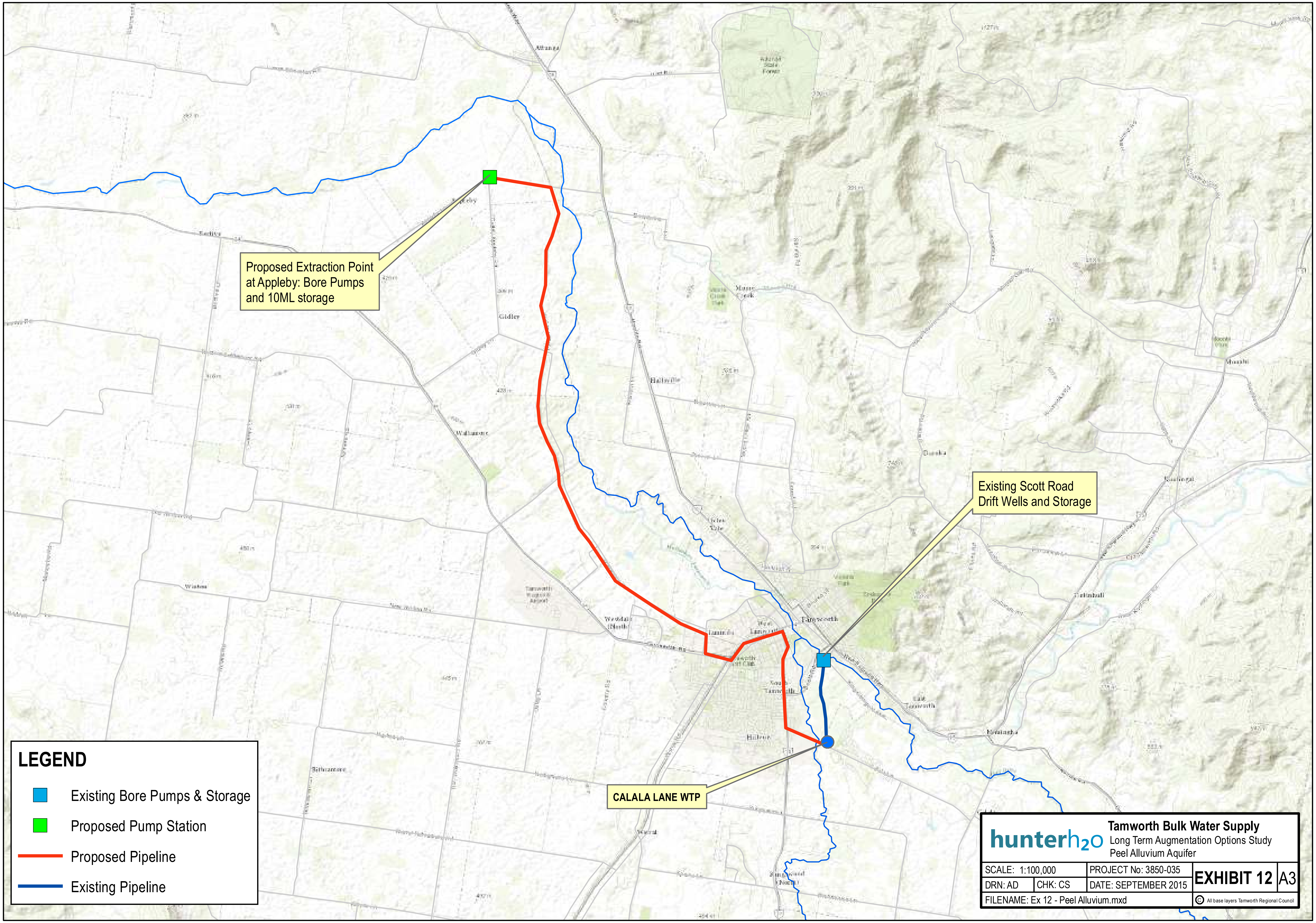

SPLIT ROCK DAM
CALALA LANE WTP
LEGEND
Proposed Pump Station
Proposed Pipeline
hunterh2o
Tamworth Bulk Water Supply
Long Term Augmentation Options Study
Transfer from Split Rock Dam
SCALE: 1:300,000
PROJECT No: 3850-035
DRN: AD
CHK: CS
DATE: SEPTEMBER 2015
EXHIBIT 8
A3
FILENAME: Ex 8 - Split Rock Pipeline.mxd
All base layers Tamworth Regional Council
Warrabah
Kingstown
Retreat
Manilla
Keepit
Somerton
Tamworth
Attunga State Forest
Kentucky
Walcha
Bendemeer
Woolbrook
Nemingha
Calala



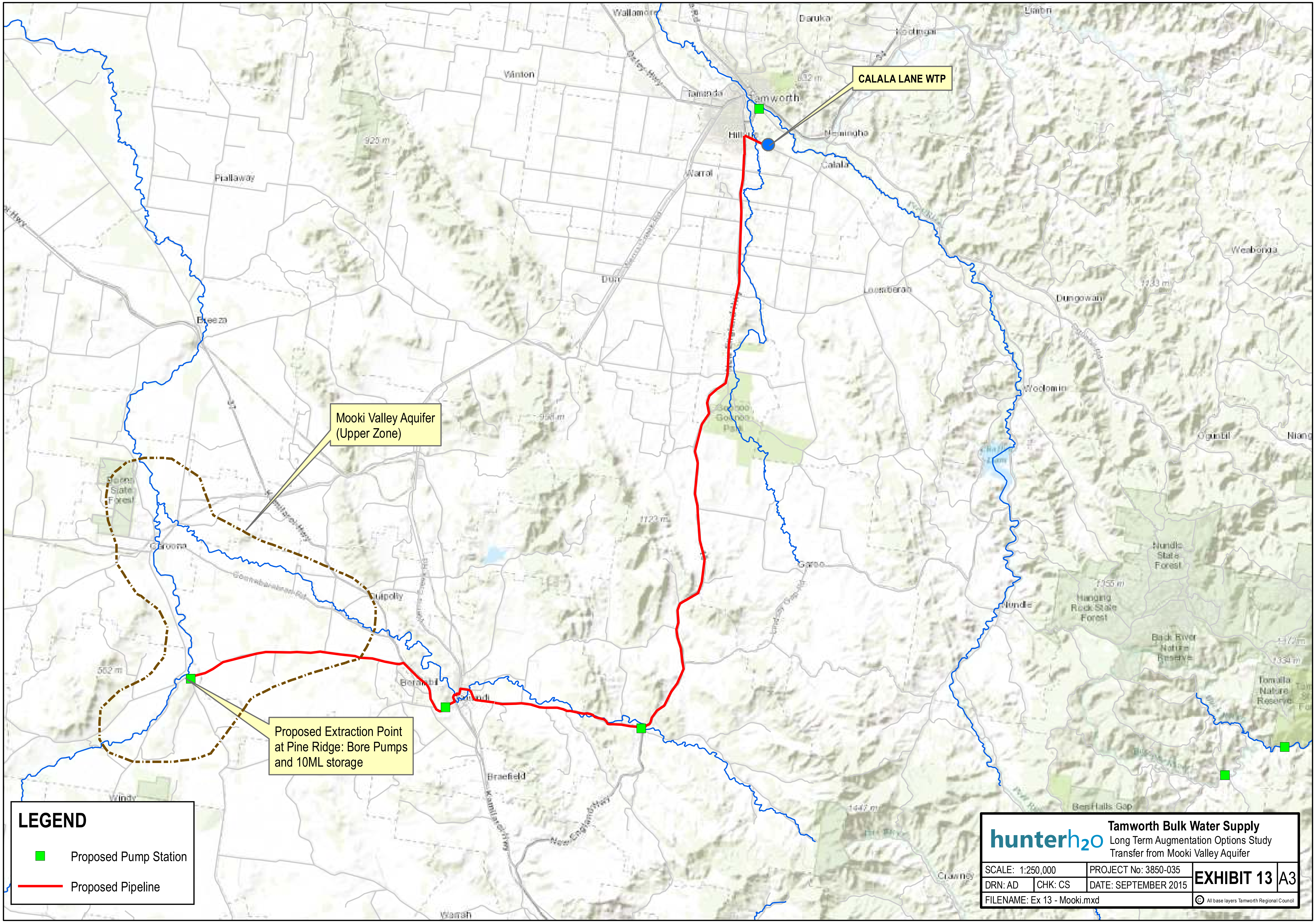
KEEPIT DAM
CALALA LANE WTP
LEGEND
Proposed Pump Station
Proposed Pipeline
hunterh2o
Tamworth Bulk Water Supply
Long Term Augmentation Options Study
Transfer from Keepit Dam
SCALE: 1:200,000
PROJECT No: 3850-035
DRN: AD
CHK: CS
DATE: SEPTEMBER 2015
EXHIBIT 9
A3
FILENAME: Ex 9 - Keepit Pipeline.mxd
All base layers Tamworth Regional Council


Weir on Macdonald River downstream of Walcha-Macdonald Pipeline discharge point OR Transfer from On-River Storage (if constructed)
Proposed Apsley River Scheme: 3 storages, 2 power stations and pipeline/ tunnel tranfer system
Pipeline to transfer flows from Macdonald River to Swamp Oak Creek
CALALA LANE WTP
LEGEND
Proposed Pipeline/ Tunnel
Proposed Dam
hunterh2o
Tamworth Bulk Water Supply
Long Term Augmentation Options Study
Transfer from Apsley River Scheme
SCALE: 1:300,000
PROJECT No: 3850-035
EXHIBIT 10
A3
DRN: AD
CHK: CS
DATE: SEPTEMBER 2015
FILENAME: Ex 10 - Apsley River Transfer.mxd
All base layers Tamworth Regional Council

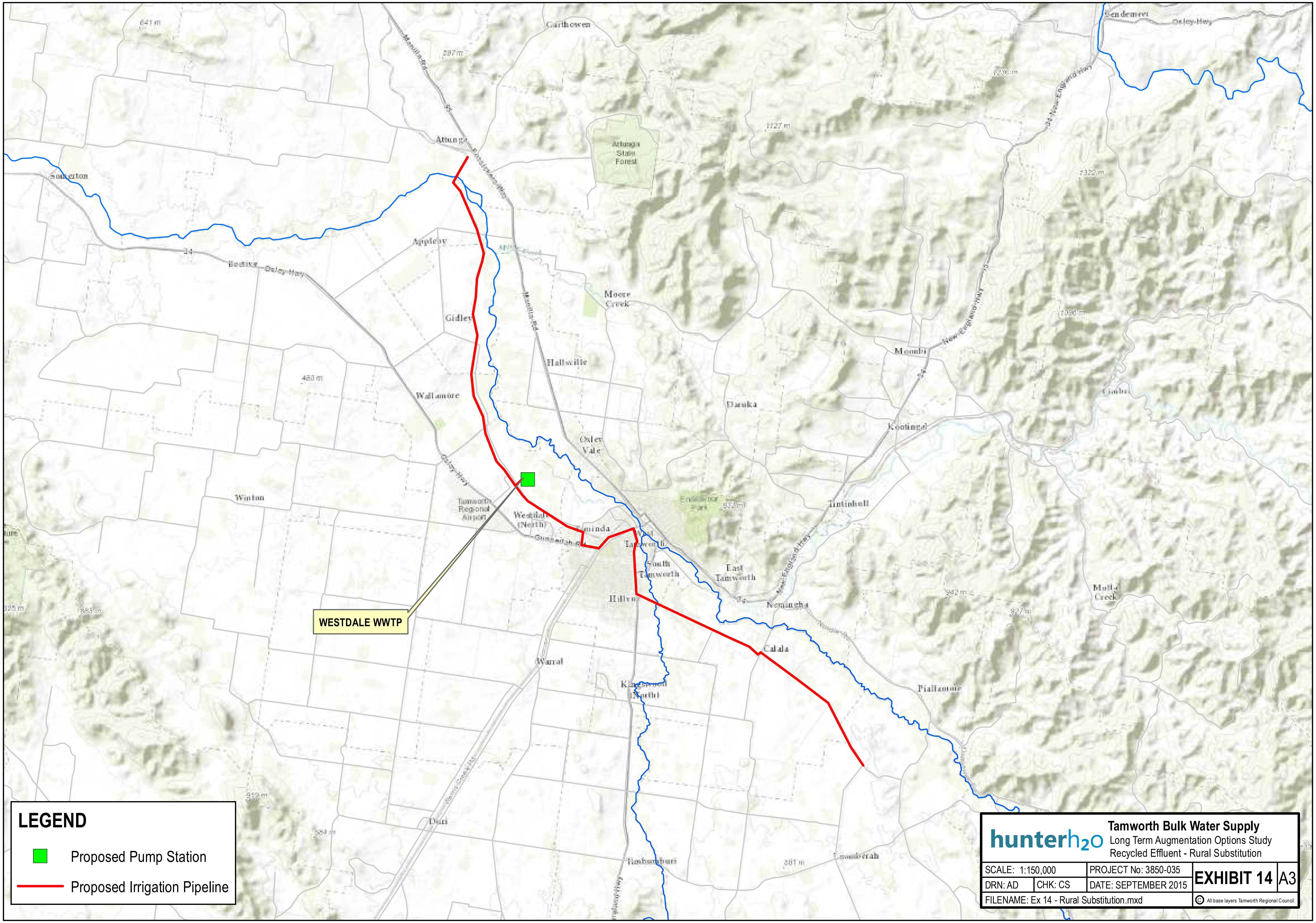

CALALA LANE WTP
CHAFFEY DAM
Proposed Pipeline Discharge Point upstream of Chaffey Dam
Proposed Barnard River Extraction Point
Tamworth
Nemingha
Calala
Daruka
Kootingal
Loomberah
Dungowan
Woolomin
Weabonga
Ogunbil
Niangala
Nundle
Nowendoc
Hanging Rock State Forest
Nundle State Forest
Back River Nature Reserve
Tomalla Nature Reserve
Tomalla State Forest
Tuggolo State Forest
Nowendoc National Park
Nowendoc State Forest
Ngulin Nature Reserve
Riamukka State Forest
Mummel Gulf National Park
Barrington Tops National Park
Crawney
Glenrock
Gaeo
LEGEND
Proposed Pump Station
Proposed Pipeline
Proposed Tunnel
hunterh2o
Tamworth Bulk Water Supply
Long Term Augmentation Options Study
Transfer from Barnard River Scheme
SCALE: 1:250,000
PROJECT No: 3850-035
DRN: AD
CHK: CS
DATE: SEPTEMBER 2015
EXHIBIT 11
A3
FILENAME: Ex 11 - Barnard River.mxd
All base layers Tamworth Regional Council

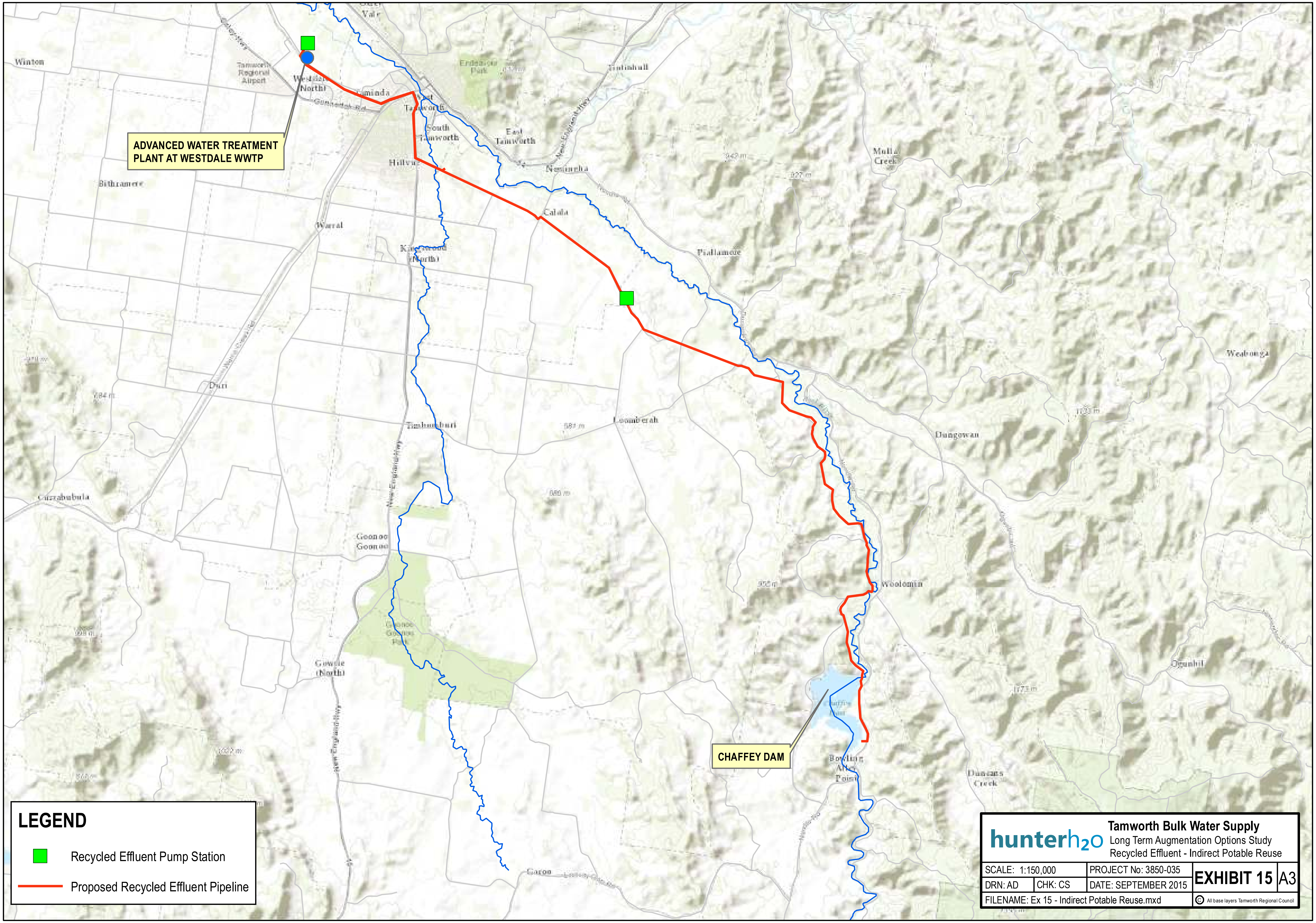


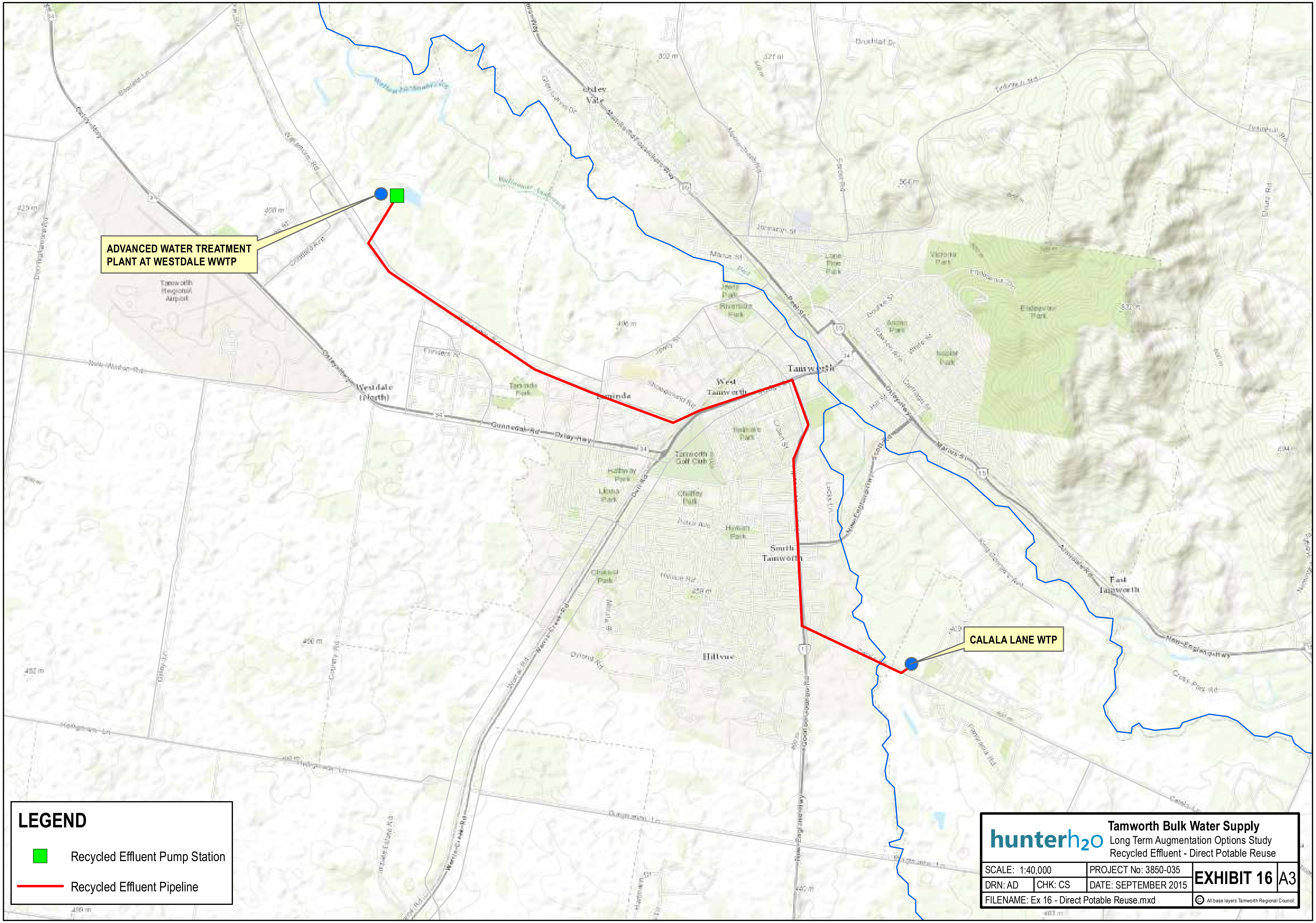
Proposed Extraction Point at Appleby: Bore Pumps and 10ML storage
Existing Scott Road Drift Wells and Storage
CALALA LANE WTP
LEGEND
Existing Bore Pumps & Storage
Proposed Pump Station
Proposed Pipeline
Existing Pipeline
hunterh2o
Tamworth Bulk Water Supply
Long Term Augmentation Options Study
Peel Alluvium Aquifer
SCALE: 1:100,000
PROJECT No: 3850-035
DRN: AD
CHK: CS
DATE: SEPTEMBER 2015
EXHIBIT 12
A3
FILENAME: Ex 12 - Peel Alluvium.mxd
© All base layers Tamworth Regional Council



CALALA LANE WTP
Mooki Valley Aquifer (Upper Zone)
Proposed Extraction Point at Pine Ridge: Bore Pumps and 10ML storage
LEGEND
Proposed Pump Station
Proposed Pipeline
hunterh2o
Tamworth Bulk Water Supply
Long Term Augmentation Options Study
Transfer from Mooki Valley Aquifer
SCALE: 1:250,000
PROJECT No: 3850-035
DRN: AD
CHK: CS
DATE: SEPTEMBER 2015
EXHIBIT 13
A3
FILENAME: Ex 13 - Mooki.mxd
All base layers Tamworth Regional Council
Wallamore
Daruka
Limbri
Kootingal
Winton
Tamworth
Taminda
Nemingha
Calala
Piallaway
Warral
Weabonga
Duri
Loomberah
Dungowan
Breeza
Woolomin
Ogunbil
Caroona
Gunnedah Rd
Quipolly
Garoo
Nundle
Nundle State Forest
Hanging Rock State Forest
Back River Nature Reserve
Tomalla Nature Reserve
Braefield
Kamilaroi Hwy
New England Hwy
Ben Halls Gap
Crawney
Windy
Warrah
925 m
1123 m
1133 m
1355 m
1447 m
562 m


Carthowen
Bendemeer
Oxley Hwy
New England Hwy
Attunga
Attunga State Forest
Somerton
Appleby
Oxley Hwy
Moore Creek
Gidley
Manilla Rd
Hallsville
Moonbi
Wallamore
Daruka
Kootingal
Oxley Vale
Tintinhull
Winton
Tamworth Regional Airport
Westdale (North)
Taminda
West Tamworth
South Tamworth
East Tamworth
Hillvue
Nemingha
Mulla Creek
Calala
Warral
Kingswood (North)
Piallamore
Duri
Timbumburi
Loomberah
WESTDALE WWTP
LEGEND
Proposed Pump Station
Proposed Irrigation Pipeline
hunterh2o
Tamworth Bulk Water Supply
Long Term Augmentation Options Study
Recycled Effluent - Rural Substitution
SCALE: 1:150,000
PROJECT No: 3850-035
EXHIBIT 14
A3
DRN: AD
CHK: CS
DATE: SEPTEMBER 2015
FILENAME: Ex 14 - Rural Substitution.mxd
All base layers Tamworth Regional Council


ADVANCED WATER TREATMENT PLANT AT WESTDALE WWTP
CHAFFEY DAM
Winton
Tamworth Regional Airport
Westdale (North)
Taminda
West Tamworth
South Tamworth
East Tamworth
Hillvue
Nemingha
Calala
Piallamore
Bithramere
Warral
Kingswood (North)
Duri
Timbumburi
Loomberah
Currabubula
Goonoo Goonoo
Gowrie (North)
Woolomin
Dungowan
Bowling Alley Point
Duncans Creek
Weabonga
Ogunbil
Moonbi
Garoo
New England Hwy
LEGEND
Recycled Effluent Pump Station
Proposed Recycled Effluent Pipeline
hunterh2o
Tamworth Bulk Water Supply
Long Term Augmentation Options Study
Recycled Effluent - Indirect Potable Reuse
SCALE: 1:150,000
PROJECT No: 3850-035
DRN: AD
CHK: CS
DATE: SEPTEMBER 2015
EXHIBIT 15
A3
FILENAME: Ex 15 - Indirect Potable Reuse.mxd
All base layers Tamworth Regional Council


ADVANCED WATER TREATMENT PLANT AT WESTDALE WWTP
CALALA LANE WTP
Tamworth
West Tamworth
South Tamworth
East Tamworth
Hillvue
Westdale (North)
Taminda
Tamworth Regional Airport
LEGEND
Recycled Effluent Pump Station
Recycled Effluent Pipeline
hunterh2o
Tamworth Bulk Water Supply
Long Term Augmentation Options Study
Recycled Effluent - Direct Potable Reuse
SCALE: 1:40,000
PROJECT No: 3850-035
DRN: AD
CHK: CS
DATE: SEPTEMBER 2015
EXHIBIT 16
A3
FILENAME: Ex 16 - Direct Potable Reuse.mxd
All base layers Tamworth Regional Council

Appendix A Demand Projections

Appendix A: Demand Projections – Assumptions

DEMAND PROJECTIONS ML/a LOW SCENARIO		Residential Dwelling Growth 0.75% pa; Residential Consumption 250 kL pa					
DEMAND COMPONENT	**Growth Rate (% pa)**	**2015**	**2025**	**2035**	**2045**	**2055**	**2065**
Residential	0.75%	4,080	4,390	4,730	5,100	5,490	5,920
Commercial	0.75%	900	970	1,050	1,130	1,220	1,310
Industrial (incl. Food Processing)	0%	1,650	1,650	1,650	1,650	1,650	1,650
Public Parks	0%	450	450	450	450	450	450
Institutions	0.75%	300	320	340	370	400	430
Other	0.75%	200	220	240	260	280	300
Residential Expansion	NA	350	500	650	800	950	1,100
Industrial Expansion	NA	-	330	670	1,000	1,330	1,670
Losses (incl. backwash users) 10%	NA	880	980	1,090	1,200	1,310	1,430
TOTAL		**8,810**	**9,810**	**10,870**	**11,960**	**13,080**	**14,260**

DEMAND PROJECTIONS ML/a AVERAGE SCENARIO		Residential Dwelling Growth 1.00% pa; Residential Consumption 300 kL pa					
DEMAND COMPONENT	**Growth Rate (% pa)**	**2015**	**2025**	**2035**	**2045**	**2055**	**2065**
Residential	1.00%	4,890	5,400	5,970	6,590	7,280	8,040
Commercial	1.00%	900	990	1,090	1,200	1,330	1,470
Industrial (incl. Food Processing)	0%	1,650	1,650	1,650	1,650	1,650	1,650
Public Parks	0%	450	450	450	450	450	450
Institutions	1.00%	300	330	360	400	440	490
Other	1.00%	200	220	240	270	300	330
Residential Expansion	NA	350	550	750	950	1,150	1,350
Industrial Expansion	NA	-	500	1,000	1,500	2,000	2,500
Losses (incl. backwash users) 10%	NA	970	1,120	1,280	1,450	1,620	1,810
TOTAL		**9,710**	**11,210**	**12,790**	**14,460**	**16,220**	**18,090**

DEMAND PROJECTIONS ML/a HIGH SCENARIO		Residential Dwelling Growth 1.25% pa; Residential Consumption 350 kL pa					
DEMAND COMPONENT	**Growth Rate (% pa)**	**2015**	**2025**	**2035**	**2045**	**2055**	**2065**
Residential	1.25%	5,710	6,460	7,310	8,280	9,380	10,620
Commercial	1.25%	900	1,020	1,150	1,300	1,470	1,660
Industrial (incl. Food Processing)	0%	1,650	1,650	1,650	1,650	1,650	1,650
Public Parks	0%	450	450	450	450	450	450
Institutions	1.25%	300	340	380	430	490	550
Other	1.25%	200	230	260	290	330	370
Residential Expansion	NA	350	600	850	1,100	1,350	1,600
Industrial Expansion	NA	-	670	1,330	2,000	2,670	3,330
Losses (incl. backwash users) 10%	NA	1,060	1,270	1,490	1,720	1,980	2,250
TOTAL		**10,620**	**12,690**	**14,870**	**17,220**	**19,770**	**22,480**

DWELLING PROJECTIONS	**Growth Rate (%pa)**	**2015**	**2025**	**2035**	**2045**	**2055**	**2065**
Low	0.75%	16,300	17,565	18,927	20,396	21,978	23,683
Average	1.00%	16,300	18,005	19,889	21,970	24,268	26,807
High	1.25%	16,300	18,456	20,897	23,661	26,791	30,335

Appendix B Peel IQQM Model Details (Extract from 2012 Yield Study)

7 Review of Peel IQQM

7.1 General Model Description

IQQM (Integrated Quantity and Quality Model) is a water resource modelling tool developed by the former DLWC (now NSW Office of Water) in association with Queensland Department of Natural Resources. The primary module of the Peel IQQM is the River System Module, which simulates the movement of water in a river system. The headwater storages in the model are Chaffey Dam and Dungowan Dam, with the primary river component being the Peel River from Chaffey Dam to Carroll Gap (just upstream of the confluence with the Namoi River). A secondary river component, Dungowan Creek, is also modelled between Dungowan Dam and the Peel River.

The Peel River is split into three main river segments:

1. Chaffey Dam to the Piallamore gauge station
2. Piallamore gauge station to Paradise Weir gauge station
3. Paradise Weir gauge station to Carroll Gap gauge station

In simulating the movement of water down the river system, the model takes into account the following major processes:

- Operation of headwater storages (Chaffey & Dungowan Dams).
- Flow routing in rivers (Peel River and Dungowan Creek).
- System inflows such as headwater inflows, minor and major tributaries (Duncans Creek, Cockburn River & Goono Goono Creek), groundwater baseflow and effluent return flow (Tamworth).
- Extractions from the system, including town water demand (Tamworth), domestic & stock extractions (Dungowan pipeline and Peel River) and regulated irrigation extractions (Peel River).
- Losses from the system, including evaporation and groundwater recharge.
- Resource assessment process administered by NOW, including water availability, water orders, dams releases and environmental releases.

The river system is represented in the model by a series of nodes connected by links. Inflows, storages, outflows and other point processes are associated with nodes, while flow routing processes are associated with links – as shown in the Peel IQQM schematic diagrams in Appendix C.

As the Peel IQQM is not able to directly model groundwater sources, the Scott Road Drift Wells are not included in the model. While the Drift Wells may be an important backup supply during severe drought periods, they are not a primary supply source and therefore have not been included in the assessment of TWS yield.

7.2 Status of Model

The Peel IQQM was originally developed in the late 1990s / early 2000s and was subject to a partial peer review by Hunter Water Australia in 2002 in order to determine its suitability for assessing the hydrological impacts resulting from the reduction of effluent return flows from Westdale Sewage Treatment Plant (STP) to the Peel River. In association with the partial review, Hunter Water Australia worked with the modellers to make some minor improvements to the model. Soon after the Hunter Water Australia review, further modifications were made in association with Peel Valley irrigators. This early version of the model was used as the basis for the *Tamworth Bulk Water Supply Augmentation - Options Study* (HWA, 2005).

During the late stages of the above study (in 2004/05) the model was re-calibrated in association with extending the input data up to 2003/04. This first major re-calibration is described in the report, *IQQM Cap Implementation Summary Report – Issue 1* (DNR, 2006). This version of the Peel IQQM was the basis for the study undertaken by GHD on behalf of State Water, assessing the need for augmenting Chaffey Dam (GHD, 2006).

The latest version of the Peel IQQM was re-calibrated in 2008/09, with all input data extended to June 2008. This second major re-calibration of the model was undertaken prior to the preparation of the Water Sharing Plan for the Peel Valley (NOW, 2010) and included flow calibration to the drought period of 2003 – 2008.

The key drivers for this most recent re-calibration included:

1. The model was overestimating flows in the Peel River at Carroll Gap during the 2003 – 2007 dry period (the model had not previously been calibrated to a dry period).
2. The model area irrigated and associated diversions were not matching observed values very well from 2004.
3. The recorded Tamworth town water supply extractions from the Peel River resulted in more releases from Chaffey Dam and lower storage volumes than simulated during the 2003 – 2008 period.
4. The Sacramento modelled derived inflows to Dungowan Dam needed to be revised as the previous calibration was based on limited data.
5. There was potential to improve the calibration on the supplementary (off allocation) usage.

While most of the above issues were addressed in the recent model re-calibration – including a significant improvement in the modelling of flows during dry periods – the model is still subject to ongoing development and improvements.

The key areas for future improvements are the modelling of groundwater extractions near the river (in association with assessing the correlation between groundwater extractions and river losses) and the modelling of unregulated users in tributaries.

Based on Hunter Water Australia's review of the latest version of the Peel IQQM, the model is considered to be sufficiently accurate for the purposes of this study and any further improvements in the model will be subject to more accurate and comprehensive data being collected in the future – particularly in the areas of surface water / groundwater interaction, extractions from tributaries, inflows to Dungowan Dam and planted crop areas.

Schematic diagrams of the latest Peel IQQM have been included in Appendix C.

7.3 Key Model Inputs

Climate Data

The Peel IQQM assesses the long-term behaviour of the Peel River system using 117 years (1892 to 2008) of historical climate data on a daily time step. The key climatic parameters are daily rainfall, evaporation and temperature.

Historical rainfall was sourced from four BOM rainfall gauging stations across the Peel Valley, with the four sites representing the variation in rainfall across the catchment. Evaporation and temperature data were sourced from Tamworth Airport.

Climate data used for assessing various climate change scenarios was taken from the CSIRO Murray-Darling Basin Sustainable Yields Project (CSIRO, 2007) as discussed in Section 6.2. Scenario C was adopted (future growth and current development scenario), with climate change parameters predicted for the year 2030. As there were 15 GCMs and three emission scenarios under Scenario C, a total of 45 scenarios were considered in the CSIRO study. Due to modelling constraints and based on the results of the CSIRO study, a dry estimate (C_{dry}), wet estimate (C_{wet}) and median estimate (C_{median}) were taken from the 45 scenarios and used in the Peel IQQM.

Streamflow Data

Streamflow data is used for both model calibration and model simulation (for periods when streamflow data is available). The main gauge stations used in the calibration were:

- Peel River downstream of Chaffey Dam (GS419045)
- Peel River at Piallamore (GS419015)
- Peel River at Paradise Weir (GS419024)
- Peel River at Carroll Gap (GS419006)

Tributary inflows that were used in both the calibration and model simulations include:

- Dungowan Creek (GS419077)
- Duncans Creek (GS419036)
- Cockburn River (GS419016)
- Goonoo Goonoo Creek (419035)

Irrigation Data

Irrigators in the Peel Valley are represented by clustered groups based on the river reaches between the main streamflow gauges, as shown on the table below.

Table 7-1 Entitlements for each River Reach

Reach	Annual Entitlements (ML/a)				
	TWS	Irrigation (active)	Industrial & Mining	Stock & Domestic	TOTAL
Chaffey to Piallamore		6,010	0	14	6,024
Piallamore to Paradise Weir	16,400	3,663	236	60	20,359
Paradise Weir to Attunga		10,635	114	0	10,749
Attunga to Carroll Gap		8,412	365	11	8,788
Carrol Gap to Namoi River		1,371	0	9	1,380
Total	**16,400**	**30,091**	**715**	**94**	**47,300**

Resource Assessment & Environmental Releases

The current Peel IQQM has been modified to reflect the new operating rules under the Water Sharing Plan (NOW, 2010), including environmental release requirements for Chaffey Dam. The resource allocation process under the Water Sharing Plan is also included in the model.

The Resource Assessment calculation includes an allowance for a carry over reserve (COR), which is an additional allowance for High Security (HS) users, including Tamworth TWS, for the following year's demand under worst case historical conditions. The COR is used in the calculation of the irrigation allocation for any given month. It is added to the HS requirements for the remainder of the water year and forms part of the essential storage requirements for the dam that must be satisfied before water is made available for irrigators. The current COR for the Peel River system is 12 GL. This is approximately equivalent to 80% of the average annual demand for town water (ie 80% of 9 GL = 7 GL) plus an estimated 5 GL deficit between minimum dam inflows (7 GL) and minimum river losses (12 GL) between the dam and the town water extraction point.

The environmental release rules that are included in the model for both the existing (62GL) and proposed augmented (100GL) Chaffey Dam are as follows:

Existing Dam (62GL)

- If at the start of the water year the volume of water stored in Chaffey Dam is greater than 50,000 ML then the next 1,600 ML shall be set aside for a stimulus flow.
- If at the start of the water year the volume of water stored in Chaffey Dam is less than or equal to 50,000 ML then the first time during the water year the volume of water stored increases to more than 50,000 ML, then the next 1,600 ML shall be set aside for a stimulus flow.

- The stimulus flow will be for a period of 7 days with a maximum release of 500 ML/day occurring on the second day and may be released between 1 July and 31 August or between 1 March and 30 June, if a flow of 500 ML/day has not occurred in the Peel River at Piallamore in the preceding 90 days.
- A minimum daily release of 3ML will be made from Chaffey Dam.

Augmented Dam (100GL)

- In the event that Chaffey Dam is enlarged, then an Environmental Contingency Allowance (ECA) is to be set aside. Whenever an available water determination for the regulated source is made, an ECA account will be credited with a volume equal to 5,000 multiplied by the available water determination (generally 5,000ML).
- Water in the ECA account may be released to return some natural flow variability to the upper reaches of the Peel River. There will be no carry-over of unused water remaining in the ECA account at the end of the year.
- A minimum daily release of 3ML will be made from Chaffey Dam.

7.4 Key Model Outputs

The IQQM produces daily results for the historical period of record (117 years) for a variety of key variables, including: streamflows; dam storage levels and releases; TWS demands and extractions; irrigation orders and extractions; and resource allocation. Results are usually presented in statistical form to assist with determining the reliability of the system over the long term.

While the key focus of this study is the reliability of the TWS supply under various demand levels, TWS security cannot be considered in isolation to the reliability of irrigation supplies. This is due to the dual purpose nature of Chaffey Dam and the importance of Chaffey Dam in supplying TWS demands, particularly during dry periods.

The key outputs produced by the model associated with irrigation security and TWS security are discussed below.

Irrigation Security

In order to assess the impact on irrigators from increasing TWS consumption, several parameters that reflect irrigation security were assessed, including:

- Average annual total irrigation diversions
- Maximum allocation on 1 July and 1 October
- Median allocation on 1 July and 1 October

Total irrigation diversions represent the total volume of water extracted from the system by general security irrigators, including both on allocation (extractions of regulated flows) and off allocation (extractions of unregulated flows). Allocations represent the percentage of the licensed entitlement volume that general security irrigators can divert in the current water year during on allocation periods. Whilst allocations can increase during the water year (subject to water availability), they cannot be reduced until the start of the next water year (1 July).

For comparison purposes, it was assumed that irrigation security would become unacceptable once median allocation on 1 October was less than 50% (currently around 74%). The median allocation (or 50th percentile) is indicative of the typical allocation that would be available in most years. 1 October was considered to be a more useful comparison point as allocations typically increase above their starting point on 1 July each year and 1 October is considered to be more relevant to the irrigation season. While allocations may further increase after 1 October, planting decisions have generally been made by then.

TWS Security

Based on the previous bulk water supply study (HWA, 2005), the current definition of TWS security for Tamworth is:

Security of Supply	Total storage should not fall below a minimum total storage equivalent to one years restricted supply (plus any expected inflows and losses) during a repeat of the worst drought on record.
Levels of Service	Restrictions imposed no more than 5% of the time and no more frequently than every 10 years on average.

Based on the experiences of the recent severe drought period, only half of the minimum storage volume in Chaffey Dam would be available for TWS due to losses between the dam and Tamworth and the target for TWS consumption under level 5 restrictions was around 65% average demand. Therefore, in order to satisfy the above security criteria, minimum storage should not drop below a volume equal to TWS demand x 65% x 2 (based on 12 months restricted supply plus 50% losses) during the 117 year historical climate sequence.

The levels of service are not considered as critical as the security of supply criteria as they represent inconvenience and cost to the customer via the imposition of restrictions, as opposed to the security of supply criteria, which represents the risk of running out of water completely. Therefore, the assessment of modelling scenarios to-date has focused on the security of supply criteria only.

Consideration should be given to also adopting levels of service criteria for severe restrictions (ie Level 3, 4 or 5) which have a much larger impact on the community than Level 1 or 2 restrictions, which are more of an inconvenience. An assessment of the levels of service is included in Section 9.3.

Appendix C Cost Estimates

Cost Estimate Assumptions

Capital Costs

- Unit costs were generally obtained from the *NSW Office of Water Reference Rates Manual (June 2014)* and indexed to June 2015, including:
  - Pipelines
  - Pumping stations
  - Bore pumps
  - Reservoirs
- Unit costs for other capital items including dams and treatment plants were based on the previous experience of Hunter H2O on similar projects
- Electricity supply costs for remote locations were based on the following allowances:
  - <1000kW total pump station power: $1M if located near existing towns or major infrastructure / $2M if remote from existing towns and infrastructure
  - >1000kW total pump station power: $1.5M if located near existing towns or major infrastructure / $3M if remote from existing towns and infrastructure
- Survey, Investigation, Design & Project Management rates were adopted from *NSW Office of Water Reference Rates Manual (June 2014)* and were based on a proportion of the Contract Cost Estimate:
  - Pipelines 10%
  - Reservoirs & Pump Stations 15%
  - Dams (assumed) 17.5%
  - Water / Wastewater Treatment 20%
- Contingencies rates were adopted from *NSW Office of Water Reference Rates Manual (June 2014)* and were based on a proportion of the Contract Cost Estimate:
  - Inherent Risk – Feasibility Stage 30%
  - Contingent Risk – Future Assets 20%
  - TOTAL CONTINGENCY 50%

Operation & Maintenance Costs

- Operating costs quoted in the report generally only include key variable costs such as power costs, bulk water charges & treatment costs for advanced water treatment of effluent
- Maintenance costs used in NPV’s were assumed to be 1% of the capital cost per annum
- Power costs were assumed to be 20 cents/kWhr (this was an assumed averaged cost per kWhr across peak, off-peak and shoulder periods and includes an allowance for peak demand costs)
- Bulk water costs were based on current charges by WaterNSW and DPI Water for 2015/16

Appendix C: Cost Estimates

Annualised Unit Costs

- Annualised unit costs represent the equivalent annual cost of owning and operating the asset for an individual unit of supply or yield, expressed as $/ML
- Annualised unit costs in this report were calculated as follows:

$$\frac{\text{NPV of capital costs plus O\&M costs converted to an annualised payment}}{\text{Annual yield volume in ML (assumed to be annual water supplied)}}$$

- NPV's were based on a 30 year term and 7% discount rate

Cost Estimates & Annualised Unit Cost Summary Table

Option	Yield ML/a	Capital Cost $	Power / AWTP Costs $/ML	Bulk Water Cost $/ML	Operating Cost NPV $	Maintenance Cost $ pa	Maintenance Cost NPV $	Annualised Unit Cost $/ML
Chaffey Dam Upgrade 100GL	6,000	31,800,000	25	90	8,559,260	318,000	3,946,075	595
Chaffey Dam Upgrade 120GL	8,000	50,760,000	25	90	11,412,347	507,600	6,298,829	690
Chaffey Dam Upgrade 100-120GL	2,000	50,760,000	25	90	2,853,087	507,600	6,298,829	2,414
Dungowan Dam Aug 22.5GL	6,000	150,000,000	-	5	396,841	1,500,000	18,613,562	2,270
Dungowan Aug 22.5GL + DN600 incr	6,000	163,600,000	-	5	372,271	1,636,000	20,301,191	2,475
Dungowan Aug 22.5GL + DN750 incr	6,000	184,800,000	-	5	372,271	1,848,000	22,931,908	2,795
Off-River Storage 10GL	4,850	138,600,000	140	5	8,746,519	1,386,000	17,198,931	2,734
Mulla Creek Dam 26GL**	6,750	164,900,000	7	5	1,032,773	1,649,000	20,462,509	2,225
Swamp Oak Ck Dam 22GL**	6,750	259,700,000	20	5	2,121,667	2,597,000	32,226,280	3,511
Keepit Pipeline (2 Boosters)*	6,850	65,400,000	191	41	19,740,849	654,000	8,115,513	1,097
Split Rock Pipeline (1 Booster)*	6,850	69,000,000	132	41	14,725,735	690,000	8,562,238	1,086
Keepit Pipeline plus Entitlements***	6,850	85,950,000	191	41	19,740,849	859,500	10,665,571	1,369
Split Rock Pipeline plus Entitlements***	6,850	89,550,000	132	41	14,725,735	895,500	11,112,296	1,357
Barnard River Transfers***	5,000	147,600,000	460	20	29,781,699	1,476,000	18,315,745	3,154
Peel Drift Wells	2,900	-	50	7	2,049,415	-	-	57
Peel Alluvium - Additional Wells	2,900	22,000,000	73	7	2,877,098	220,000	2,729,989	767
Mooki Groundwater Transfers	5,000	106,500,000	403	7	25,435,432	1,065,000	13,215,629	2,339
Mooki Transfers + Entitlements	5,000	121,500,000	403	7	25,435,432	1,215,000	15,076,985	2,611
Effluent Reuse - Rural****	1,000	41,800,000	175	-	2,171,582	418,000	5,186,979	3,962
Effluent Reuse - Urban Non-Potable	520	24,900,000	350	-	2,258,445	249,000	3,089,851	4,688
Effluent Reuse - Indirect Potable*****	2,900	171,600,000	2,472	-	88,957,934	1,716,000	21,293,915	7,832
Effluent Reuse - Direct Potable	5,800	132,600,000	1,042	-	74,995,281	1,326,000	16,454,389	3,113

Term	30 years
Discount Rate	7%

* Keepit / Split Rock - assume 18hrs pumping per day (75%) max
** Cockburn Dams - Assumes 25% reduction in PWD yield estimate
*** Operating costs have been doubled as 10GL/a is pumped to achieve 5GL/a benefit
**** Operating costs have been x 2.5 as 2.5GL/a is pumped to achieve 1GL/a benefit
***** Operating costs have been doubled as 5.8GL/a is pumped to achieve 2.9GL/a benefit

Entitlements assumed to be $3000/ML to purchase (capital cost) for inter-basin transfers

TAMWORTH RAW WATER SECURITY & SUSTAINABILITY OPTIONS ASSESSMENT

PRELIMINARY PROJECT ESTIMATE

PROJECT NO: 3850-035

Chaffey Dam Pipeline Route 2 (DN500) with Single Booster Pump Station **Date of Estimate: Sep-15**

Note: Costs obtained from the NSW Office of Water Reference Rates Manual June 2014

Estimated Contract Award Sum

ITEM	DEPTH	QUANTITY	UNIT	RATE	SUB-TOTAL (Inc. change in CPI)	TOTAL	
CHANGE IN CPI							
Pipeline: Jun-14 to Sep-15		1.0217		2.17%			
1. Pipes							
Water Trunkmain DICL - DN500	<1.5m	40,900	m	536.00	$ 22,398,116		
						$ 22,398,116	
2. Pumping Station							
Duty Flow (per pump)		289	L/s				
Duty Head		25	m				
No. of pumps		2		1 duty, 1 standby			
Power Required Per Pump		99	kW				
Total Station Power Required		200	kW				
Civil (inc. pipework)		1	Item	191,520	$ 195,676		
Mechanical & Electrical		1	Item	312,480	$ 319,261		
Allowance for Power Supply in remote location (at Chaffey Dam)		1	Item	1,000,000	$ 1,000,000		
						$ 1,514,937	
3. Establishment / Disestablishment							
Establishment / Disestablishment		1	Item	30,000.00	$ 30,000		
						$ 30,000	
Total Estimated Contract Award Sum						**$ 23,950,000**	**A**
Design (includes Survey, Investigation, Design and Project Management)						$ 2,470,000	**B**
Allow 10% for Pipelines and 15% for Pump Stations							
Inherent Risk							
Feasibitily Stage		**30% of A**				$ 7,185,000	**C**
Contingency							
Future Assets		**20% of A**				$ 4,790,000	**D**
Total Preliminary Project Estimate		**A + B + C + D**				**$ 38,400,000**	

TAMWORTH RAW WATER SECURITY & SUSTAINABILITY OPTIONS ASSESSMENT

PRELIMINARY PROJECT ESTIMATE

PROJECT NO: 3850-035

New Enlarged Dungowan Dam **Date of Estimate: Sep-15**

Estimated Contract Award Sum

ITEM	DEPTH	QUANTITY	UNIT	RATE	SUB-TOTAL (Inc. change in CPI)	TOTAL	
1. Preliminaries & Miscellaneous Costs							
Land Purchases		4,700	Ha	5,000	$ 23,500,000		
Storage Clearing		500	Ha	3,000	$ 1,500,000		
Environmental/ Social & Community Studies			% contract award sum	1.5%	$ 801,307		
						$ 25,801,307	**A**
2. Dam Works							
Creek Diversion Works		174	m^2	81,241	$ 14,135,859		
Outlet Works		49	m	168,100	$ 8,236,920		
Foundation Preparation		265	m	24,027	$ 6,367,276		
Dam Embankment Construction		511575	m^3	37	$ 19,071,317		
Spillway		174	m^2	59,206	$ 10,301,922		
Electrical & Instrumentation		1	Item	1,027,040	$ 1,027,040		
						$ 59,140,333	
3. Road Works							
Upgrade existing road for Construction Plant (Ogunbil Bridge to site)		6	km	250,000	$ 1,500,000		
Dam Site Access Roads		1	Item	13,249,864	$ 13,249,864		
						$ 14,749,864	
4. Establishment / Disestablishment							
Establishment / Disestablishment		1	Item	30,000.00	$ 30,000		
						$ 30,000	
Total Estimated Contract Award Sum (ex. Land purchase & clearing)						**$ 73,920,197**	**B**

Preliminaries & Design			
Survey, Investigation, Design and Project Management	**10% of B**	$ 7,392,020	
Construction Management & Supervision	**6% of B**	$ 4,435,212	
Environmental Management	**1.0 % of B**	$ 739,202	
Safety Management	**0.5% of B**	$ 369,601	
Subtotal		**$ 12,936,034**	**C**
Inherent Risk			
Feasibility Stage	**30% of B**	$ 22,176,059	**D**
Contingency			
Future Assets	**20% of B**	$ 14,784,039	**E**
Total Preliminary Project Estimate	**A + B + C + D + E**	**$ 149,620,000**	

TAMWORTH RAW WATER SECURITY & SUSTAINABILITY OPTIONS ASSESSMENT

PRELIMINARY PROJECT ESTIMATE

PROJECT NO: 3850-035

Pipeline from New Dungowan Dam (DN600) **Date of Estimate: Sep-15**

Note: Costs obtained from the NSW Office of Water Reference Rates Manual June 2014

Estimated Contract Award Sum

ITEM	DEPTH	QUANTITY	UNIT	RATE	SUB-TOTAL (Inc. change in CPI)	TOTAL	
CHANGE IN CPI							
Pipeline: Jun-14 to Sep-15		1.0217		2.17%			
1. Pipes							
Water Trunkmain DICL - DN600	<1.5m	57,000	m	682.00	$ 39,717,566		
						$ 39,717,566	
2. Establishment / Disestablishment							
Establishment / Disestablishment		1	Item	30,000.00	$ 30,000		
						$ 30,000	
Total Estimated Contract Award Sum						**$ 39,747,566**	**A**
Design (includes Survey, Investigation, Design and Project Management)						$ 3,971,757	**B**
Allow 10% for Pipelines and 15% for Pump Stations							
Inherent Risk							
Feasibility Stage		**30% of A**				$ 11,924,270	**C**
Contingency							
Future Assets		**20% of A**				$ 7,949,513	**D**
Total Preliminary Project Estimate		**A + B + C + D**				**$ 63,600,000**	

TAMWORTH RAW WATER SECURITY & SUSTAINABILITY OPTIONS ASSESSMENT

PRELIMINARY PROJECT ESTIMATE

PROJECT NO: 3850-035

Pipeline from New Dungowan Dam (DN750) **Date of Estimate: Sep-15**

Note: Costs obtained from the NSW Office of Water Reference Rates Manual June 2014

Estimated Contract Award Sum

ITEM	DEPTH	QUANTITY	UNIT	RATE	SUB-TOTAL (Inc. change in CPI)	TOTAL	
CHANGE IN CPI							
Pipeline: Jun-14 to Sep-15		1.0217		2.17%			
1. Pipes							
Water Trunkmain DICL - DN750	<1.5m	57,000	m	910.00	$ 52,995,579		
						$ 52,995,579	
2. Establishment / Disestablishment							
Establishment / Disestablishment		1	Item	30,000.00	$ 30,000		
						$ 30,000	
Total Estimated Contract Award Sum						**$ 53,025,579**	**A**
Design (includes Survey, Investigation, Design and Project Management)						$ 5,299,558	**B**
Allow 10% for Pipelines and 15% for Pump Stations							
Inherent Risk							
Feasibility Stage		**30% of A**				$ 15,907,674	**C**
Contingency							
Future Assets		**20% of A**				$ 10,605,116	**D**
Total Preliminary Project Estimate		**A + B + C + D**				**$ 84,840,000**	

TAMWORTH RAW WATER SECURITY & SUSTAINABILITY OPTIONS ASSESSMENT

PRELIMINARY PROJECT ESTIMATE

PROJECT NO: 3850-035

hunterh2o

10GL Off-River Storage near Piallamore **Date of Estimate: Sep-15**

Note: Costs obtained from estimates prepared for Tilligerra and Native Dog Creek dams

Estimated Contract Award Sum

ITEM	DEPTH	QUANTITY	UNIT	RATE	SUB-TOTAL (Inc. change in CPI)	TOTAL	
1. Preliminaries & Miscellaneous Costs							
Land Purchases		166	Ha	5,000	$ 830,000		
Storage Clearing		75	Ha	3,000	$ 225,000		
Environmental/ Social & Community Studies			% contract award sum	1.5%	$ 801,307		
						$ 1,856,307	**A**
2. Dam Works							
Outlet Works		60	m	168,100	$ 10,086,024		
Foundation Preparation		350	m	24,027	$ 8,409,609		
Dam Embankment Construction		708,000	m^3	37	$ 26,393,965		
Spillway		50	m^2	59,206	$ 2,960,322		
Electrical & Instrumentation		1	Item	1,027,040	$ 1,027,040		
Rebuild Paradise Weir		1	Item	1,378,200	$ 1,378,200		
Fishway at Paradise Weir		1	Item	2,010,300	$ 2,010,300		
						$ 52,265,461	
3. Road Works							
Dam Site Access Roads; 2.5km new road from Tamworth-Nundle Road		2.5	km	250,000	$ 625,000		
New roads at dam site		2	km	250,000	$ 500,000		
						$ 1,125,000	
4. Establishment / Disestablishment							
Establishment / Disestablishment		1	Item	30,000.00	$ 30,000		
						$ 30,000	
Total Estimated Contract Award Sum (ex. Land purchase & clearing)						**$ 53,430,000**	**B**

Preliminaries & Design			
Survey, Investigation, Design and Project Management	**10% of B**	$ 5,343,000	
Construction Management & Supervision	**6% of B**	$ 3,205,800	
Environmental Management	**1.0 % of B**	$ 534,300	
Safety Management	**0.5% of B**	$ 267,150	
Subtotal		**$ 9,350,250**	**C**
Inherent Risk			
Feasibility Stage	**30% of B**	$ 16,029,000	**D**
Contingency			
Future Assets	**20% of B**	$ 10,686,000	**E**
Total Preliminary Project Estimate	**A + B + C + D + E**	**$ 91,360,000**	

TAMWORTH RAW WATER SECURITY & SUSTAINABILITY OPTIONS ASSESSMENT

PRELIMINARY PROJECT ESTIMATE

PROJECT NO: 3850-035

Mulla Creek Dam

hunterh2o

Date of Estimate: Sep-15

Estimated Contract Award Sum

ITEM	DEPTH	QUANTITY	UNIT	RATE	SUB-TOTAL (Inc. change in CPI)	TOTAL	
1. Preliminaries & Miscellaneous Costs							
Land Purchases		500	Ha	5,000	$ 2,500,000		
Storage Clearing		50	Ha	3,000	$ 150,000		
Environmental/ Social & Community Studies			% contract award sum	1.5%	$ 801,307		
						$ 3,451,307	**A**
2. Dam Works							
Creek Diversion Works		219.7	m^2	81,241	$ 17,848,553		
Outlet Works		28	m	168,100	$ 4,706,811		
Foundation Preparation		300	m	24,027	$ 7,208,236		
Dam Embankment Construction		206038	m^3	37	$ 7,681,017		
Spillway		219.7	m^2	59,206	$ 13,007,656		
Electrical & Instrumentation		1	Item	1,027,040	$ 1,027,040		
						$ 51,479,313	
3. Road Works							
Upgrade existing road for Construction Plant		15	km	250,000	$ 3,750,000		
Dam Site Access Roads		1	Item	13,249,864	$ 13,249,864		
Road Diversion to Upper Catchment		6	km	250,000	$ 1,500,000		
						$ 18,499,864	
4. Establishment / Disestablishment							
Establishment / Disestablishment		1	Item	30,000.00	$ 30,000		
						$ 30,000	
Total Estimated Contract Award Sum (ex. Land purchase & clearing)						**$ 70,009,177**	**B**

Preliminaries & Design			
Survey, Investigation, Design and Project Management	**10% of B**	$ 7,000,918	
Construction Management & Supervision	**6% of B**	$ 4,200,551	
Environmental Management	**1.0 % of B**	$ 700,092	
Safety Management	**0.5% of B**	$ 350,046	
Subtotal		**$ 12,251,606**	**C**
Inherent Risk			
Feasibility Stage	**30% of B**	$ 21,002,753	**D**
Contingency			
Future Assets	**20% of B**	$ 14,001,835	**E**
Total Preliminary Project Estimate	**A + B + C + D + E**	**$ 120,720,000**	

TAMWORTH RAW WATER SECURITY & SUSTAINABILITY OPTIONS ASSESSMENT

PRELIMINARY PROJECT ESTIMATE

hunterh2o

PROJECT NO: 3850-035

Pipeline from Mulla Creek Dam **Date of Estimate: Sep-15**

Note: Costs obtained from the NSW Office of Water Reference Rates Manual June 2014

Estimated Contract Award Sum

ITEM	DEPTH	QUANTITY	UNIT	RATE	SUB-TOTAL (Inc. change in CPI)	TOTAL	
CHANGE IN CPI							
Pipeline: Jun-14 to Sep-15		1.0217		2.17%			
1. Pipes							
Water Trunkmain DICL - DN500	<1.5m	36,100	m	682.00	$ 25,154,458		
						$ 25,154,458	
2. Pumping Station at Dam Site							
Duty Flow (per pump)		289	L/s				
Duty Head		10	m				
No. of pumps		2		1 duty, 1 standby			
Power Required Per Pump		40	kW				
Total Station Power Required		100	kW				
Civil (inc. pipework)		1	Item	86,940	$ 88,827		
Mechanical & Electrical		1	Item	235,060	$ 240,161		
Allowance for Power Supply in Remote Location (proposed dam site)		1	Item	2,000,000	$ 2,000,000		
						$ 2,328,987	
3. Establishment / Disestablishment							
Establishment / Disestablishment		1	Item	30,000.00	$ 30,000		
						$ 30,000	
Total Estimated Contract Award Sum						**$ 27,520,000**	**A**
Design (includes Survey, Investigation, Design and Project Management)						$ 2,870,000	**B**
Allow 10% for Pipelines and 15% for Pump Stations							
Inherent Risk							
Feasibility Stage		**30% of A**				$ 8,256,000	**C**
Contingency							
Future Assets		**20% of A**				$ 5,504,000	**D**
Total Preliminary Project Estimate		**A + B + C + D**				**$ 44,150,000**	

TAMWORTH RAW WATER SECURITY & SUSTAINABILITY OPTIONS ASSESSMENT

PRELIMINARY PROJECT ESTIMATE

PROJECT NO: 3850-035

Swamp Oak Creek Dam

Date of Estimate: Sep-15

Estimated Contract Award Sum

ITEM	DEPTH	QUANTITY	UNIT	RATE	SUB-TOTAL (Inc. change in CPI)	TOTAL	
1. Preliminaries & Miscellaneous Costs							
Land Purchases		500	Ha	5,000	$ 2,500,000		
Storage Clearing		50	Ha	3,000	$ 150,000		
Environmental/ Social & Community Studies			% contract award sum	1.5%	$ 801,307		
						$ 3,451,307	**A**
2. Dam Works							
Creek Diversion Works		382.3	m^2	81,241	$ 31,058,269		
Outlet Works		30	m	168,100	$ 5,043,012		
Foundation Preparation		875	m	24,027	$ 21,024,023		
Dam Embankment Construction		764152	m^3	37	$ 28,487,290		
Spillway		382.3	m^2	59,206	$ 22,634,625		
Electrical & Instrumentation		1	Item	1,027,040	$ 1,027,040		
						$ 109,274,258	
3. Road Works							
Upgrade existing road from Limbri to Dam Site		7	km	250,000	$ 1,750,000		
Dam Site Access Roads		1	Item	13,249,864	$ 13,249,864		
Road Diversion to Upper Catchment		4	km	250,000	$ 1,000,000		
						$ 15,999,864	
4. Establishment / Disestablishment							
Establishment / Disestablishment		1	Item	30,000.00	$ 30,000		
						$ 30,000	
Total Estimated Contract Award Sum (ex. Land purchase & clearing)						**$ 125,304,122**	**B**

Preliminaries & Design			
Survey, Investigation, Design and Project Management	**10% of B**	$ 12,530,412	
Construction Management & Supervision	**6% of B**	$ 7,518,247	
Environmental Management	**1.0 % of B**	$ 1,253,041	
Safety Management	**0.5% of B**	$ 626,521	
Subtotal		**$ 21,928,221**	**C**
Inherent Risk			
Feasibility Stage	**30% of B**	$ 37,591,237	**D**
Contingency			
Future Assets	**20% of B**	$ 25,060,824	**E**
Total Preliminary Project Estimate	**A + B + C + D + E**	**$ 213,340,000**	

TAMWORTH RAW WATER SECURITY & SUSTAINABILITY OPTIONS ASSESSMENT

PRELIMINARY PROJECT ESTIMATE

PROJECT NO: 3850-035

Pipeline from Swamp Oak Creek Dam **Date of Estimate: Sep-15**

Note: Costs obtained from the NSW Office of Water Reference Rates Manual June 2014

Estimated Contract Award Sum

ITEM	DEPTH	QUANTITY	UNIT	RATE	SUB-TOTAL (Inc. change in CPI)	TOTAL	
CHANGE IN CPI							
Pipeline: Jun-14 to Sep-15		1.0217		2.17%			
1. Pipes							
Water Trunkmain DICL - DN500	<1.5m	37,500	m	682.00	$ 26,129,978		
						$ 26,129,978	
2. Pumping Station at Dam Site							
Duty Flow (per pump)		289	L/s				
Duty Head		28	m				
No. of pumps		2		1 duty, 1 standby			
Power Required Per Pump		111	kW				
Total Station Power Required		300	kW				
Civil (inc. pipework)		1	Item	246,050	$ 251,389		
Mechanical & Electrical		1	Item	418,950	$ 428,041		
Allowance for Power Supply in Remote Location (proposed dam site)		1	Item	2,000,000	$ 2,000,000		
						$ 2,679,431	
3. Establishment / Disestablishment							
Establishment / Disestablishment		1	Item	30,000.00	$ 30,000		
						$ 30,000	
Total Estimated Contract Award Sum						**$ 28,840,000**	**A**
Design (includes Survey, Investigation, Design and Project Management)						$ 3,020,000	**B**
Allow 10% for Pipelines and 15% for Pump Stations							
Inherent Risk							
Feasibility Stage		**30% of A**				$ 8,652,000	**C**
Contingency							
Future Assets		**20% of A**				$ 5,768,000	**D**
Total Preliminary Project Estimate		**A + B + C + D**				**$ 46,280,000**	

TAMWORTH RAW WATER SECURITY & SUSTAINABILITY OPTIONS ASSESSMENT

PRELIMINARY PROJECT ESTIMATE

PROJECT NO: 3850-035

hunterh2o

Keepit Dam Pipeline (DN500) with two booster pump stations

Date of Estimate: Sep-15

Note: Costs obtained from the NSW Office of Water Reference Rates Manual June 2014

Estimated Contract Award Sum

ITEM	DEPTH	QUANTITY	UNIT	RATE	SUB-TOTAL (Inc. change in CPI)	TOTAL	
CHANGE IN CPI							
Pipeline: Jun-14 to Sep-15		1.0217		2.17%			
1. Pipes							
Water Trunkmain DICL - DN500	<1.5m	61,600	m	536.00	$ 33,734,082		
						$ 33,734,082	
2. Pumping Station 1							
Duty Flow (per pump)		289	L/s				
Duty Head		155	m				
No. of pumps		3		2 duty, 1 standby			
Power Required Per Pump		308	kW				
Total Station Power Required		1,000	kW				
Civil (inc. pipework)		1	Item	573,000	$ 585,434		
Mechanical & Electrical		1	Item	1,337,000	$ 1,366,013		
Allowance for Power Supply at dam site		1	Item	1,000,000	$ 1,000,000		
						$ 2,951,447	
3 Pumping Station 2							
Duty Flow (per pump)		289	L/s				
Duty Head		120	m				
No. of pumps		2		1 duty, 1 standby			
Power Required Per Pump		477	kW				
Total Station Power Required		1,000	kW				
Civil (inc. pipework)		1	Item	573,000	$ 585,434		
Mechanical & Electrical		1	Item	1,337,000	$ 1,366,013		
Allowance for Power Supply in remote location (~3km west of Bective)		1	Item	2,000,000	$ 2,000,000		
						$ 3,951,447	
4. Establishment / Disestablishment							
Establishment / Disestablishment		1	Item	30,000.00	$ 30,000		
						$ 30,000	
Total Estimated Contract Award Sum						**$ 40,670,000**	**A**
Design (includes Survey, Investigation, Design and Project Management)						$ 4,410,000	**B**
Allow 10% for Pipelines and 15% for Pump Stations							
Inherent Risk							
Feasibitily Stage		**30% of A**				$ 12,201,000	**C**
Contingency							
Future Assets		**20% of A**				$ 8,134,000	**D**
Total Preliminary Project Estimate		**A + B + C + D**				**$ 65,420,000**	

TAMWORTH RAW WATER SECURITY & SUSTAINABILITY OPTIONS ASSESSMENT

PRELIMINARY PROJECT ESTIMATE

hunterh2o

PROJECT NO: 3850-035

Split Rock Pipeline (DN500) with single booster pump station **Date of Estimate: Sep-15**

Note: Costs obtained from the NSW Office of Water Reference Rates Manual June 2014

Estimated Contract Award Sum

ITEM	DEPTH	QUANTITY	UNIT	RATE	SUB-TOTAL (Inc. change in CPI)	TOTAL	
CHANGE IN CPI							
Pipeline: Jun-14 to Sep-15		1.0217		2.17%			
1. Pipes							
Water Trunkmain DICL - DN500	<1.5m	70,400	m	536.00	$ 38,553,236		
						$ 38,553,236	
2. Pumping Station							
Duty Flow (per pump)		289	L/s				
Duty Head		190	m				
No. of pumps		3		2 duty, 1 standby			
Power Required Per Pump		378	kW				
Total Station Power Required		1,200	kW				
Civil (inc. pipework)		1	Item	658,000	$ 672,279		
Mechanical & Electrical		1	Item	1,692,000	$ 1,728,716		
Allowance for Power Supply at dam site		1	Item	2,000,000	$ 2,000,000		
						$ 4,400,995	
3. Establishment / Disestablishment							
Establishment / Disestablishment		1	Item	30,000.00	$ 30,000		
						$ 30,000	
Total Estimated Contract Award Sum						**$ 42,990,000**	**A**
Design (includes Survey, Investigation, Design and Project Management)						$ 4,520,000	**B**
Allow 10% for Pipelines and 15% for Pump Stations							
Inherent Risk							
Feasibitily Stage		**30% of A**				$ 12,897,000	**C**
Contingency							
Future Assets		**20% of A**				$ 8,598,000	**D**
Total Preliminary Project Estimate		**A + B + C + D**				**$ 69,010,000**	

TAMWORTH RAW WATER SECURITY & SUSTAINABILITY OPTIONS ASSESSMENT

PRELIMINARY PROJECT ESTIMATE

PROJECT NO: 3850-035

Transfer from Barnard River **Date of Estimate: Sep-15**

Note: Costs obtained from the NSW Office of Water Reference Rates Manual June 2014

Estimated Contract Award Sum

ITEM	DEPTH	QUANTITY	UNIT	RATE	SUB-TOTAL (Inc. change in CPI)	TOTAL	
CHANGE IN CPI							
Pipeline: Jun-14 to Sep-15		1.0217		2.17%			
1. Pipes							
Water Trunkmain DICL - DN750	<1.5m	19,100	m	910.00	$ 17,758,168		
DN750 Tunnel		10,700	m	5,000.00	$ 54,660,950	$ 72,419,118	
2. Pumping Station 1							
Duty Flow (per pump)		810	L/s				
Duty Head		150	m				
No. of pumps		4		3 duty, 1 standby			
Power Required Per Pump		557	kW				
Total Station Power Required		2,300	kW				
Civil (inc. pipework)		1	Item	1,106,376	$ 1,130,384		
Mechanical & Electrical		1	Item	3,319,127	$ 3,391,152		
Allowance for Power Supply at dam site		1	Item	3,000,000	$ 3,000,000		
						$ 7,521,536	
3 Pumping Station 2							
Duty Flow (per pump)		810	L/s				
Duty Head		180	m				
No. of pumps		4		3 duty, 1 standby			
Power Required Per Pump		668	kW				
Total Station Power Required		2,700	kW				
Civil (inc. pipework)		1	Item	1,295,516	$ 1,323,628		
Mechanical & Electrical		1	Item	3,886,547	$ 3,970,885		
Allowance for Power Supply in remote location (~4km east of Barry)		1	Item	3,000,000	$ 3,000,000		
						$ 8,294,514	
4. Barnard River Weir & Fishway							
Weir (3m high x 30m crest)		1	Item	1,400,000.00	$ 1,400,000		
Fishway		1	Item	2,000,000.00	$ 2,000,000		
						$ 3,400,000	
5. Establishment / Disestablishment							
Establishment / Disestablishment		1	Item	30,000.00	$ 30,000		
						$ 30,000	
Total Estimated Contract Award Sum						**$ 91,670,000**	**A**
Design (includes Survey, Investigation, Design and Project Management)						$ 10,130,000	**B**
Allow 10% for Pipelines and 15% for Pump Stations							
Inherent Risk							
Feasibitily Stage		**30% of A**				$ 27,501,000	**C**
Contingency							
Future Assets		**20% of A**				$ 18,334,000	**D**
Total Preliminary Project Estimate		**A + B + C + D**				**$ 147,640,000**	

TAMWORTH RAW WATER SECURITY & SUSTAINABILITY OPTIONS ASSESSMENT

PRELIMINARY PROJECT ESTIMATE

PROJECT NO: 3850-035

Transfer from Peel Alluvium Aquifer **Date of Estimate: Sep-15**

Note: Costs obtained from the NSW Office of Water Reference Rates Manual June 2014

Estimated Contract Award Sum

ITEM	DEPTH	QUANTITY	UNIT	RATE	SUB-TOTAL (Inc. change in CPI)	TOTAL	
CHANGE IN CPI							
Pipeline: Jun-14 to Sep-15		1.0217		2.17%			
1. Pipeline from Mooki Valley to Calala WTP							
Water Trunkmain DICL - DN375	<1.5m	26,400	m	355.00	$ 9,575,372		
						$ 9,575,372	
2. Bore Pumps							
Bore Pumps (6kW)		8	Item	52,136.40	$ 426,142		
						$ 426,142	
3. Raw Water Storage at Pine Ridge							
10ML raw water steel reservoir		1	Item	1,830,000.00	$ 1,869,711		
						$ 1,869,711	
4. Pumping Station at Borefields							
Duty Flow (per pump)		116	L/s				
Duty Head		75	m				
No. of pumps		2		1 duty, 1 standby			
Power Required Per Pump		119	kW				
Total Station Power Required		300	kW				
Civil (inc. pipework)		1	Item	246,050	$ 251,389		
Mechanical & Electrical		1	Item	418,950	$ 428,041		
Allowance for Power Supply in remote location (near Abbleby)		1	Item	1,000,000	$ 1,000,000		
						$ 1,679,431	
5. Establishment / Disestablishment							
Establishment / Disestablishment		1	Item	30,000.00	$ 30,000		
						$ 30,000	
Total Estimated Contract Award Sum						**$ 13,590,000**	**A**
Design (includes Survey, Investigation, Design and Project Management)						$ 1,560,000	**B**
Allow 10% for Pipelines and 15% for Pump Stations & Reservoirs							
Inherent Risk							
Feasibitily Stage		**30% of A**				$ 4,077,000	**C**
Contingency							
Future Assets		**20% of A**				$ 2,718,000	**D**
Total Preliminary Project Estimate		**A + B + C + D**				**$ 21,950,000**	

TAMWORTH RAW WATER SECURITY & SUSTAINABILITY OPTIONS ASSESSMENT

PRELIMINARY PROJECT ESTIMATE

PROJECT NO: 3850-035

Transfer from Mooki Valley Aquifer (DN500 pipeline) **Date of Estimate: Sep-15**

Note: Costs obtained from the NSW Office of Water Reference Rates Manual June 2014

Estimated Contract Award Sum

ITEM	DEPTH	QUANTITY	UNIT	RATE	SUB-TOTAL (Inc. change in CPI)	TOTAL	
CHANGE IN CPI							
Pipeline: Jun-14 to Sep-15		1.0217		2.17%			
1. Pipeline from Mooki Valley to Calala WTP							
Water Trunkmain DICL - DN500	<1.5m	92,800	m	536.00	$ 50,820,175		
						$ 50,820,175	
2. Bore Pumps							
Bore Pumps (16 kW)		8	Item	73,500.40	$ 600,763		
						$ 600,763	
3. Raw Water Storage at Pine Ridge							
10ML raw water steel reservoir		1	Item	1,830,000.00	$ 1,869,711		
						$ 1,869,711	
4. Pumping Station 1 at Pine Springs							
Duty Flow (per pump)		289	L/s				
Duty Head		175	m				
No. of pumps		3		2 duty, 1 standby			
Power Required Per Pump		348	kW				
Total Station Power Required		1,100	kW				
Civil (inc. pipework)		1	Item	617,700	$ 631,104		
Mechanical & Electrical		1	Item	1,512,300	$ 1,545,117		
Allowance for Power Supply in remote location (Pine Springs)		1	Item	3,000,000	$ 3,000,000		
						$ 5,176,221	
5. Pumping Station 2 near Quirindi							
Duty Flow (per pump)		289	L/s				
Duty Head		175	m				
No. of pumps		3		2 duty, 1 standby			
Power Required Per Pump		348	kW				
Total Station Power Required		1,100	kW				
Civil (inc. pipework)		1	Item	617,700	$ 631,104		
Mechanical & Electrical		1	Item	1,512,300	$ 1,545,117		
Allowance for Power Supply in remote location (near Quirindi)		1	Item	1,500,000	$ 1,500,000		
						$ 3,676,221	
6. Pumping Station 3 near Wallabadah							
Duty Flow (per pump)		289	L/s				
Duty Head		200	m				
No. of pumps		3		2 duty, 1 standby			
Power Required Per Pump		397	kW				
Total Station Power Required		1,200	kW				
Civil (inc. pipework)		1	Item	658,000	$ 672,279		
Mechanical & Electrical		1	Item	1,692,000	$ 1,728,716		
Allowance for Power Supply in remote location (near Wallabadah)		1	Item	1,500,000	$ 1,500,000		
						$ 3,900,995	
7. Establishment / Disestablishment							
Establishment / Disestablishment		1	Item	30,000.00	$ 30,000		
						$ 30,000	
Total Estimated Contract Award Sum						**$ 66,080,000**	**A**
Design (includes Survey, Investigation, Design and Project Management)						$ 7,370,000	**B**
Allow 10% for Pipelines and 15% for Pump Stations & Reservoirs							
Inherent Risk							
Feasibitily Stage		**30% of A**				$ 19,824,000	**C**
Contingency							
Future Assets		**20% of A**				$ 13,216,000	**D**
Total Preliminary Project Estimate		**A + B + C + D**				**$ 106,490,000**	

TAMWORTH RAW WATER SECURITY & SUSTAINABILITY OPTIONS ASSESSMENT

PRELIMINARY PROJECT ESTIMATE

PROJECT NO: 3850-035

Effluent Reuse (Rural) **Date of Estimate: Sep-15**

Note: Costs obtained from the NSW Office of Water Reference Rates Manual June 2014

Estimated Contract Award Sum

ITEM	DEPTH	QUANTITY	UNIT	RATE	SUB-TOTAL (Inc. change in CPI)	TOTAL	
CHANGE IN CPI							
Pipeline: Jun-14 to Sep-15		1.0217		2.17%			
1. Pipelines from Westdale STP to Attunga and Piallamore							
Water Trunkmain DICL - DN500	<1.5m	41,600	m	536.00	$ 22,781,458		
						$ 22,781,458	
2. Pumping Station 1 (to Attunga)							
Duty Flow (per pump)		289	L/s				
Duty Head		32	m				
No. of pumps		2		1 duty, 1 standby			
Power Required Per Pump		127	kW				
Total Station Power Required		300	kW				
Civil (inc. pipework)		1	Item	246,050	$ 251,389		
Mechanical & Electrical		1	Item	418,950	$ 428,041		
						$ 679,431	
3 Pumping Station 2 (to Piallamore)							
Duty Flow (per pump)		289	L/s				
Duty Head		172	m				
No. of pumps		3		2 duty, 1 standby			
Power Required Per Pump		342	kW				
Total Station Power Required		1,100	kW				
Civil (inc. pipework)		1	Item	352,800	$ 360,456		
Mechanical & Electrical		1	Item	655,200	$ 669,418		
Allowance for Power Supply upgrade at Westdale STP		1	Item	1,500,000	$ 1,500,000		
						$ 2,529,874	
4. Establishment / Disestablishment							
Establishment / Disestablishment		1	Item	30,000.00	$ 30,000		
						$ 30,000	
Total Estimated Contract Award Sum						**$ 26,030,000**	**A**
Design (includes Survey, Investigation, Design and Project Management)						$ 2,760,000	**B**
Allow 10% for Pipelines and 15% for Pump Stations							
Inherent Risk							
Feasibility Stage		**#N/A**				$ 7,809,000	**C**
Contingency							
Future Assets		**20% of A**				$ 5,206,000	**D**
Total Preliminary Project Estimate		**A + B + C + D**				**$ 41,810,000**	

TAMWORTH RAW WATER SECURITY & SUSTAINABILITY OPTIONS ASSESSMENT

PRELIMINARY PROJECT ESTIMATE

hunterh2o

PROJECT NO: 3850-035

Effluent Reuse (Indirect Potable) **Date of Estimate: Sep-15**

Note: Costs obtained from the NSW Office of Water Reference Rates Manual June 2014

Estimated Contract Award Sum

ITEM	DEPTH	QUANTITY	UNIT	RATE	SUB-TOTAL (Inc. change in CPI)	TOTAL	
CHANGE IN CPI							
Pipeline: Jun-14 to Sep-15		1.0217		2.17%			
1. Pipeline from Westdale to Calala WTP							
Water Trunkmain DICL - DN450	<1.5m	52,600	m	464.00	$ 24,936,019		
						$ 24,936,019	
2. Pumping Station 1							
Duty Flow (per pump)		231	L/s				
Duty Head		155	m				
No. of pumps		2		1 duty, 1 standby			
Power Required Per Pump		493	kW				
Total Station Power Required		1,000	kW				
Civil (inc. pipework)		1	Item	573,000	$ 585,434		
Mechanical & Electrical		1	Item	1,222,400	$ 1,248,926		
						$ 1,834,360	
3. Pumping Station 2							
Duty Flow (per pump)		231	L/s				
Duty Head		185	m				
No. of pumps		3		2 duty, 1 standby			
Power Required Per Pump		294	kW				
Total Station Power Required		900	kW				
Civil (inc. pipework)		1	Item	538,625	$ 550,313		
Mechanical & Electrical		1	Item	1,198,875	$ 1,224,891		
Allowance for Power Supply in remote location		1	Item	2,000,000	$ 2,000,000		
						$ 3,775,204	
2. Advanced Water Treatment Plant at Westdale STP							
20ML/day Advanced Water Treatment Plant		1	Item	70,000,000	$ 70,000,000		
Allowance for Power Supply Upgrade at Westdale STP		1	Item	2,000,000	$ 2,000,000		
						$ 72,000,000	
4. Establishment / Disestablishment							
Establishment / Disestablishment		1	Item	30,000.00	$ 30,000		
						$ 30,000	
Total Estimated Contract Award Sum						**$ 102,580,000**	**A**
Design (includes Survey, Investigation, Design and Project Management)						$ 17,740,000	
Allow 10% for Pipelines, 15% for Pump Stations and 20% for AWTP							**B**
Inherent Risk							
Feasibitily Stage		**30% of A**				$ 30,774,000	
							C
Contingency							
Future Assets		**20% of A**				$ 20,516,000	
							D
Total Preliminary Project Estimate		**A + B + C + D**				**$ 171,610,000**	

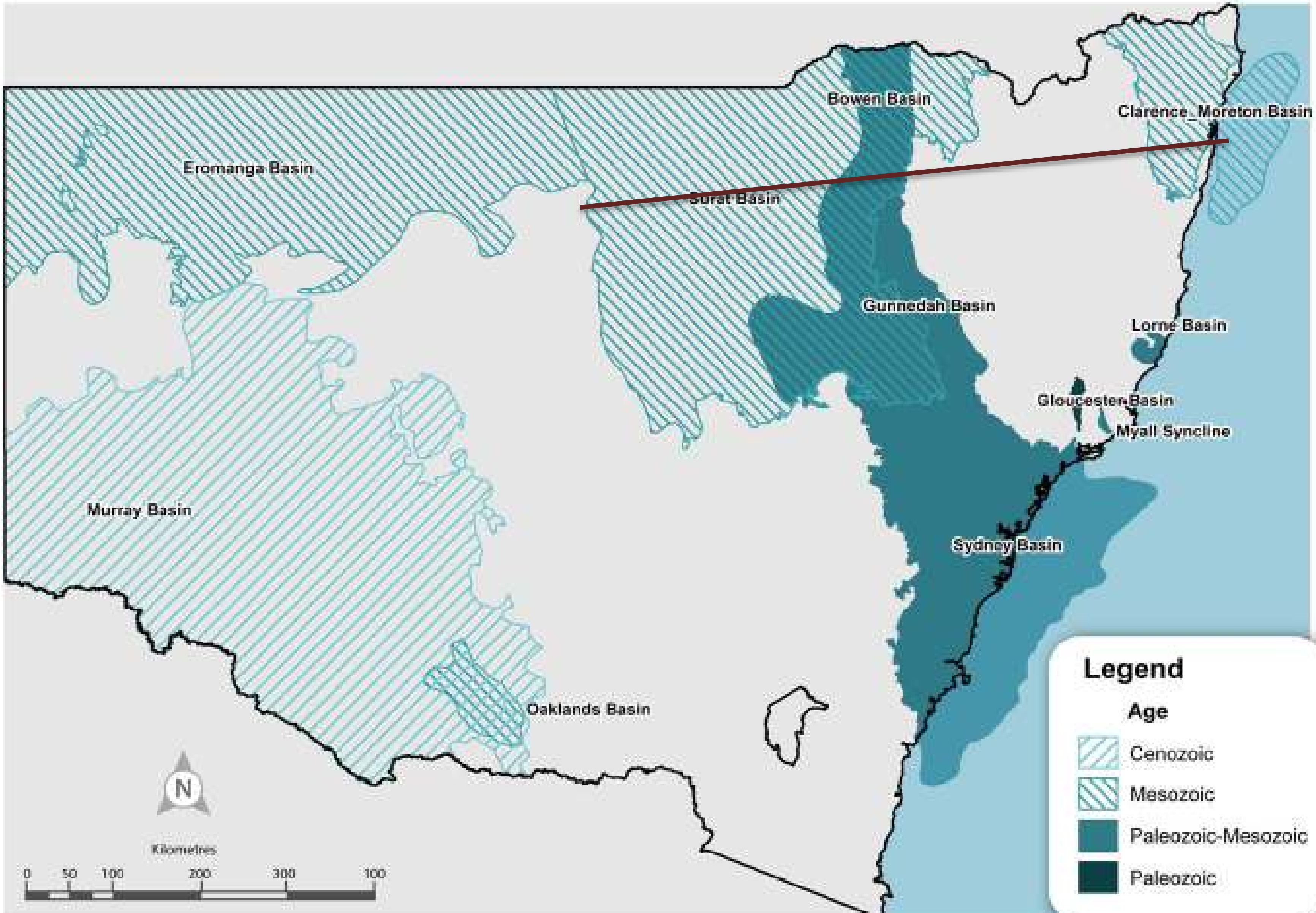
GROUNDWATER

Gunnedah Basin NSW

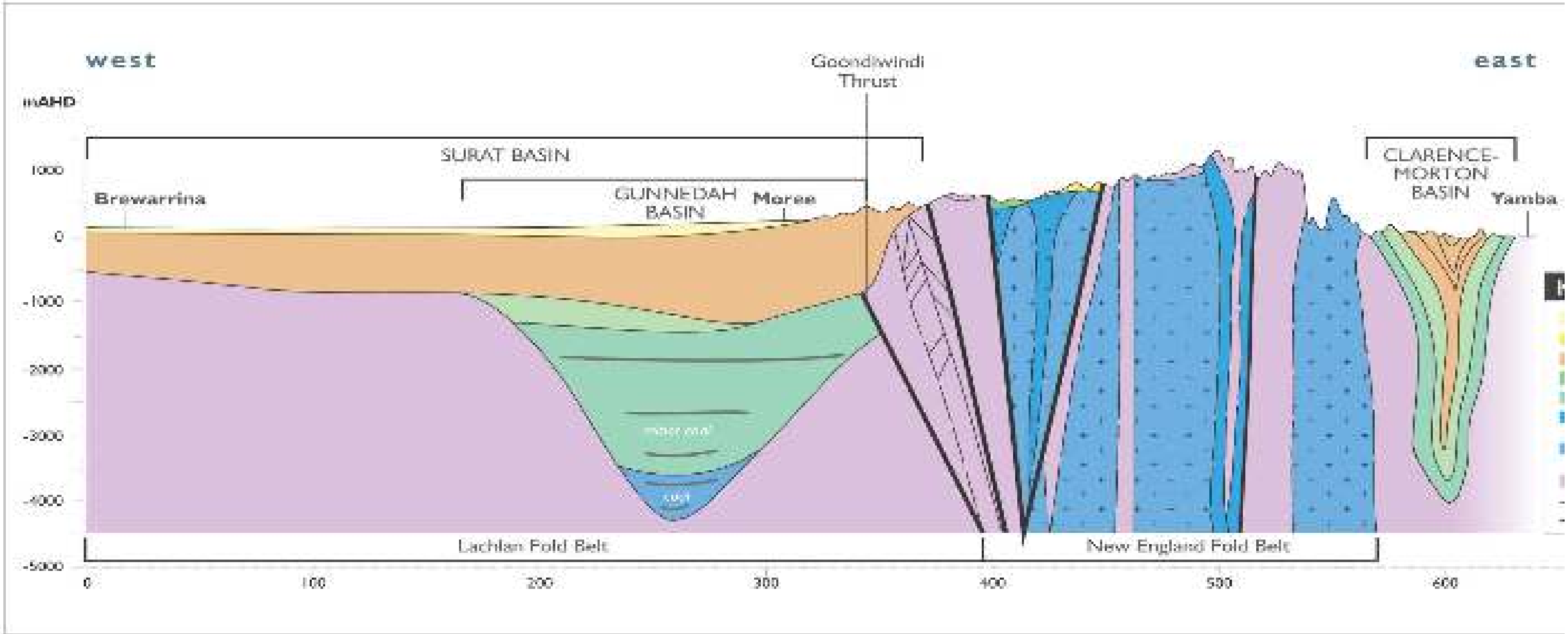
What water information can tell us

PUB17/219

Sedimentary basins in NSW



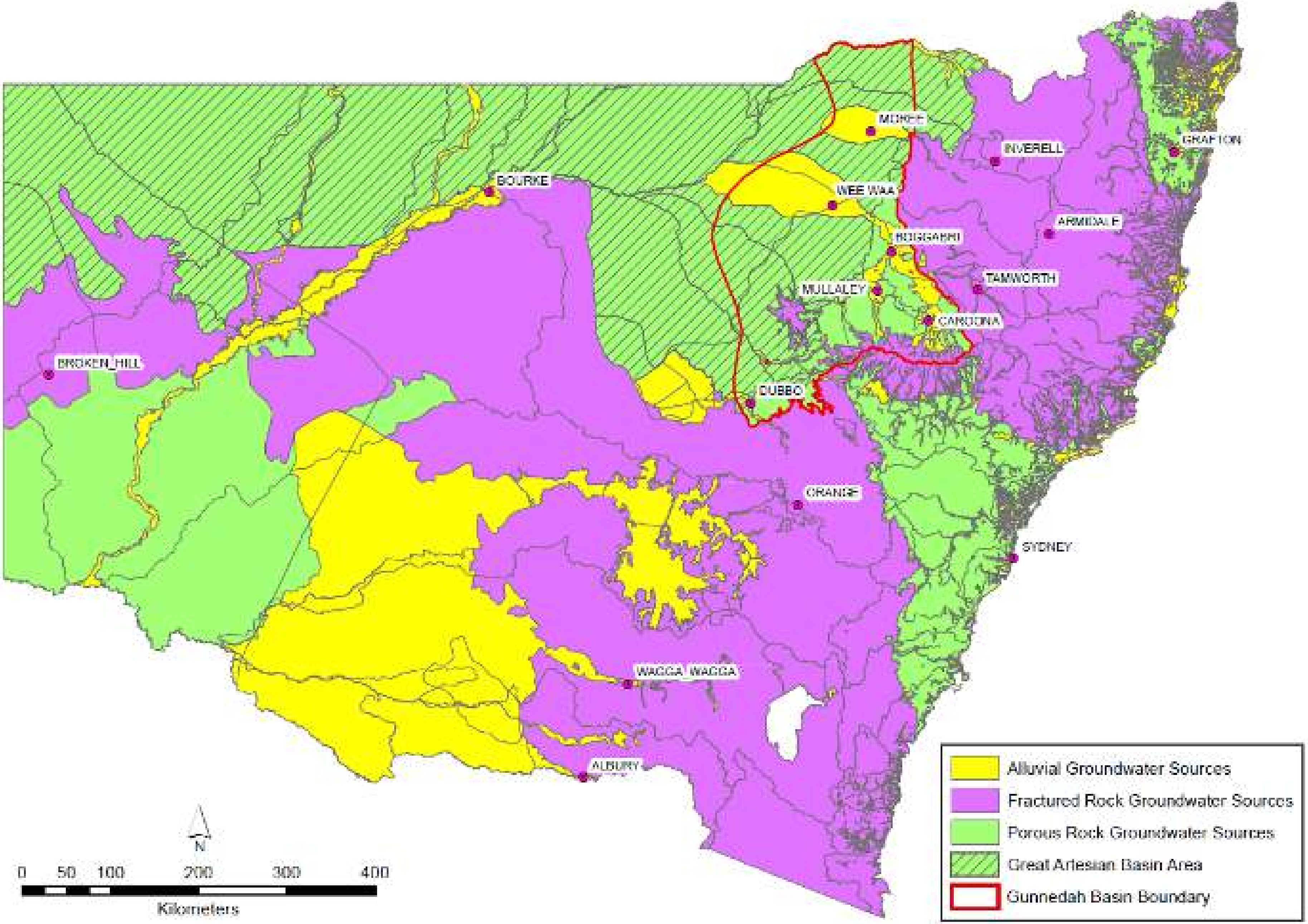
Section through both the Gunnedah and Clarence Moreton Basins



KEY

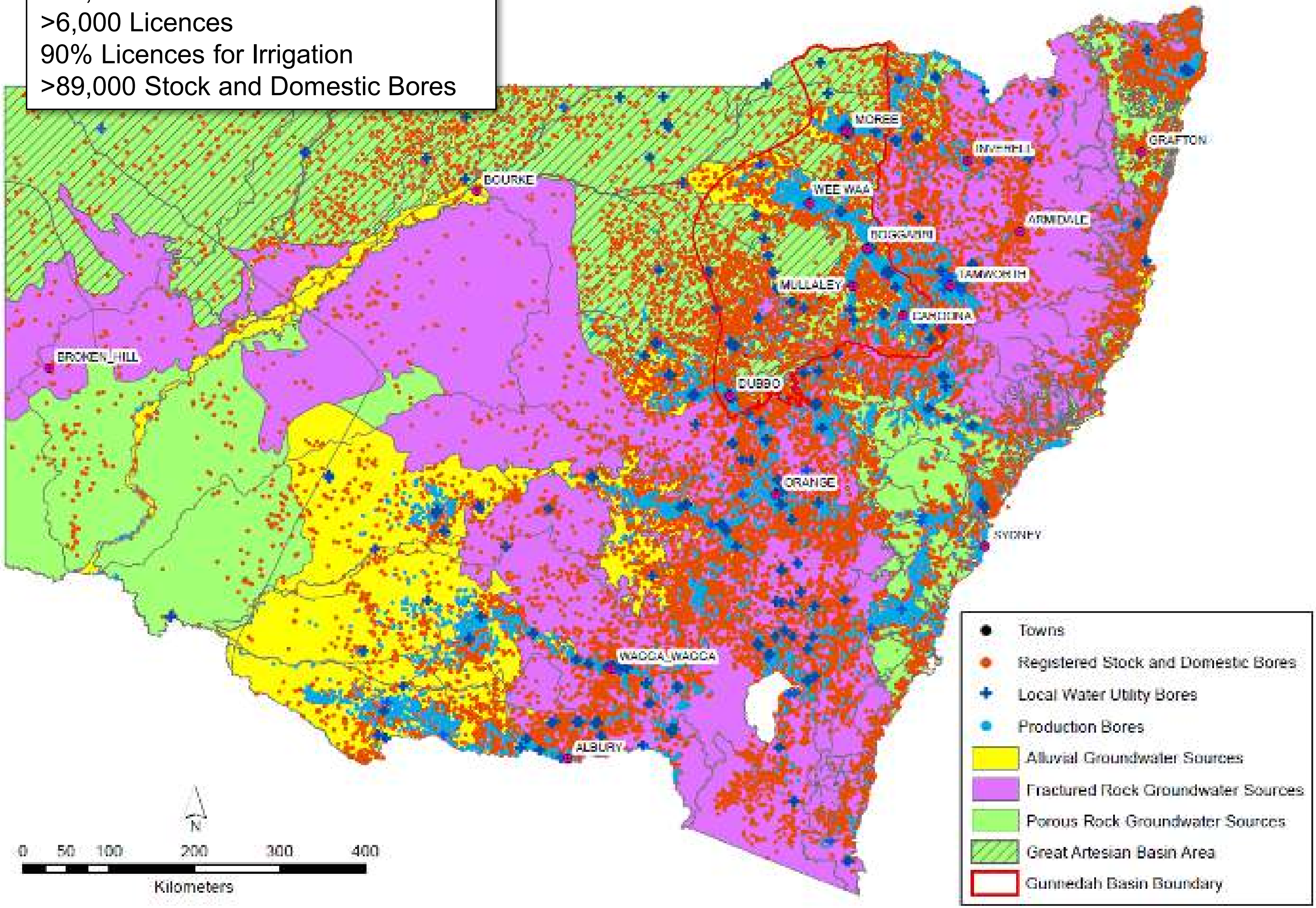
- Quarternary - alluvium
- Tertiary - basalts
- Cretaceous - sandstone, shale
- Jurassic - sandstone, shale
- Triassic - sandstone, shale
- Permain - coal, sandstone, siltstone and shale
- Permain - intrusive and gratite
- Carboniferous
- Coal measures
- Fault

Groundwater Sources in NSW

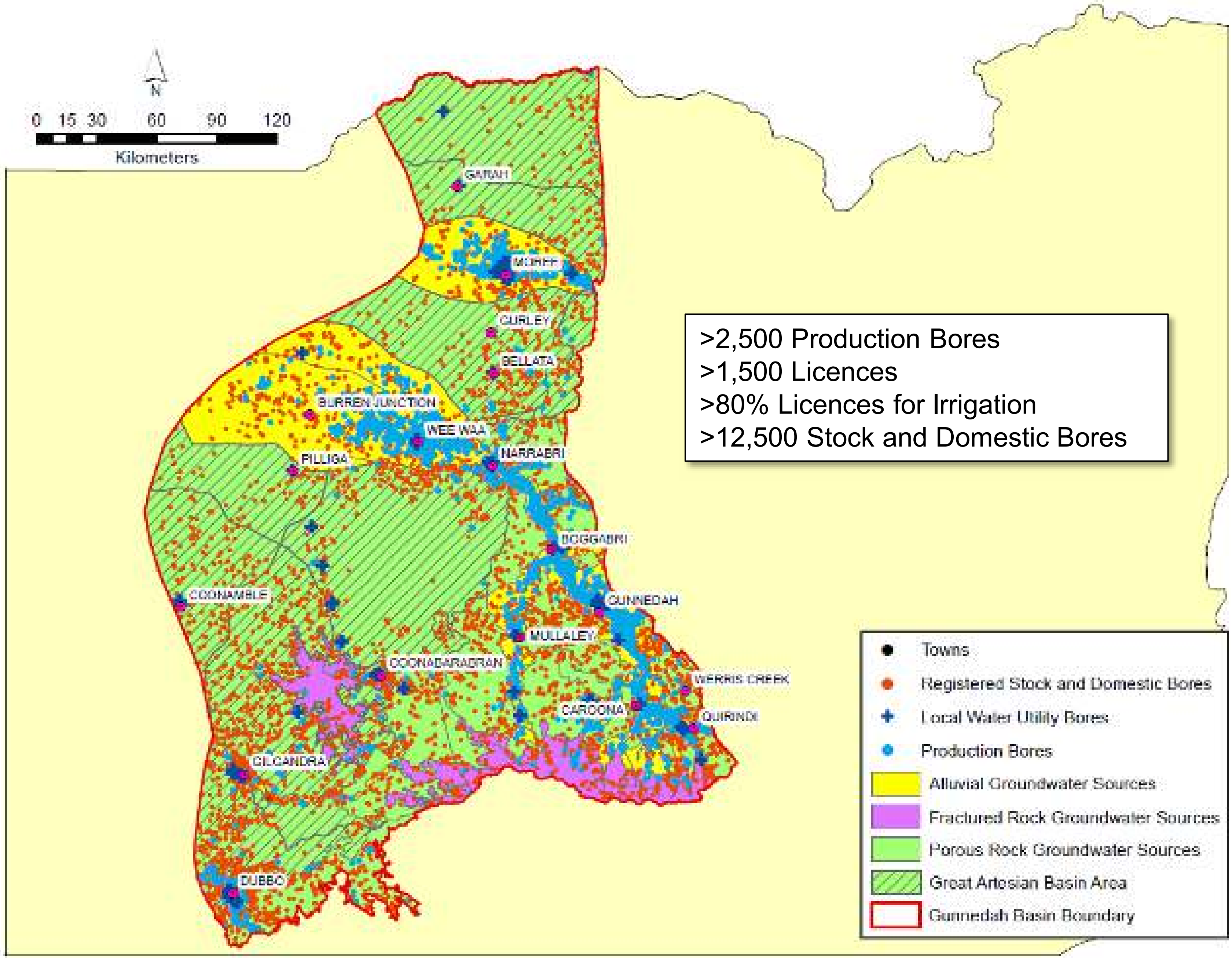


Distribution of groundwater extraction

>10,000 Production Bores
>6,000 Licences
90% Licences for Irrigation
>89,000 Stock and Domestic Bores

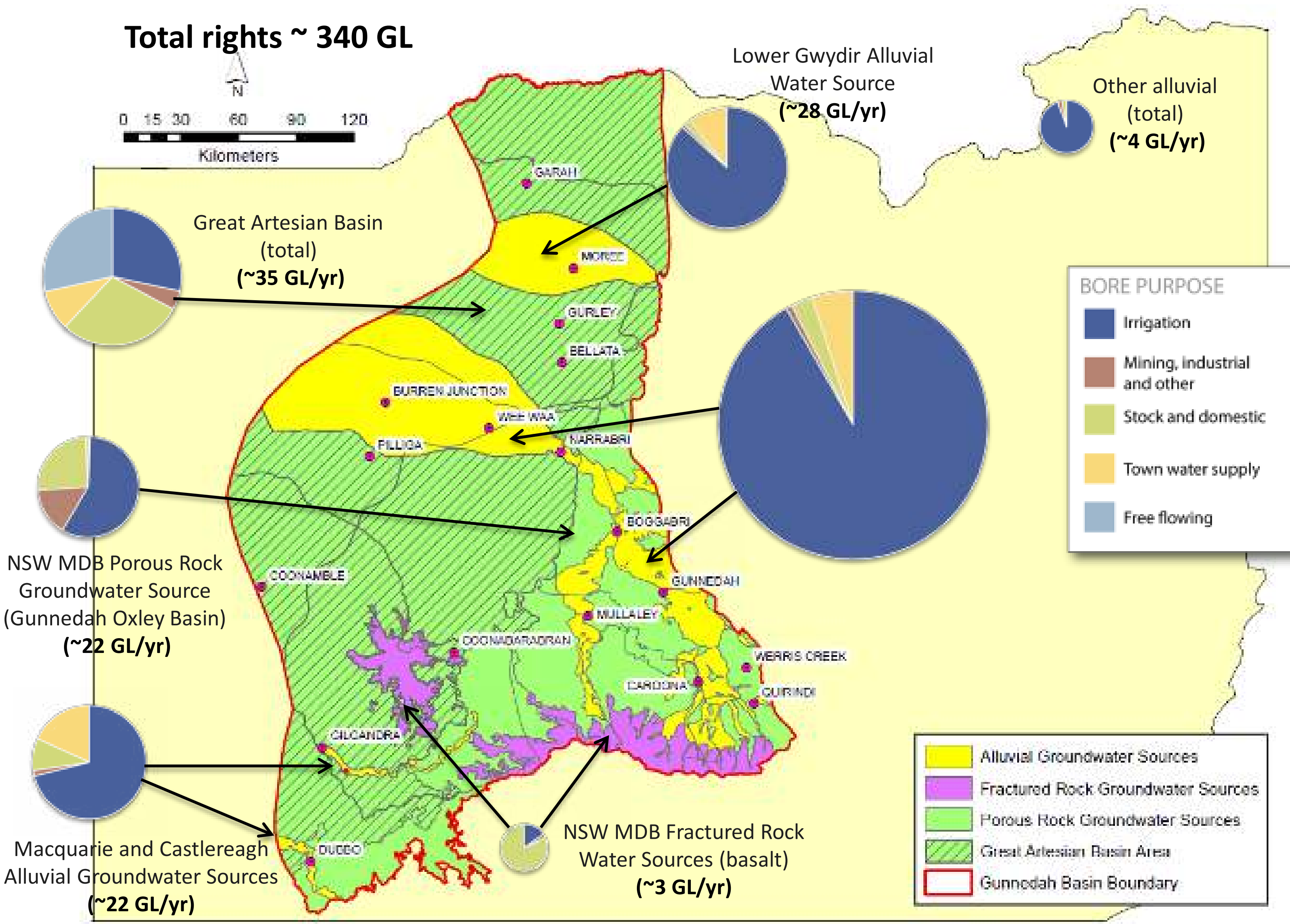


Distribution of groundwater extraction Gunnedah Basin

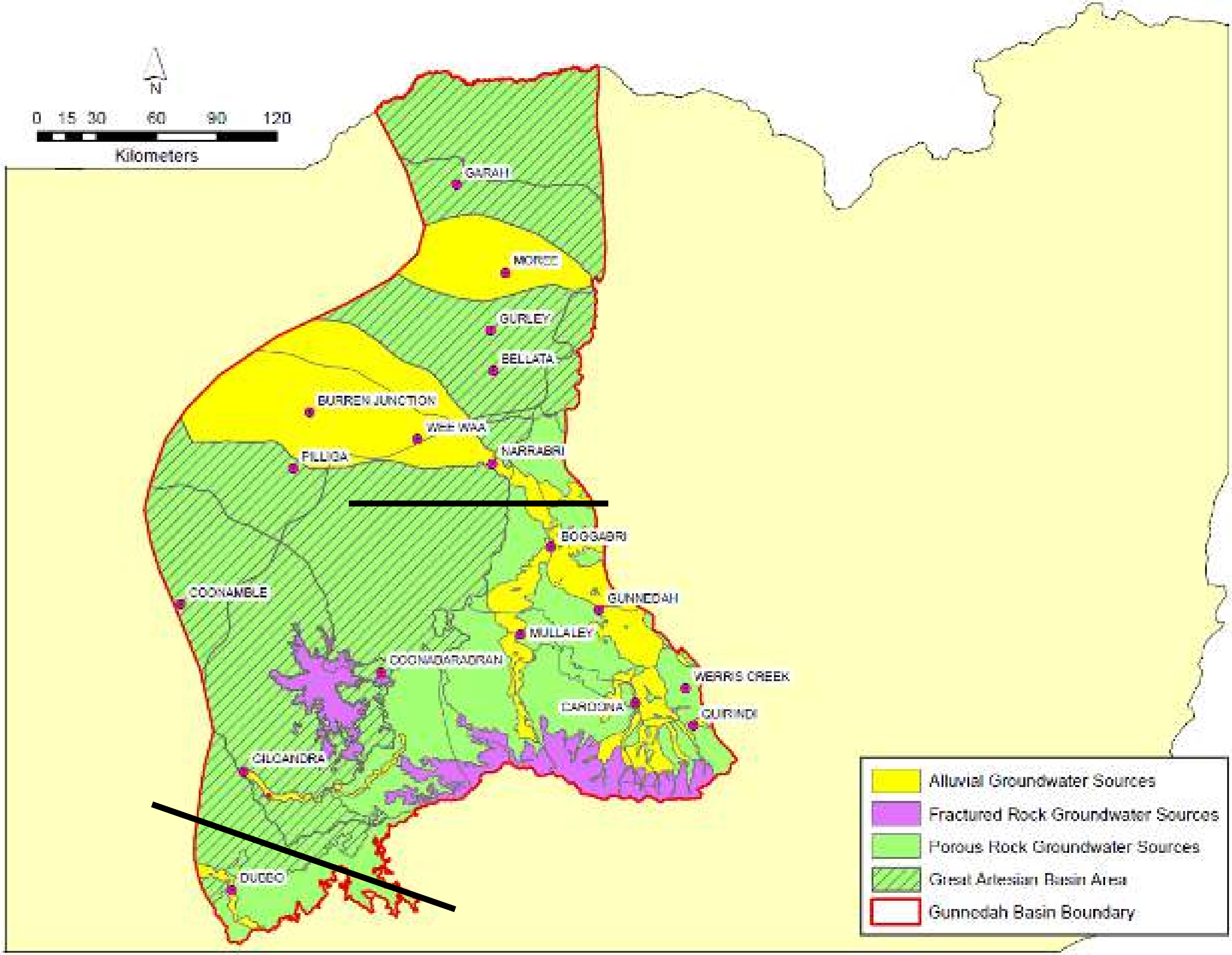


>2,500 Production Bores
>1,500 Licences
>80% Licences for Irrigation
>12,500 Stock and Domestic Bores

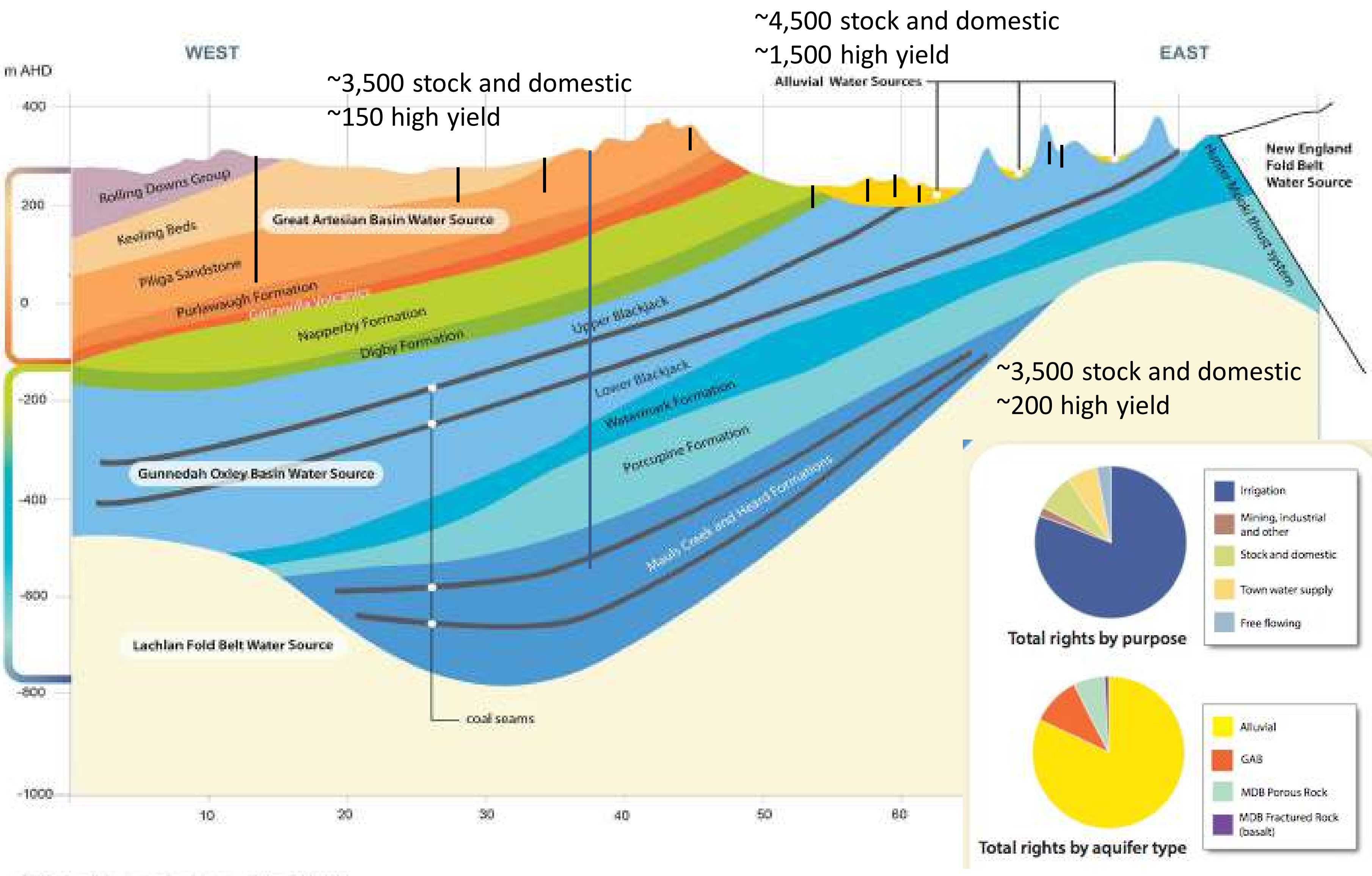
Gunnedah Basin: Distribution and purpose of groundwater rights



Gunnedah Basin: Areas of Permian outcrop

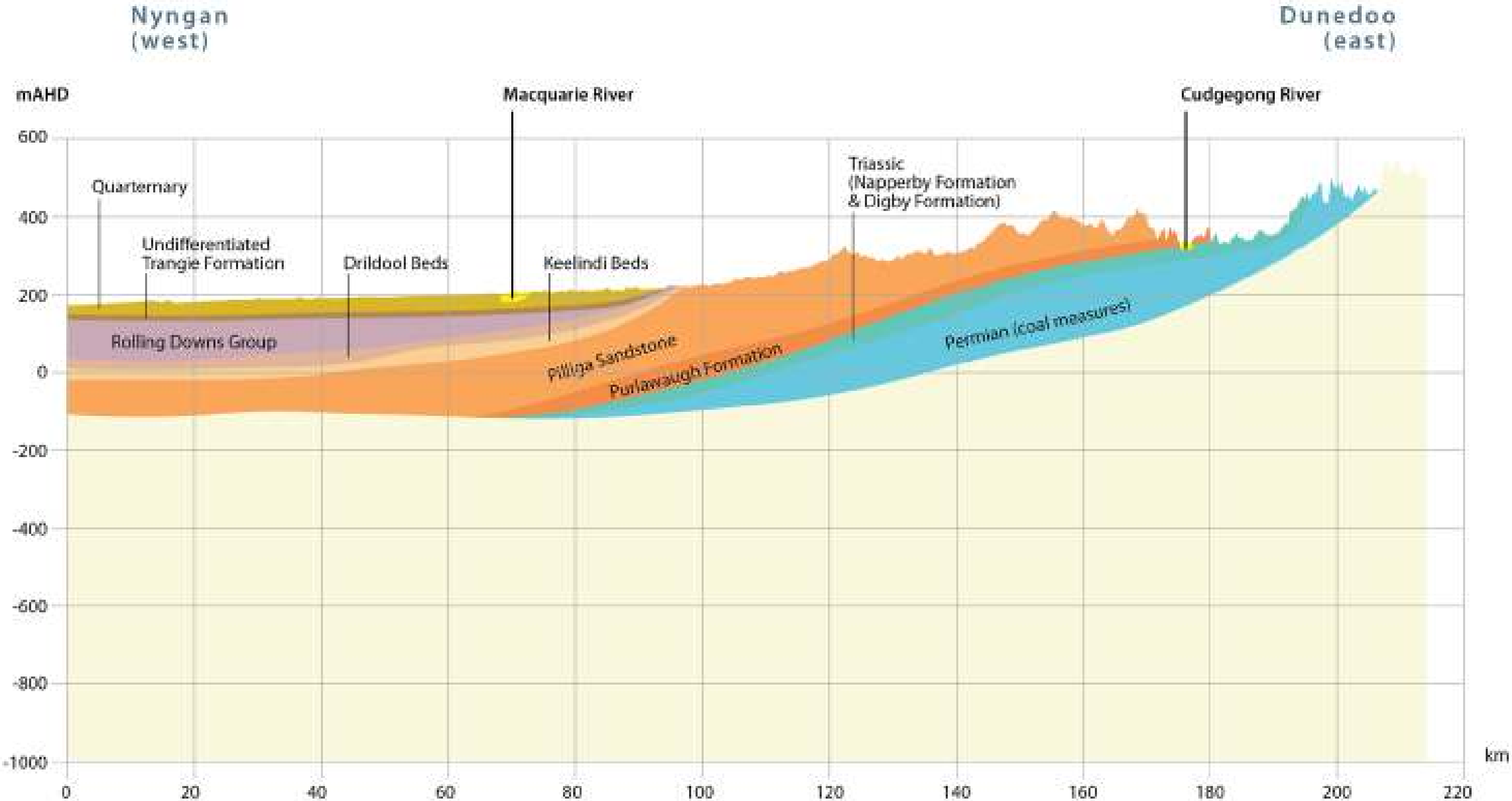


Gunnedah Basin: vertical distribution of groundwater rights



Total rights 340 GL

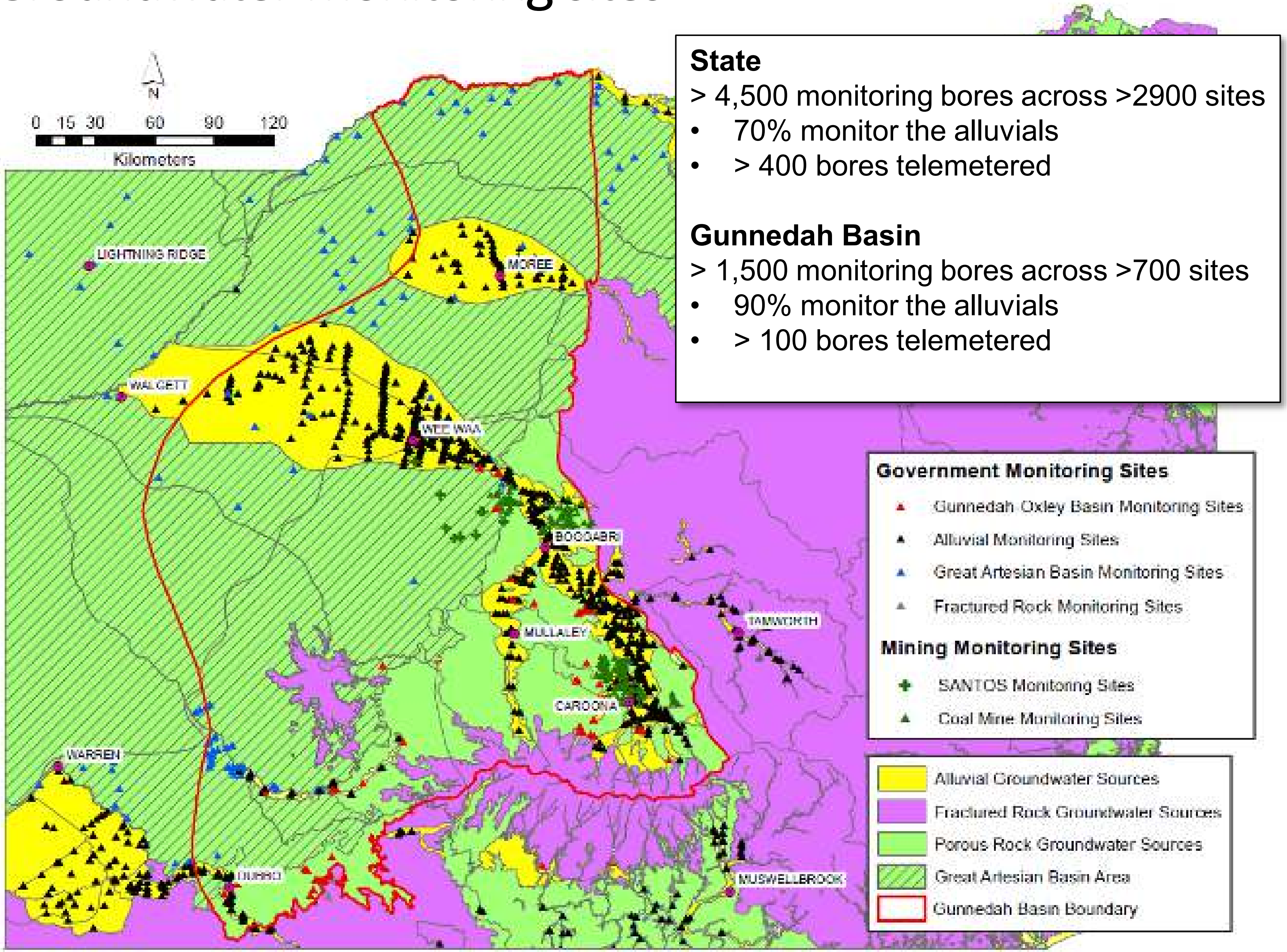
Gunnedah Basin: Cross section (south western basin)



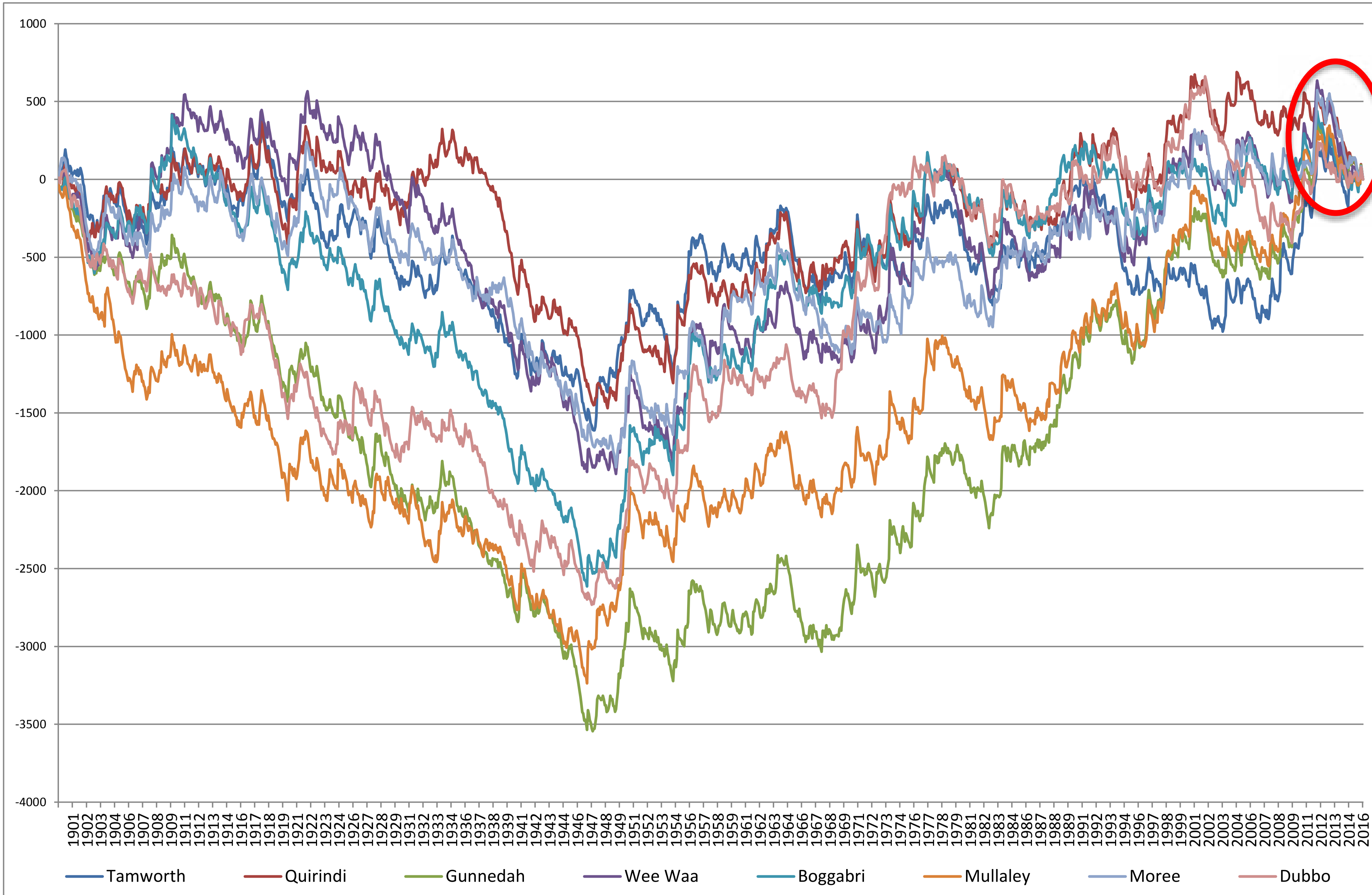
Groundwater monitoring sites

State
> 4,500 monitoring bores across >2900 sites
- 70% monitor the alluvials
- > 400 bores telemetered

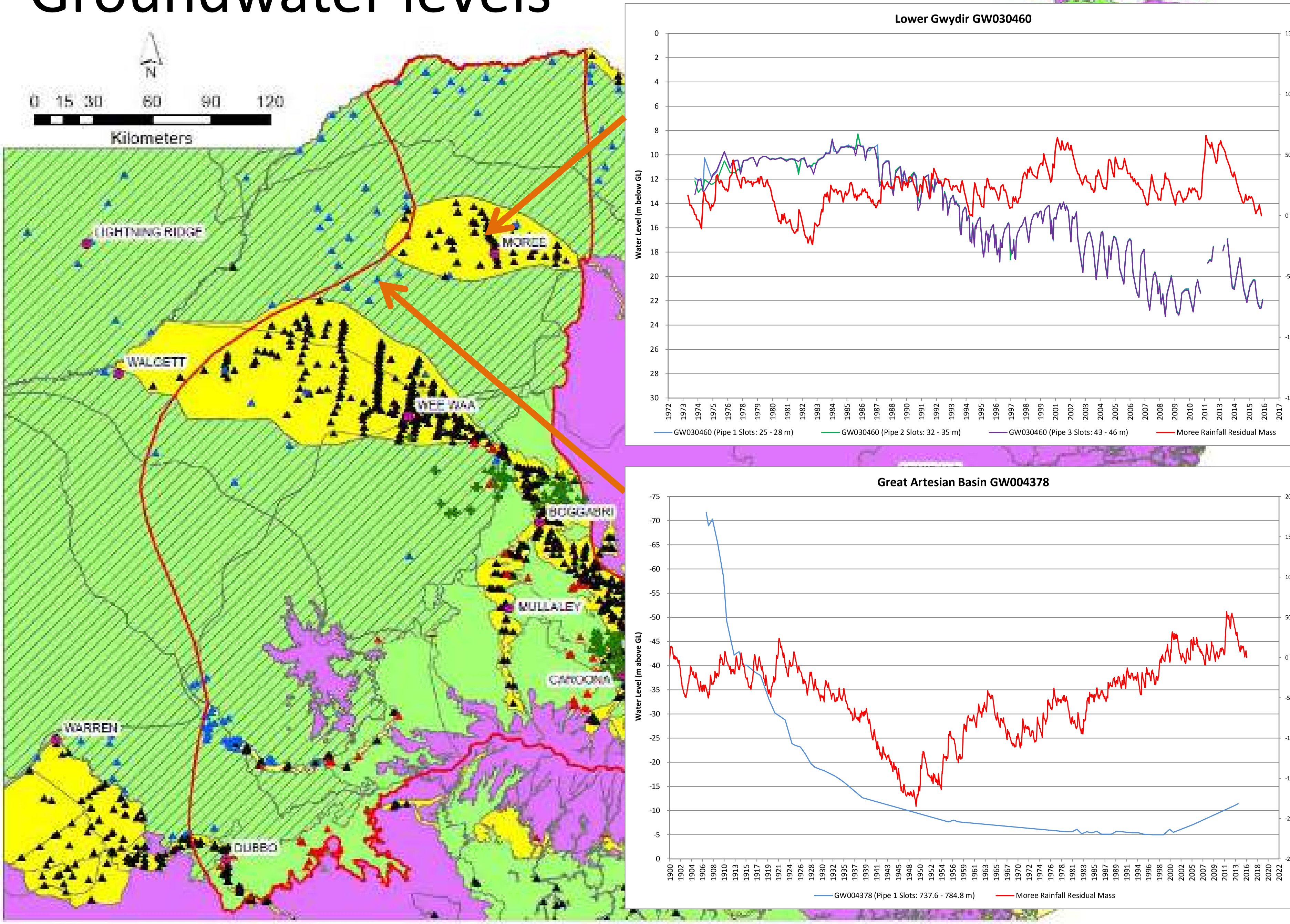
Gunnedah Basin
> 1,500 monitoring bores across >700 sites
- 90% monitor the alluvials
- > 100 bores telemetered



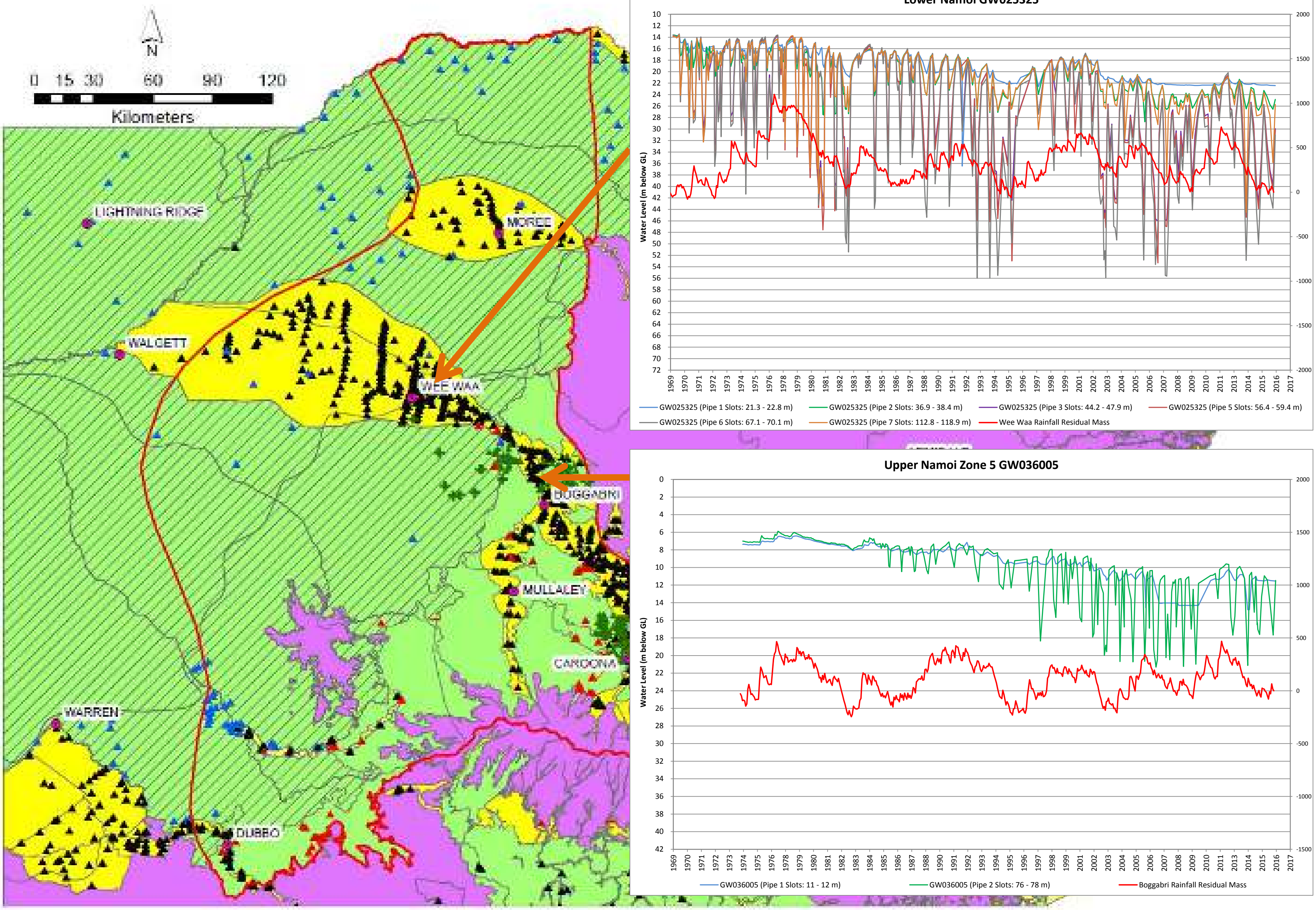
Long term rainfall trends



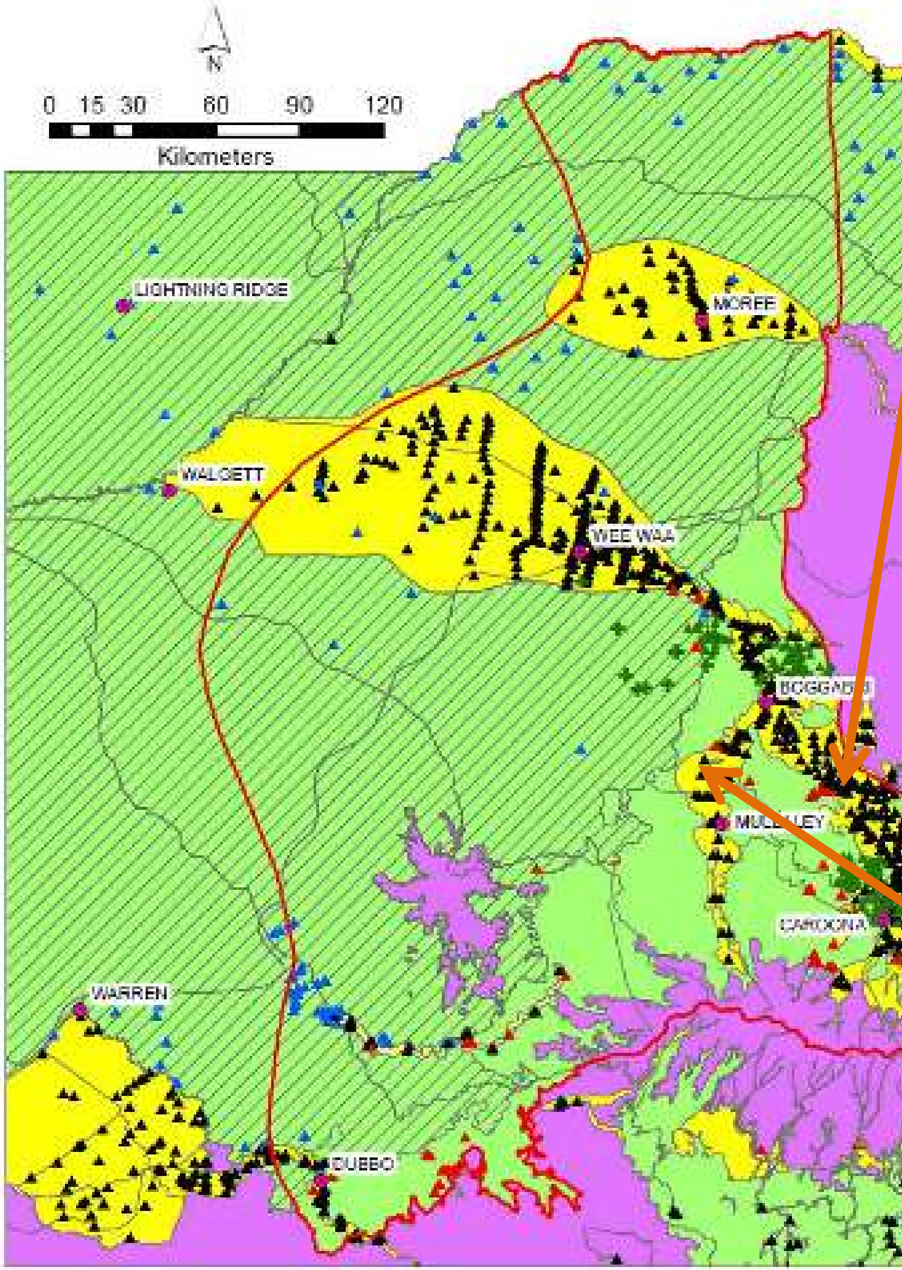
Groundwater levels

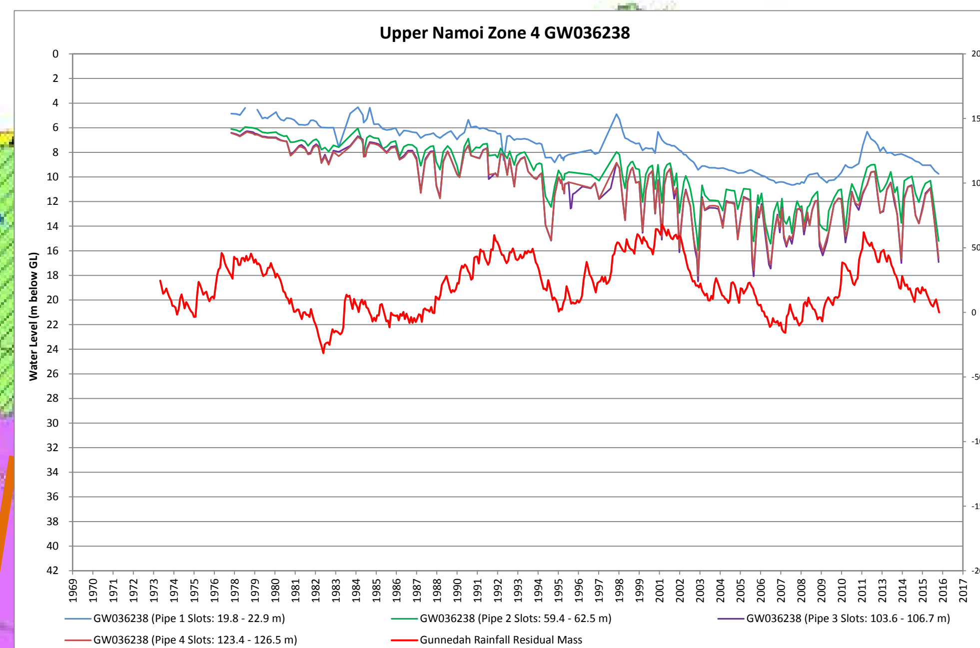


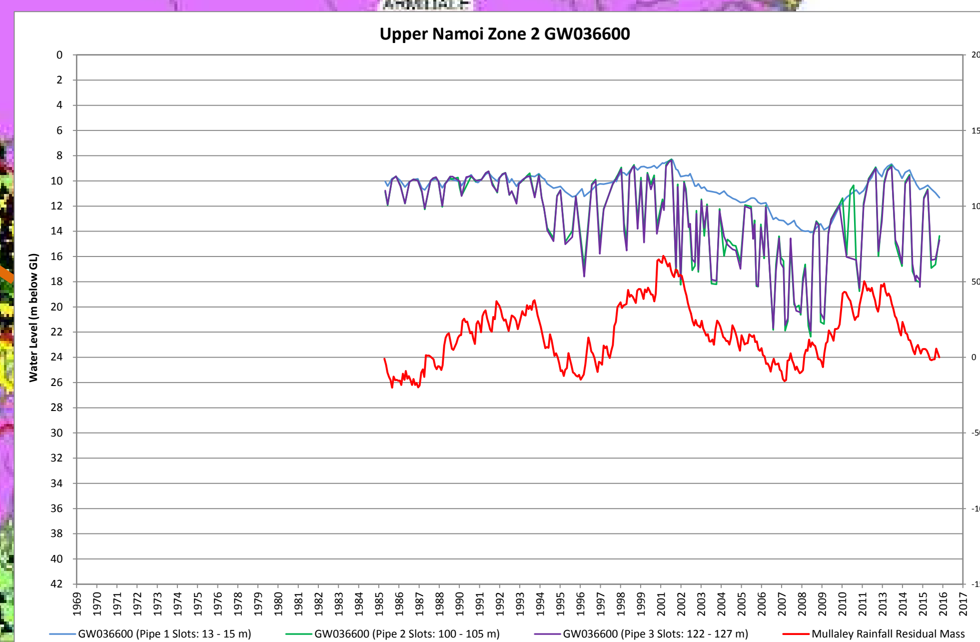
Groundwater levels



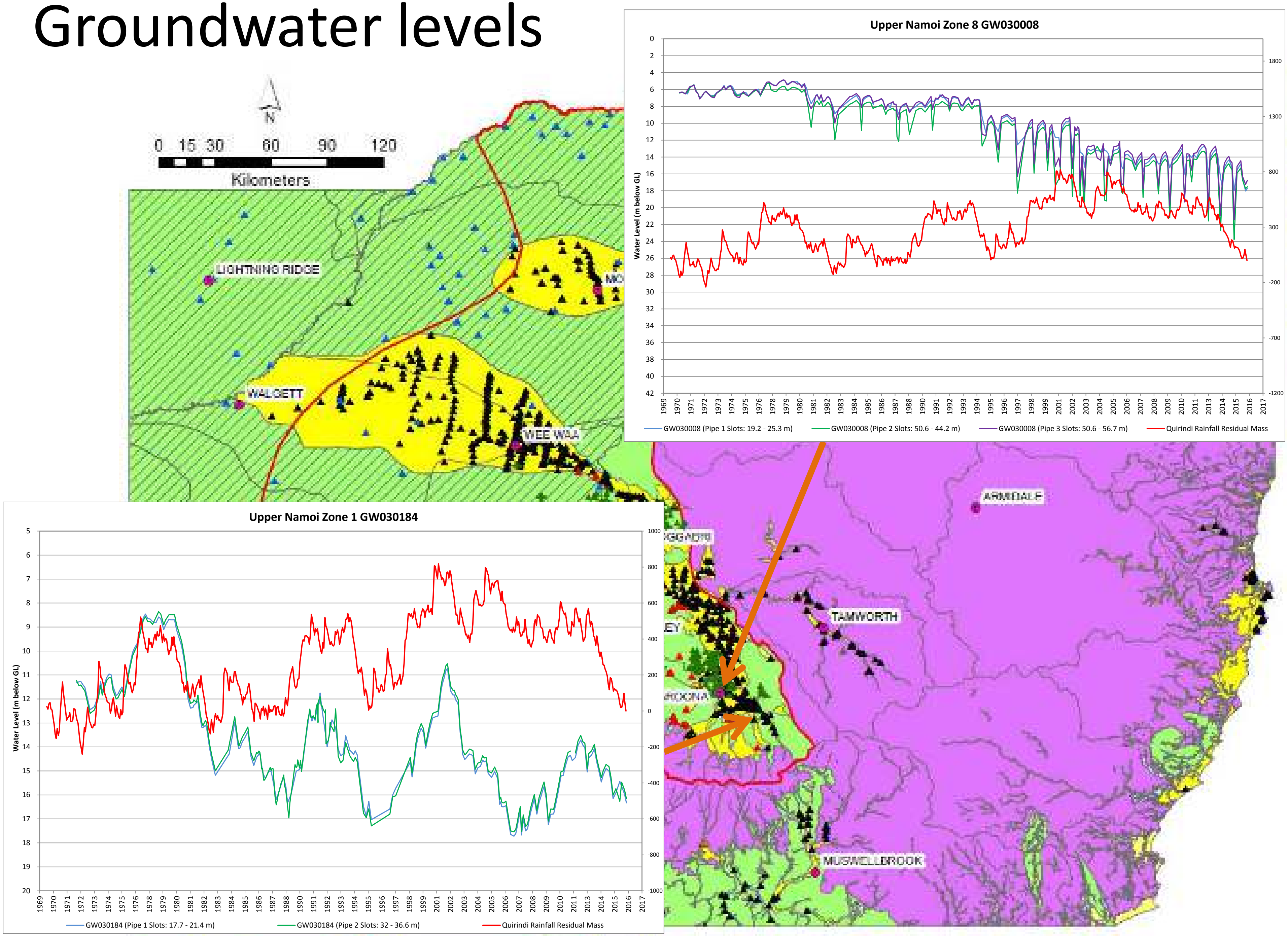
Groundwater levels



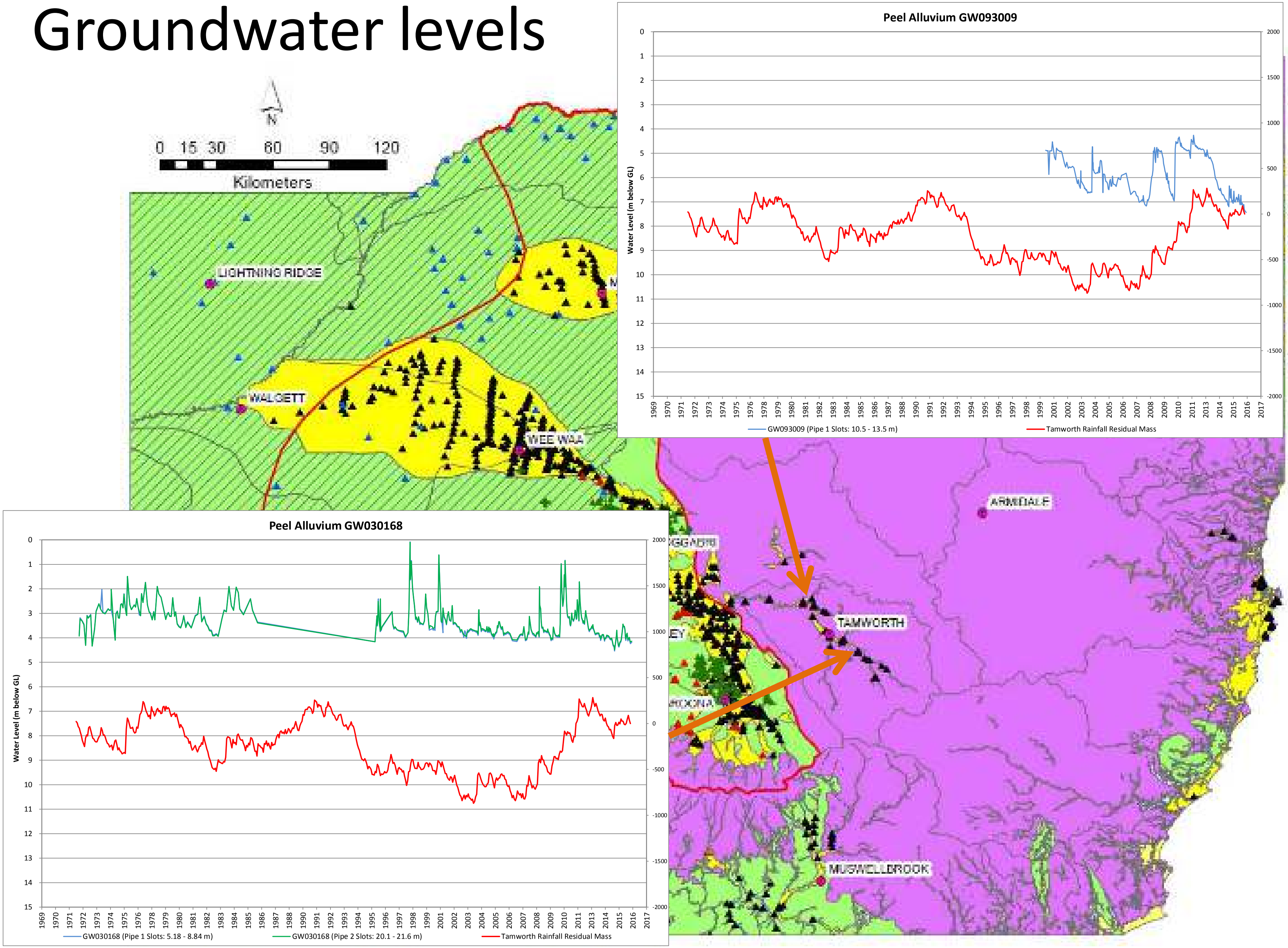




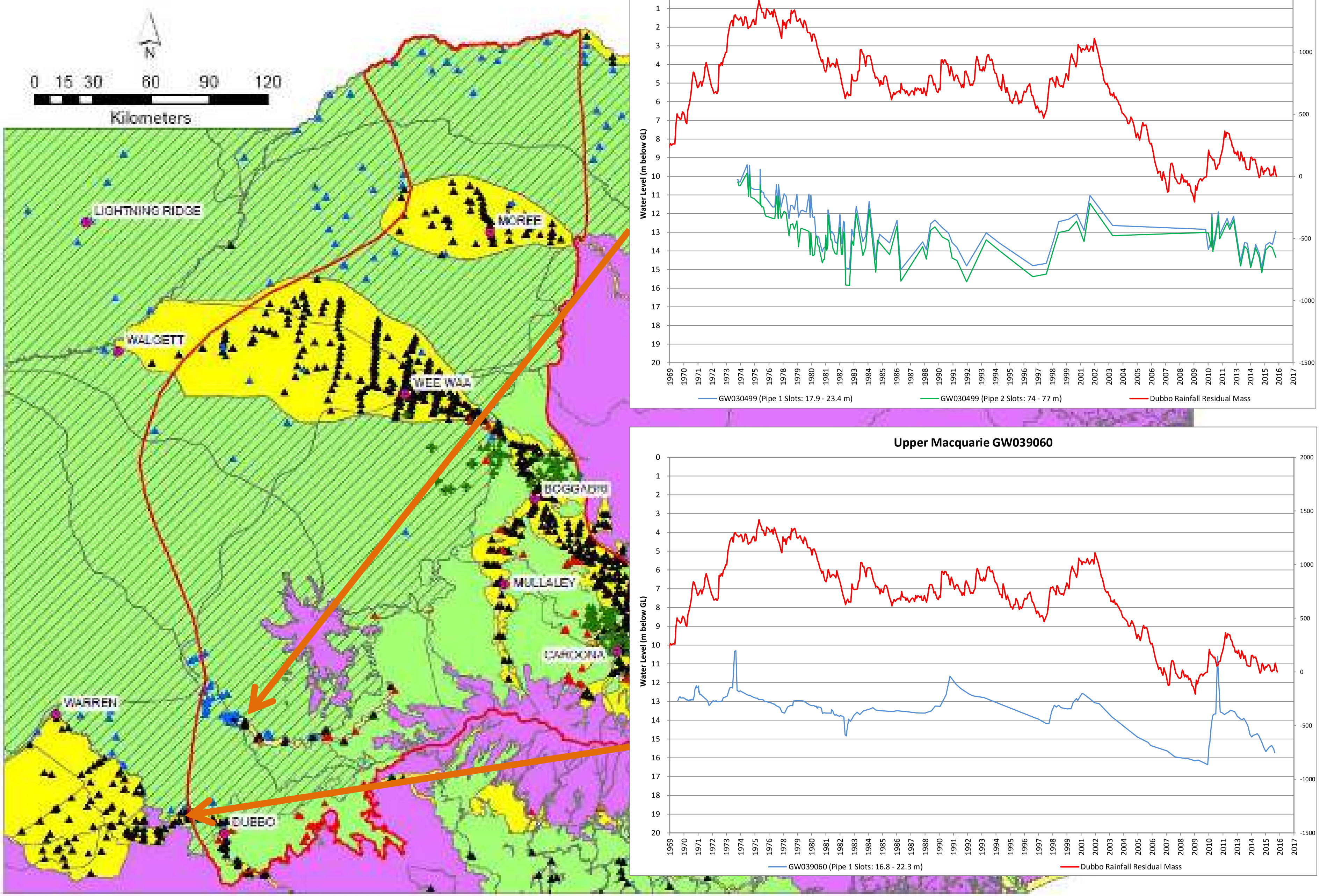
Groundwater levels



Groundwater levels



Groundwater levels



THANK YOU

Please direct enquiries to the NSW Land and Water Commissioner:

commissioner@landandwater.nsw.gov.au or (02) 6391 3429

Hunter Water Australia

Tamworth Regional Council

Tamworth Water Supply

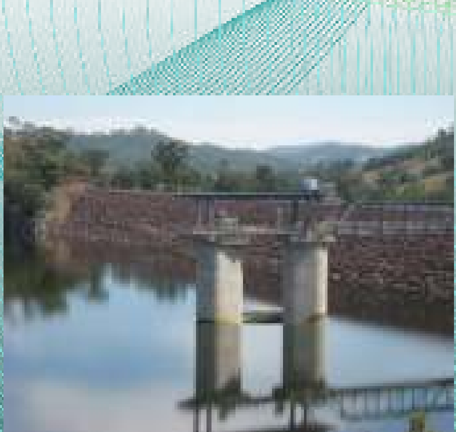
Future Yield & Demand Scenarios

FINAL REPORT

1 November 2012

Presented by Hunter Water Australia Pty Limited

ABN 19080869905



Report Details

Report Title	Tamworth Water Supply: Future Yield & Demand Scenarios
Project No.	2850-010
Status	FINAL REPORT
File Location	\\ho-fs1\Projects\Tamworth RC\2850-010 TRC Future Yield Scenarios\TASK 6 - REPORT\FINAL REPORT\TRC Future Yield & Demand Scenarios (Final Report).docx
Enquiries	Cameron Smith P: (02) 4941 4816 E: cameron.smith@hwa.com.au

Document History and Status

Revision	Report Status	Prepared by	Reviewed by	Approved by	Issue Date
A	First Draft	P Wilson	C Smith	C Smith	21-Sep-12
B	Final Draft	C Smith	Client	C Smith	24-Oct-12
C	Final Report	C Smith	Client	C Smith	01-Nov-12

Executive Summary

Tamworth Regional Council (TRC) has two primary sources of bulk water for the regional city of Tamworth – Chaffey Dam and Dungowan Dam. While historical demands have never exceeded 50% of the current combined license allocation of 22 GL/a from these two sources, bulk water supplies became critical during the unprecedented drought conditions between 2003 and 2008. Chaffey Dam storage fell to a low of 13.8% in June 2007, resulting in TRC applying severe Level 5 restrictions. This recent drought experience has raised some concerns about the ability of the Tamworth bulk water supply system to reliably achieve a sustainable yield of 22 GL/a, in line with the current license allocation.

Hunter Water Australia was engaged by TRC (in association with the Namoi Catchment Management Authority) to estimate future town water supply (TWS) demands and to investigate the sustainable yield for both the current bulk water supply system and the future system, once the planned upgrade of Chaffey Dam from 62 GL to 100 GL is complete. Yield modelling has been undertaken using the Peel IQQM, in association with the NSW Office of Water, and the study also considered the potential impacts of climate change on future yields and the potential impacts of decommissioning Dungowan Dam.

The adopted TWS demand estimates for 2040 range between 11.8 GL/a and 17.0 GL/a (depending on assumed growth and consumption rates), with the average growth and consumption scenario estimating a 2040 demand of 14.4 GL/a.

TWS yield estimates have been determined for both the existing and future augmented system, along with several sensitivity scenarios and are summarised in Table A.

Table A Future Yield Estimates - Summary

Scenario	TWS System Yield Estimate
Existing System / Chaffey Dam 62 GL	11 GL/a
Augmented System / Chaffey Dam 100 GL	18 GL/a
Augmented System / Median Climate Change	17 GL/a
Augmented System / Dry Climate Change	14 GL/a
Augmented System / Decommission Dungowan Dam *(Median Climate Change)*	15 GL/a

The table shows that while the augmentation of Chaffey Dam does have a significant impact on TWS security, the current town water entitlement of 22 GL/a is still not achievable. The increase in TWS yield is likely to be at least partly offset by future climate change conditions, with around 1 GL/a reduction expected under median climate change predictions and around 4 GL/a reduction under dry climate change predictions.

Based on the limited modelling undertaken, decommissioning Dungowan Dam would result in around a 2 GL/a reduction in TWS yield.

TWS yield scenarios have been compared to projected TWS demands to assess the potential timing of when demand may outstrip supply, as shown in Figure A below. The figure shows that the yield estimate of 18 GL/a for the augmented system is well above all 30 year demand projections. However, the yield estimate under median climate change (17 GL/a) is in line with high growth demand projections for 2040 and under the more severe dry climate change scenario, the yield estimate of 14 GL/a is slightly under the 2040 average growth demand projection.

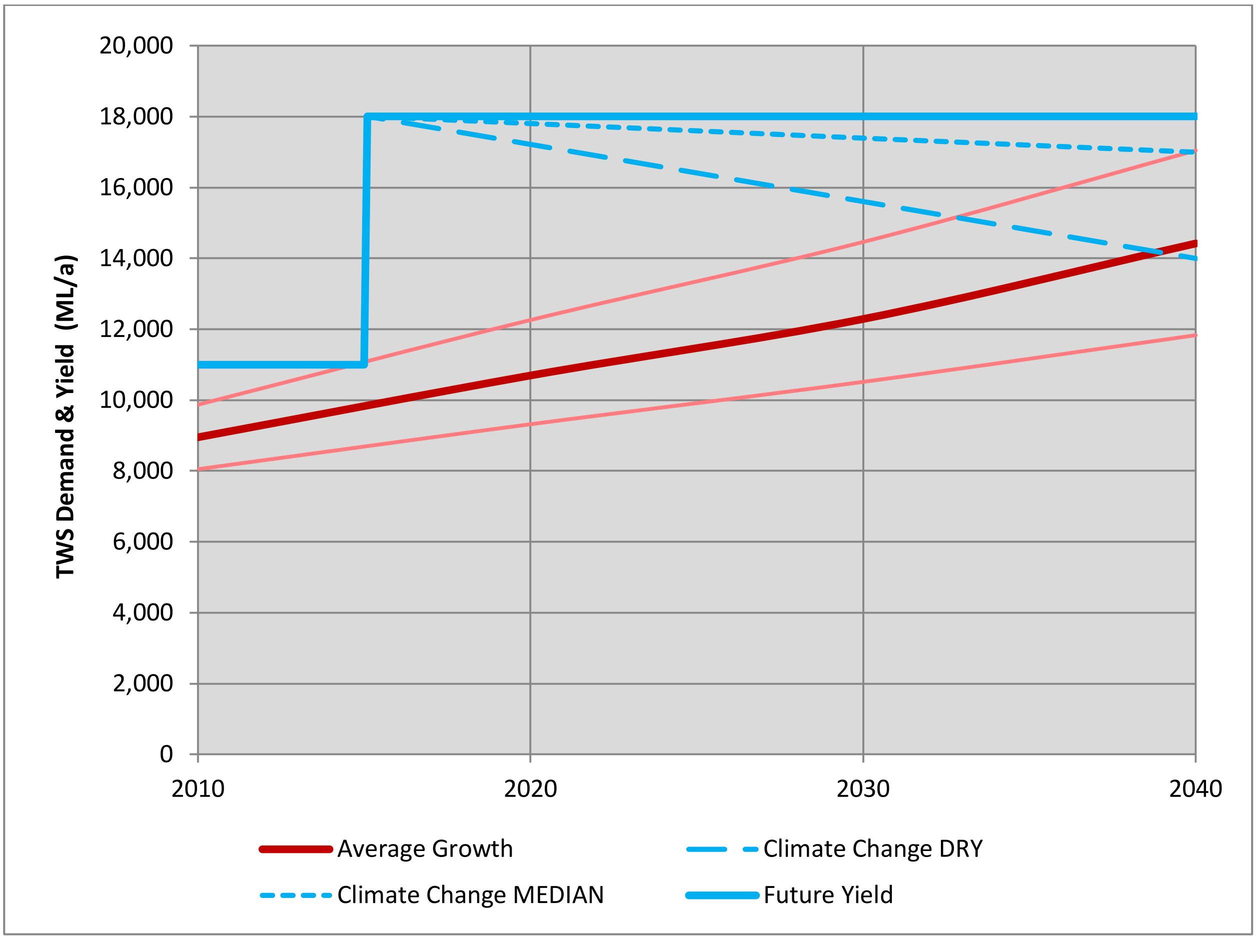


Figure A **Future Yield Estimates versus Demand Projections – Tamworth Water Supply**

The estimates of TWS yield for Tamworth are subject to many variables, including model accuracy, future climate variability, future climate change conditions and the criteria for TWS and irrigation security and TWS levels of service. Each of these variables should be periodically reviewed and reassessed in order to improve the accuracy of yield estimates and the report includes recommendations for ongoing work that will assist with this.

A key recommendation is the need to commence discussions with relevant State Government Departments/Enterprises (including NSW Office of Water) concerning increasing carry over reserve in Chaffey Dam as Tamworth's TWS demand increases in the future. Yield modelling has shown that significant increases in carry over reserve are required as demands increase to ensure adequate TWS security is maintained into the future.

Contents

Appendices

Figures

Tables

1 Introduction

Tamworth Regional Council (TRC) has two primary sources of bulk water for the regional city of Tamworth – Chaffey Dam and Dungowan Dam. While historical demands have never exceeded 50% of the current combined license allocation of 22,000 ML/a from these two sources (16,400 ML/a from Chaffey Dam and 5,600 ML/a from Dungowan Dam), bulk water supplies became critical during the unprecedented drought conditions between 2003 and 2008. Chaffey Dam storage fell to a low of 13.8% in June 2007, resulting in TRC applying severe Level 5 restrictions. This recent drought experience has raised some concerns about the ability of the Tamworth bulk water supply system to reliably achieve a sustainable yield of 22,000 ML/a, in line with the current license allocation.

TRC, in association with the Namoi Catchment Management Authority (CMA), commissioned Hunter Water Australia to investigate the sustainable yield for both the current bulk water supply system and the future system, once the planned upgrade of Chaffey Dam from 62 GL to 100 GL is complete. Yield modelling was undertaken in association with the NSW Office of Water, using the Peel Integrated Quantity & Quality Model (IQQM). The study has also considered the potential impacts of climate change on future yields. Future yield scenarios have been compared to projected town water demand levels to assess the potential timing of when demand may outstrip supply.

2 Existing Bulk Water Supply System

Bulk water for Tamworth is sourced from two major storages within the Peel Valley – Chaffey Dam on the Peel River and Dungowan Dam on Dungowan Creek. TRC also has access to a number of drift wells located along the Peel River in the vicinity of Paradise Weir.

Chaffey Dam is located near Bowling Alley Point on the Peel River approximately 40km upstream of Tamworth. It was constructed in 1979 by the former Department of Water Resources and is owned and operated by the State Water Corporation. The dam is an earth and rock-fill embankment 54m high and 430m long with a total storage volume of 62,000 ML and a catchment area of 420 km^2. Releases from the dam provide water for irrigators located on the Peel River and is a major source of supply for town water supply (TWS) which is extracted at the Peel River Intake Pumping Station located just outside Tamworth, approximately 35 km downstream of the dam.

The Peel River Intake Pumping Station is located approximately 1 km upstream from the confluence of the Peel and Cockburn Rivers. It was constructed in 1980 and has a capacity of 80 ML/day. Water is extracted from the Peel River and is pumped via dual parallel rising mains of 600mm diameter to Calala Lane Water Treatment Plant (WTP), located approximately 2.6 km away. The intake pumping station is prone to a build-up of sediments (generally sand and gravel) in high flow periods, due to the location of screen inlet on the river bed. Construction of Johnson screens with 6mm openings in the mid 1990s was only effective in reducing larger diameter sediments and the screens are prone to blockage in low flow times. An airlift pump was also installed in the grit chamber to allow frequent removal of material.

TRC has a high security entitlement of 16,400 ML/yr from Chaffey Dam. The entitlement from Chaffey Dam is based on the guaranteed supply volume to the town water extraction point, based on ordered releases (i.e. whether or not the water is taken). During drought periods, General Security users such as irrigators and other non-High Security users only receive small allocations from the Peel River. Chaffey Dam currently contributes approximately 60% (~5,100 ML/yr) of Tamworth's water supply.

Dungowan Dam is located on Dungowan Creek and is the second major water supply for Tamworth. It was constructed in 1958 by the former Tamworth City Council. The dam is an earth and rock fill embankment 24m high and 290m long with a total storage volume of 6,300 ML and catchment area of approximately 125 km^2. Water is supplied to Tamworth via a 54km long DN500/375 gravity pipeline directly to Calala Lane WTP following mostly along the route of Dungowan Creek and then the Peel River downstream of the confluence of the two streams. The pipeline has a capacity of around 22 ML/day and is chlorinated to minimise slime growth and provide some form of disinfection for the rural customers who use the pipeline for stock and non-potable uses. During periods of algal blooms in the storage, protocols exist to warn Dungowan Pipeline customers of the potential health impacts.

TRC holds a water licence for the extraction of water from Dungowan Dam of 5,600 ML/yr. Dungowan Dam currently contributes approximately 40% (~3,400 ML/yr) of Tamworth's water supply.

The severe drought experienced in Tamworth between 2003 and 2008 saw a number of drift wells along the Peel River (Scott Road) re-commissioned to mitigate falling storage levels in Chaffey Dam. These wells were originally used to supply water to Tamworth between 1931 and 1980 and are now used as a backup supply to Dungowan Dam and Chaffey Dam. The wells are located downstream of the confluence of Cockburn and Peel Rivers and source surface water from the Peel River as well as groundwater from the Cockburn and Peel alluviums. They supply water directly to the Calala Lane WTP.

An overview of the Tamworth bulk water supply system is shown below on Figure 2.1.

Figure 2.1 Tamworth Bulk Water Supply System

3 Background

3.1 Previous Water Supply Studies

A number of studies have been undertaken by TRC in recent years focusing on improving the efficiency and overall management of Tamworth's bulk water supply, as well as considering options for future augmentation to supply sources.

These studies are summarised briefly below:

Tamworth Bulk Water Supply Augmentations Options Study (Hunter Water Australia, 2005)

The *Tamworth Bulk Water Supply Augmentation Options Study* (HWA, 2005) identified a broad range of supply side and demand side augmentation options to improve system yields and water demand efficiencies. Both technical and economic feasibility of various supply side options were assessed, with the following options being considered economically feasible and worth further consideration:

- Upgrade of Chaffey Dam to either 80, 100 or 120 GL, which would result in an increased yield of 7 GL/a, 10 GL/a and >10 GL/a respectively
- Upgrading Chaffey Dam (as above) combined with decommissioning the Dungowan Pipeline
- Augmenting the Peel River Intake PS along with augmentations to Calala WTP and major distribution reservoirs and trunk mains
- Construction of a 100 ML off-river storage near Calala WTP or a 1000 ML off-river storage near the Peel River Intake PS

A number of demand side options were also considered with the preferred options being:

- Pricing (including excess usage charges)
- Permanent restrictions
- Improving residential water efficiency through indoor and outdoor audits and retrofitting
- Promoting the use of rainwater tanks
- Stormwater reuse
- Grey water reuse

Projected demand scenarios were also presented in this study which looked at population growth and demand increases over a 30 year period. These projections were based on Tamworth's total annual water demand for 2003 which was 9.76 GL and a residential demand per dwelling of 345 kL/a. Base demand forecasts assumed that no water efficiency targets would be met and existing residential and non-residential usage rates would remain static. Water efficient demand forecasts assumed that a 15% reduction in demand would occur over a 15 year period, with a 5% reduction by 2008, followed by a 10% reduction by 2010 and a 15% reduction by 2018.

Low, average and medium growth rates were applied to both the base demand forecasts and the water efficient forecasts, with additional allowances for residential expansion and non-residential growth. Adopted demand forecasts are summarised in Table 3-1 below.

Table 3-1 30 Year Demand Forecasts (HWA, 2005)

Growth Level	Existing Demand (2003)	30 year demand forecast (2033)	
		Base Demand	Water Efficient Demand
Low Growth (0.5% pa)	9.76 GL/a	14.0 GL/a	11.9 GL/a
Average Growth (1% pa)		16.9 GL/a	14.4 GL/a
High Growth (1.5% pa)		19.9 GL/a	16.9 GL/a

Demand Management Plan (Hunter Water Australia, 2007)
Water Sustainability Strategy (Tamworth Regional Council, 2008 & 2011)

The *Demand Management Plan* (HWA, 2007a), published in 2007, provides Council with a structured approach to effective demand management and includes a range of water efficiency measures, including rebate schemes, to encourage sustainable water use (during both drought and non-drought periods).

TRC's ongoing commitment to water conservation is outlined in their *Water Sustainability Strategy* (TRC, 2011), which is updated every three years. The *Water Sustainability Strategy* outlines Council's commitment to a range of water conservation initiatives, including public and schools education programs, Large Water User Optimisation Program, and Residential Water Saving Rebate Scheme.

TRC's *Water Sustainability Strategy*, in association with the *Demand Management Plan*, are major initiatives of Council for managing the future impacts of climate change. The latest strategy (TRC, 2011) represents TRC's plan for water efficiency over the period 2011 to 2014 and includes four key interrelated themes that reflect how Council sees the vision of sustainable water use in the region best being achieved. These themes are:

1. Developing an integrated approach
2. Increasing awareness and understanding
3. Implementing water efficiency measures
4. Carrying out effective review and reporting.

TRC's commitment to water efficiency was recognised by the National 2011 savewater! awards, with TRC winning the award for best government agency in Australia. In winning the award, TRC was recognised for employing a comprehensive, well-managed, and well-executed water efficiency program with a high level of community engagement. TRC's water efficiency program was also recognised as having a high potential to serve as a case study for other rural councils across Australia.

Future demand projections over 30 years were developed as part of the *Demand Management Plan* and used a similar method adopted in the *Bulk Water Supply Augmentations Options Study* (HWA, 2005).

Projections were based on two forecast scenarios:

- Unrestricted base demand forecast (350 kL/year per residential connection)
- Water efficient demand forecast (300 kL/year per residential connection and a 10% reduction in non-residential usage)

The demand projections determined for low, average and high population growth are shown in Table 3-2.

Table 3-2 30 Year Demand Forecast (HWA, 2007a)

Growth Level	Existing Demand (2005)	30 year demand forecast (2035)	
		Base Demand	Water Efficient Demand
Low Growth	9.72 GL	13.3 GL	11.5 GL
Average Growth		16.7 GL	14.5 GL
High Growth		20.4 GL	17.8 GL

Drought Management Plan (Hunter Water Australia, 2007)

The *Drought Management Plan* (HWA, 2007b) includes a structured five level water restriction policy, along with a range of emergency supply options for each water supply scheme. The Plan outlines the various demand and supply side drought response actions that should be employed at various stages during an extended drought period. The Plan also outlines Council's restriction policy and documents various backup supply sources and emergency supply options.

For Tamworth water supply, five water restriction levels were developed with each level triggered according to storage volume in Chaffey Dam with Level 1 restrictions triggered when Chaffey Dam reaches 50% of total storage volume through to Level 5 restrictions which is triggered when Chaffey Dam falls to 25% of total storage volume.

Tamworth Water Supply - Options to Improve Efficiency & Management of Raw Water Sources (Hunter Water Australia, 2008)

This study (HWA, 2008) identified options to improve the efficiency of Tamworth's water supply from Chaffey Dam. From the period between December 2005 and June 2007, storage levels in the dam dropped from 67% to 15% which triggered the highest water restriction level (Level 5) in Tamworth. During this period, significant water losses were occurring between Chaffey Dam and the Peel River Intake PS and were determined to be in the order of approximately 50% or more of Chaffey Dam outflows.

The link between surface water and groundwater in the Peel Valley was identified as being the most likely cause of the high transmission losses with illegal surface and groundwater extractions by irrigators located near the Peel River contributing to these losses.

Options identified to improve water efficiency included:

- Construction of a pipeline between Chaffey Dam and Tamworth
- Local Raw Water Storage at Calala WTP or near the Peel River Intake PS
- Recommissioning of Scott Road Drift Wells
- Reinstatement of Paradise Weir
- Various operational Improvements

The preferred drought contingency response at the time was the re-commissioning of Scott Road Drift Wells which began operating again in the summer of 2007/08. A total of six wells were re-instated to produce up to 10ML/day of raw water, pumped directly to Calala WTP.

3.2 Previous Estimates of Town Water Supply (TWS) Yield

TWS yield estimates for the Tamworth bulk water supply system are difficult to quantify due to the need to consider both town water security and irrigation security (refer to Section 7.4 for further discussion). The following table summarises previous estimates of TWS yield that have been assessed using the Peel IQQM. Each of the three studies utilised different base model versions of the Peel IQQM, which has been progressively updated and recalibrated over the last 10 years (refer to Section 7.2 below).

Table 3-3 Previous Estimates of Town Water Supply Yield / Security using the Peel IQQM

Study	Estimated TWS Yield / Security	
	62 GL Chaffey Dam (Existing)	100 GL Chaffey Dam (Augmented)
Tamworth Bulk Water Supply Augmentation Options Study (HWA, 2005)	Security is acceptable for demands of 13 GL/a or less	Security is acceptable for demands of up to 20 GL/a
State Water modelling runs to assess the need to augment Chaffey Dam (GHD, 2006)	Security is acceptable for demands of 14 GL/a or less	Security is acceptable for demands of up to 20 GL/a
NOW modelling runs to support the development of the Water Sharing Plan for the Peel Valley (NOW, 2010)	Planned environmental water provisions for existing dam would have an undetectable impact on Chaffey Dam's minimum storage volume for existing demand levels (implies no change in town water security).	Planned environmental water provisions for enlarged dam and Tamworth town water diversions of 16.4 GL/a would result in a 2.5GL improvement in minimum storage for Chaffey Dam (compared to current conditions).

While the most recent runs undertaken by NOW for the preparation of the Peel Valley Water Sharing Plan were not conclusive in regards to town water security for various demand levels, this version of the model is the basis for the modelling scenarios undertaken for this study (refer to Section 8 for a detailed assessment of town water security using the Water Sharing Plan models).

4 Historical Demand & Population Growth

4.1 Historical Town Water Demands

Historical water production for Tamworth water supply provides a reliable estimate of town water demands and was obtained from data collected at Calala WTP, as shown on Figure 4.1 below.

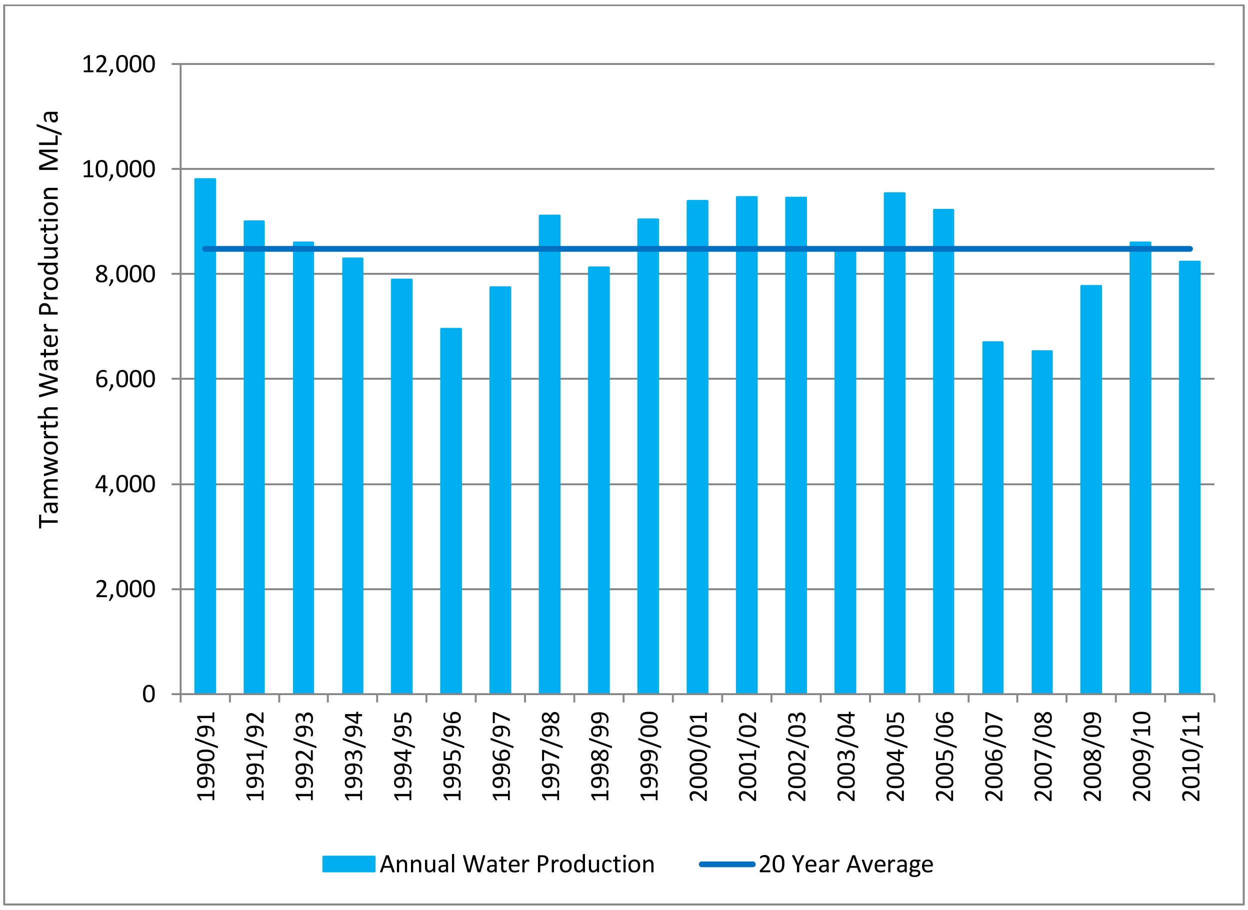


Figure 4.1 Total Annual Treated Water Production for Tamworth Water Supply (Calala WTP)

Average town water demand over the last 20 years has been around 8,500 ML/a, with a maximum of 9,809 ML in 1990/91 and minimum of 6,535 ML in 2007/08.

The recent drought combined with the introduction of the Demand and Drought Management Plans in 2007, resulted in a significant reduction in demands over the last five years (average demand around 7,600 ML/a) compared to the previous 5 years (average demand around 9,200 ML/a). Total consumption in 2007/08 reached a 20 year minimum due to the imposition of severe Level 5 restrictions in late 2006/07.

The other notable fluctuation in demand occurred in 1994/95 and can be attributed to the introduction of a user pays pricing system and to a lesser extent, water restrictions that were in place at the time. During 1994 and 1996, Tamworth was considered to be in drought and minor water restrictions were put in place to reduce consumption. These restrictions are outlined further in Section 4.3 below. The impact of the user pays pricing system during these years was further examined in the Demand Management Plan (HWA, 2007a) by using a climate correction model to remove the effects of climate on demand.

4.2 Historical Residential Usage

Annual residential usage per property has reduced in recent years, in accordance with reductions in total town water demands. In the early 2000s, annual residential usage was estimated to be around 350 kL/property (HWA, 2005). With the help of restrictions over the next few years, usage dropped to around 300 kL/property by the mid-2000s (HWA, 2007a).

Annual residential usage has decreased further over the last five years, averaging around 225 kL/property, as shown on Figure 4.2 below. While moderate to severe water restrictions helped to reduce residential usage levels in 2006/07 and 2007/08, usage has remained substantially below pre-drought levels over the last three years.

While the stage average for annual residential usage is currently around 160 kL/property (2010-11), the weighted median annual residential water usage for inland water utilities is around 215 kL/property (NOW, 2012), which is generally in line with recent residential usage in Tamworth.

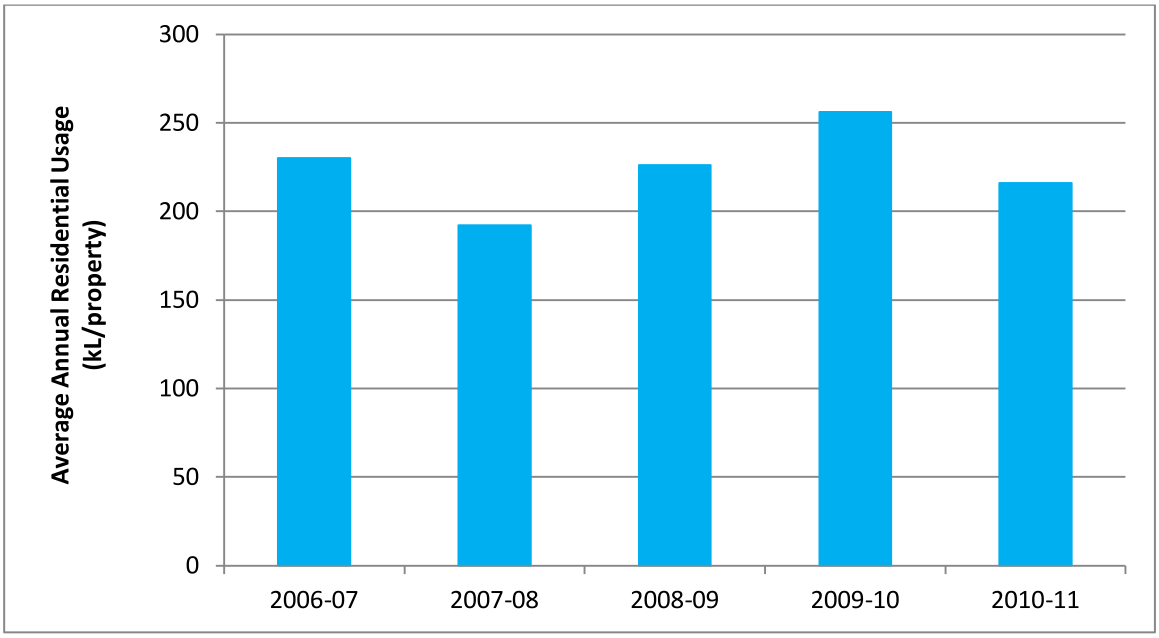


Figure 4.2 **Average Annual Residential Usage per Property**

4.3 Impact of Restrictions on Demands

As part of the water restrictions regime adopted in 2007, consumption reduction targets accompanying each restriction level were set. Each target was defined as a percentage of an average daily demand of 26 ML/day. This average daily demand was the typical daily consumption defined in the Drought Management Plan (HWA, 2007b).

In order to assess the impacts of water restrictions on town water demands, typical town water consumption levels (based on daily water production data) have been determined for each of the 5 water restriction levels over the period of 2006 – 2007 and compared to the reduction targets included in the Drought Management Plan.

Table 4-1 shows the reduction targets for each restriction level and the typical average town water consumption during the period of restriction during the years of 2006 and 2007.

Table 4-1 Tamworth Water Restriction Reduction Targets vs Actual Consumption (2006-07)

Restriction Level	Reduction Target (% of Average Daily Demand)	Reduction Target (based on average of 26 ML/day) (ML/d)	Actual Average Demand During Restriction Periods 2006 & 2007 (ML/day)
Level 1	95%	24.7	21.1
Level 2	90%	23.4	20.3
Level 3	85%	22.1	22.8
Level 4	75%	19.5	17.2
Level 5	65%	16.9	15.4

The impact of restrictions is clearly illustrated in the table, with a noticeable reduction in consumption over nearly all restriction levels. The only period where the average demand did not reach the reduction target was under Level 3 restrictions which came into effect at the end of December 2006 and continued through to February 2007. This could be attributable to the hotter months of summer where consumption is generally higher and reaching the target would be much harder than if the same restrictions were in place during winter months. Although the reduction target was not reached, the demand during this period came very close to 85% of the benchmark average demand of 26 ML/day which suggests that the water restrictions enforced under Level 3 were still successful.

4.4 Historical Population & Dwelling Growth

A review of Tamworth's historical population data between 1991 and 2006 shows an average annual growth of around 0.4%. Based on the five yearly Census data, the average annual growth rate between each Census date has increased from minor negative growth between 1991 and 1996 to significant positive growth of 0.9% between 2001 and 2006. Over the period between 1991 and 2006, average annual dwelling growth rates have fluctuated between 1.0% and 1.3%, with an overall average annual growth rate of 1.2%.

Table 4-2 shows the historical population and dwelling growth rates experienced in Tamworth since 1991.

Table 4-2 Historical Population & Dwellings – Tamworth Urban Area

Statistic	1991	1996	2001	2006
Population	37,664	37,454	38,248	39,973
5 yr Annual Growth Rate		*-0.1%*	*0.4%*	*0.9%*
Occupied Dwellings	12,815	13,670	14,340	15,252
5 yr Annual Growth Rate		*1.3%*	*1.0%*	*1.2%*
Occupancy Rate	2.94	2.74	2.67	2.62

Note: Population & Total Dwelling data based on ABS Census data for Tamworth Urban Area

5 Demand Projections

5.1 Projected Population & Dwellings

For projected population and dwelling growth in this study, average annual growth rates of 0.75% for population and 1.0% for dwellings have been adopted for the Tamworth Water Supply System area. A higher growth rate for dwellings compared to population was adopted due to an expected ongoing reduction in occupancy rates over the next thirty years. This is based on the assumption that dwellings growth would be partly driven by existing Tamworth residents and families “spreading out” as opposed to growth only occurring from an influx of residents from outside the Tamworth region.

Table 5-1 below shows the projected population and dwellings for Tamworth.

Table 5-1 Projected Population and Dwellings for TWS (excludes Moonbi/Kootingal)

Statistic	2009	2010	2020	2030	2040
Projected Population	40,879*	41,186	44,381	47,824	51,535
Projected Dwellings	15,748**	15,905	17,570	19,408	21,438

Note: * *2009 Population is based on projected 2006 Census data for Tamworth Urban Area*
** *2009 Dwellings is based on TRC connection data*

Figure 5.1 below shows the projected population and dwellings for Tamworth, along with historical figures.

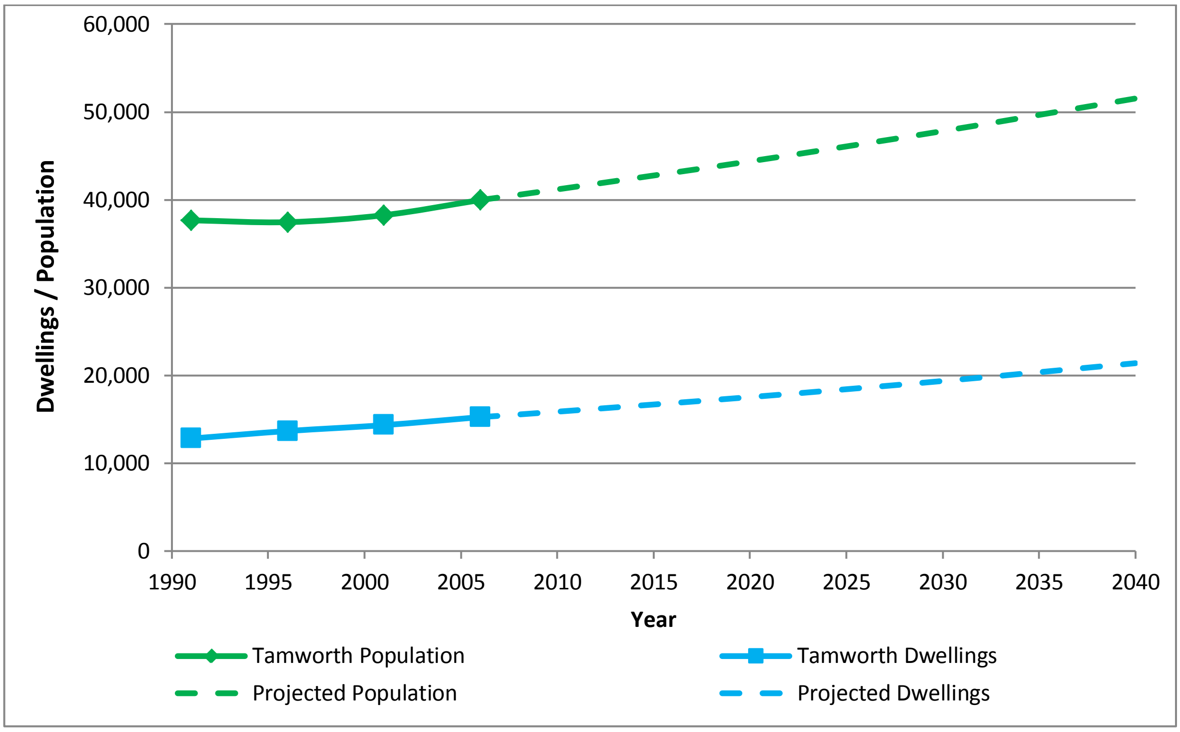


Figure 5.1 Projected Population & Dwellings for Tamworth Water Supply

5.2 Adopted Demand Projections

As discussed in Section 4.2, annual residential usage fell from an unrestricted pre-drought level of around 350 kL/property to under 200 kL/property at the height of the drought in 2007/08. Since then residential usage has ranged from 215 kL/property to 255 kL/property and it is possible that usage levels could keep increasing further. Due to the uncertainty of residential customer behaviour post-drought, it is assumed that demand will continue to increase; however it is likely that demand will stabilise to a level which is below pre-drought demand. This value is assumed to be at around 300 kL/day. This prediction is based on the assumption that the residents of Tamworth are more conscious of their water usage after experiencing the worst drought on record. The permanent water conservation measures introduced in the Drought Management Plan (HWA, 2007b) could also help stabilise levels to less than the unrestricted pre-drought demand.

For the purposes of this study, three demand scenarios were considered for estimating future demand, as shown in Table 5-2 below.

Table 5-2 Demand Scenario Assumptions

Demand Scenario	Assumed Annual Residential Usage (kL/property)	Assumed Dwelling Growth Rate (per annum)
Low	250	0.75%
Average	300	1.0%
High	350	1.25%

The average demand scenario has assumed an annual residential usage of 300 kL/property, which is higher than recent residential usage levels but it considered to be a more realistic and sustainable level over the medium to long term. The lower bound demand scenario adopted 250 kL/property, based on recent residential usage levels being maintained indefinitely, while the higher bound demand scenario adopted 350 kL/property, based on pre-drought demand levels.

In addition to the three residential usage scenarios, three dwellings growth rates have been assumed (as shown on Table 5-2). The average growth (as discussed in Section 5.1) was assumed to be 1.0% pa. A lower bound growth rate of 0.75% pa and a higher bound growth rate of 1.25% pa were also adopted.

The above demand scenario assumptions were used to estimate future demands for the Tamworth water supply system, as shown on Figure 5.2 below. The demand projections include allowances for supplying Moonbi and Kootingal from 2010 and further allowances for progressively servicing other small towns (including Attunga, Duri and Dungowan) over the next 30 years. Assumed demands for future industrial expansion over the next 30 years have also been included in the demand projections (refer to Appendix A for details).

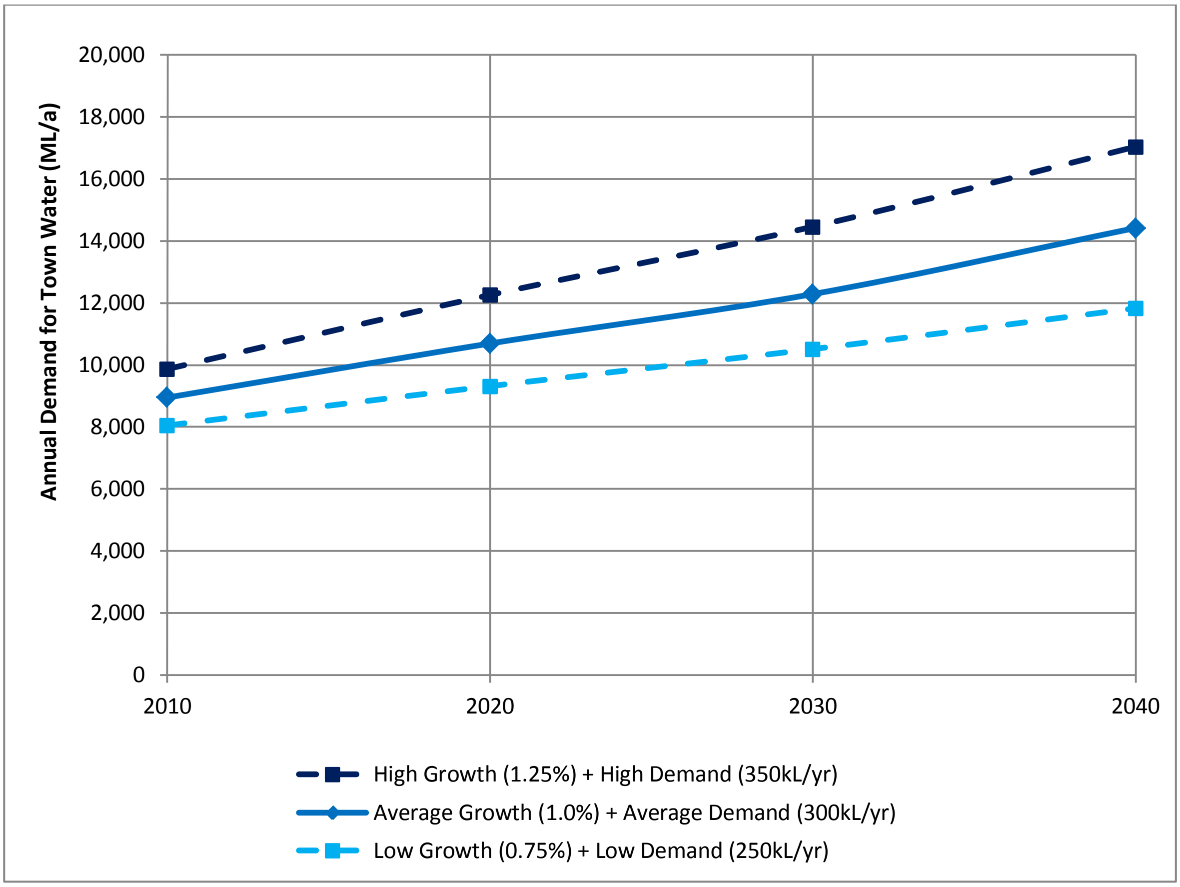


Figure 5.2 Adopted Future Demand Projections – Tamworth Water Supply

Future demand projections are also shown in Table 5-3 below. The adopted 2040 demands range between 11,800 ML/a and 17,000 ML/a. These projection figures are in line with the 30 year water efficient demand projections included in the previous bulk water supply study (refer to Section 3.1).

Table 5-3 Adopted Future Demand Projections – Tamworth Water Supply

Demand Scenario	Annual Demand for Town Water (ML/a)			
	2010	2020	2030	2040
Low	8,100	9,300	10,500	11,800
Average	9,000	10,700	12,300	14,400
High	9,900	12,300	14,500	17,000

6 Climate Change Impacts

6.1 Background

The topic of climate change has quickly become a major focus for local water supply utilities in Australia over the past decade. Since 1950, Australia's annual mean temperatures have increased by approximately 0.9°C and the projected warming by the year 2030 relative to 1990 temperatures is in the order of 1.0°C (CSIRO and Bureau of Meteorology, 2007). These predictions have also led to a general assumption that extreme natural events such as droughts, floods, and heatwaves will become more severe and more frequent.

The uncertainties surrounding current climate change predictions will prove to be a challenge for local water utilities, particularly in managing existing bulk water supply assets and also in planning for future water demand as a result of population growth. The major concern for many local water utilities will be the changes to rainfall and runoff patterns at a local or regional level and the resulting impacts this will have on the yield of their bulk water supply systems.

In order to obtain an understanding of the potential future impacts of climate change on rainfall and runoff volumes in the Tamworth region, a number of scenarios need to be considered when modelling the TWS system. The following discussion provides a brief background on recent climate change studies that have been undertaken in NSW. The studies used a range of Global Climate Models (GCMs) and considered a number of climate change scenarios developed by the International Panel on Climate Change (IPCC). The results of these studies were used to model the TWS system to determine future yields under climate change. These results are presented later in Section 9.1.

6.2 NSW Overview

Over the next 30 to 50 years, NSW is expected to become hotter (1 – 3^{0}C), with the highest temperature increases expected to occur in the north and west of the state. Some parts of the state are expected to experience a slight increase in summer rainfall (eg 0 – 10% in the North-east), while other parts of the state are expected to experience a significant decline in winter rains (eg 20 – 50% in the south-west). Many parts of the state will see a shift from winter-dominated rainfall to summer-dominated rainfall. The higher temperatures are expected to result in significantly higher evaporation across much of the state.

Figure 6.1 below illustrates the expected future changes in rainfall across NSW due to climate change.

Modelling projections are indicating that there will be a shift in runoff patterns resulting in significantly more summer runoff (up to 20% more) and significantly less winter runoff (up to 25% less). The impact on annual runoff volumes across the state is dependent on the relative contribution of runoff in each season. In areas that are dominated by summer rainfall and runoff (eg northern NSW), there is expected to be a slight increase in annual runoff volumes. However, in areas which experience more dominate winter rainfall and runoff (eg southern NSW), there is expected to be a significant decrease in annual runoff volumes (DECCW, 2010).

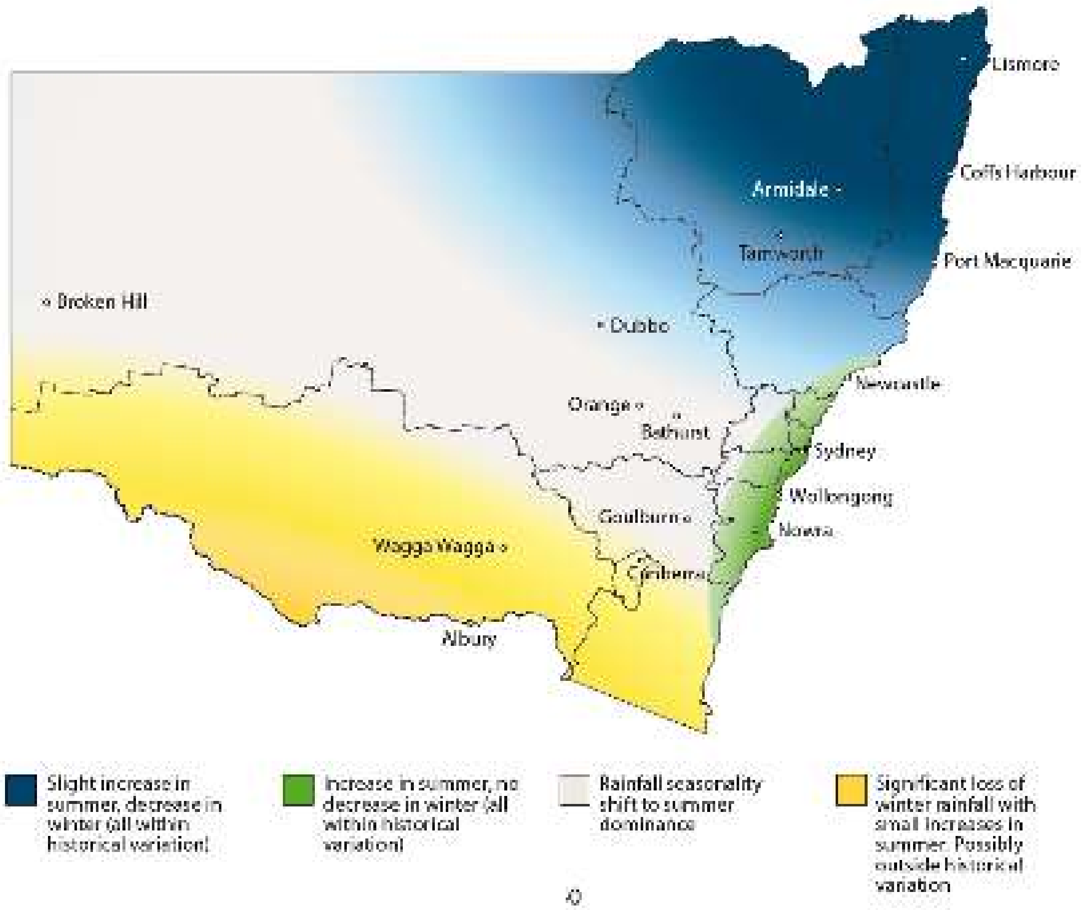


Figure 6.1 Projected Average Changes in Rainfall 2050 (DECCW, 2010)

6.3 Regional Impacts

There have been three major studies recently published that investigated the impacts of climate change at a NSW state and regional level. The first study was published in December 2007 by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) titled *Water Availability in the Namoi* (CSIRO, 2007) which formed part of the Murray Darling Sustainable Yields Project. This study aimed to predict the availability of water throughout the Murray Darling Basin by looking at a number of climate change scenarios and predicting future surface water availability in the Namoi River catchment using rainfall-runoff models, river system modelling and groundwater recharge modelling.

The second study was published in June 2008 by the former Department of Water and Energy (DWE), titled *Future climate and runoff projections (~2030)* (DWE, 2008b) and looked at predicting mean annual rainfall and runoff at ~2030 in New South Wales and the Australian Capital Territory.

These two studies incorporated a number of climate change and emissions scenarios derived from the IPCC's *Special Report on Emissions Scenarios (2000)* (SRES) and the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (IPCC, 2007). These reports outlined four distinct climate change scenarios used that can help predict climate change impacts from varying population growth rates, development levels, and emissions growth. These four scenarios were labelled A1, A2, B1, B2. Scenario A1 represents a globalised economy undergoing rapid growth, A2 represents a more fragmented, regionalised and heterogeneous global economy, B1 reflects a more integrated and ecologically friendly global economy, and B2 reflecting a divided and fragmented economy growing at a slower rate but still becoming a more ecologically friendly economy.

The third study was published in June 2010 by the former NSW Department of Environment, Climate Change and Water (DECCW) and titled *NSW Climate Impact Profile* (DECCW, 2010). The study used outputs from an earlier study titled *Climate Change in Australia* which was conducted by the CSIRO and the Bureau of Meteorology (BOM) in 2007. The CSIRO and BOM study looked at all four IPCC climate change scenarios (A1, A2, B1, B2) and predicted the change in a number of climate variables such as temperature, rainfall, snow, solar radiation, and wind for the years 2030, 2050 and 2070. The aim of the DECCW study was to refine the outputs from CSIRO and BOM study in order to provide local water utilities with climate change predictions at a more localised scale.

The results from all three studies suggest that mean monthly rainfall and runoff within the Namoi and New England regions is likely to increase slightly during summer months but decrease during winter. Overall however, the conclusion seems to be that availability of water from rainfall and runoff within these regions is likely to decrease as a result of climate change.

These three studies are discussed in more detail below:

Water Availability in the Namoi (CSIRO, 2007)

This study looked at four climate scenarios and compared the results from 15 different Global Climate Models (GCMs) to obtain best estimates for changes in future rainfall, runoff and evapotranspiration. The four scenarios were defined by historical and future climate, and current and future development:

- Scenario A - Historical climate and current development
- Scenario B - Recent climate and current development
- Scenario C - Future climate and current development
- Scenario D - Future climate and future development

The conceptual daily rainfall-runoff model, SIMHYD, was used in conjunction with the 15 GCMs to run a 112 year time series which estimated daily runoff in 29 (5km x 5km) subcatchments throughout the Namoi region for the four scenarios. The model was calibrated against historical daily streamflow data from 180 small to medium sized unregulated catchments within the Namoi system. Climate data was sourced from the Queensland Department of Natural Resources 'SILO Data Drill' which provides historical daily maximum and minimum temperatures, rainfall and evaporation over a 5km^2 grid.

Scenario A formed the baseline for which scenarios B through to D were compared and used historical rainfall data along with potential evapotranspiration determined from climate algorithms. Current development levels consider the average amount and types of land use and small farm conditions between the period of 1975 to 2005.

The notion of "recent climate", which forms part of Scenario B, refers to climate observed over the period between 1997 and 2006 that may be representative of future climate. That is, Scenario B aims to predict future rainfall and runoff based on the assumption that future climate will be similar to climate observed over that 10 year period. As the climate data over this period does not prove to be 'statistically significantly different' to the long term historical climate used in Scenario A, Scenario B was omitted from this study on the Namoi.

Scenario C assessed the change in rainfall, runoff and evapotranspiration based on future climate and current development. Scenario C also incorporated three subsets of the A1 climate change scenario derived in the IPCC SRES report. As mentioned previously, the IPCC SRES A1 scenario represents a globalised and integrated world economy with rapid economic growth and efficient new technologies.

The three subsets incorporated into Scenario C reflect various emission levels for the year 2030 compared to 1990 which are based on whether the world's energy needs are obtained from fossil fuels or non-fossil fuels. In summary, these subsets are:

1. A1F (High) – high fossil fuel consumption;
2. A1B (Medium) – balanced consumption between fossil fuels and non-fossil fuels; and
3. A1T (Low) –predominantly non-fossil fuel consumption.

These three subsets were modelled using a 112 year time series in the 15 GCMs producing a total of 45 results. These results represented the changes in rainfall, runoff and evapotranspiration for an enhanced climate around the year 2030.

From the 45 results obtained from Scenario C a 'dry', 'mid' and 'wet' variant was chosen, with the 'mid' (or median) result assumed to provide the best estimate. The 'dry' estimate was taken as the *second driest* result from the 45 runs and the 'wet' estimate taken as the *second wettest* result.

Scenario D follows on from Scenario C using the 'dry', 'mid' and 'wet' results but also considers the future expansion of farms dams and increases in land use including commercial forestry plantations and anticipated changes in groundwater extraction volumes.

The results for the climate change scenarios in the Namoi region are shown in Table 6-1. The accuracy of the results for the Scenario A model was considered 'relatively good' due to the high number of gauged catchments throughout the Namoi which allowed for accurate calibration. Scenario A gives mean annual rainfall and runoff quantities and actual evapotranspiration averaged over the Namoi region. Scenarios C and D give a percentage change based on the values from Scenario A.

Table 6-1 Rainfall, Runoff and Evaporation Predictions for the Namoi region at 2030 (CSIRO, 2007)

Scenario	Rainfall	Runoff	Evapotranspiration
A	633mm	24mm	609mm
B	-	-	-
Cdry	-10%	-31%	-9%
Cmedian (best estimate)	-2%	-6%	-2%
Cwet	13%	39%	12%
Ddry	-10%	-32%	-9%
Dmedian (best estimate)	-2%	-7%	-2%
Dwet	13%	38%	12%

The results illustrate that there is still a high degree of uncertainty regarding climate change and the impacts on rainfall and runoff. This is illustrated in the large difference in runoff results between the 15 GCMs which ranges between -31% and +39% for Scenario C and -32% and +38% for Scenario D.

Figure 6.2 shows the graphical outputs for the mean monthly rainfall and runoff modelling in the Namoi region.

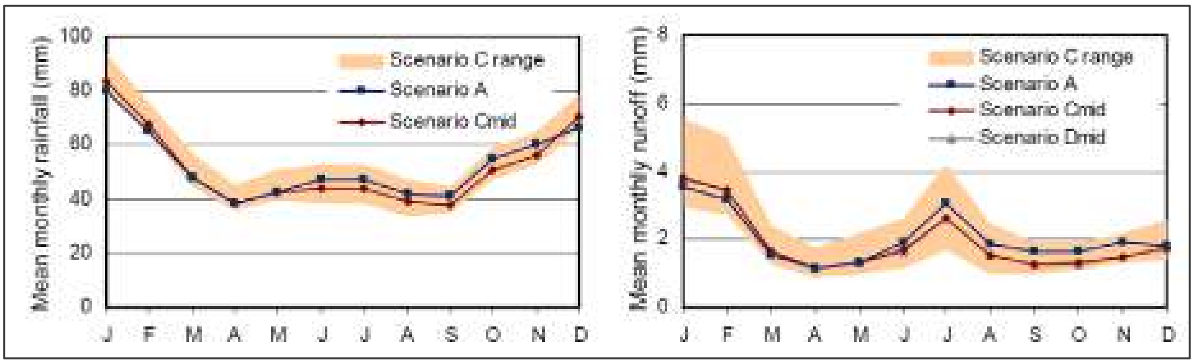


Figure 6.2 Mean monthly rainfall and runoff across the Namoi for various climate scenarios (CSIRO, 2007)

Figure 6.2 illustrates that from a seasonal point of view, runoff in the Namoi region is likely to increase slightly in summer months for both Scenarios C and D. Winter and spring however, will see a reduction in runoff. The pink shaded area shows the large area of uncertainty of results between the dry estimate and wet estimate for Scenario C (as highlighted in Table 6-1).

The CSIRO study also concluded that under the best estimate 2030 climate there would be:

- A 5% reduction in water availability
- An 8% reduction in end-of-system flows
- A 1% reduction in surface water diversions overall
- No reduction in Tamworth town water supply or Peel stock and domestic supply

Future Climate and Runoff Projections (~2030) (DWE, 2008b)

The second study, published by DWE in June 2008, described the potential changes to rainfall and runoff that may occur around 2030 (relative to 1990) in NSW and the ACT. Similar to the CSIRO study this report presented a range of runoff modelling results using a 112 year time series based on climate projections made from the same 15 GCMs. This study however focused specifically on the IPCC SRES A1B global warming scenario. As mentioned previously, this scenario assumes that the sources of energy used in the future will be balanced between fossil fuels and other energy sources. Further assumptions under the A1B global warming scenario are that global temperatures will increase by 0.9°C (from 1990 temperatures), future economic growth and development will be rapid and that global population will peak around 2050 and then begin to decline afterwards.

In a similar approach to the CSIRO study, a best estimate was given by taking the median result from all 15 GCMs, with the dry estimate and wet estimate taken as the *second driest* GCM result and the *second wettest* GCM result respectively.

Table 6-2 shows the median, 'dry', and 'wet' estimates in terms of a percentage change in the mean annual, mean summer and mean winter runoff around the Tamworth region (~2030 relative to ~1990).

Table 6-2 Percentage Change Mean Runoff for 2030 in Tamworth Region (DWE, 2008)

Description	Best Estimate	Dry Estimate	Wet Estimate
Mean Annual Runoff	-5 to +5%	-10 to -20%	+10 to + 20%
Mean Summer Runoff	+5 to +10%	-5 to -10%	+20 to +30%
Mean Winter Runoff	-10 to -20%	-20 to -30%	+10 to 20%

Figure 6.3 also shows the range of future monthly rainfall and runoff values in the Tamworth region compared to historical values.

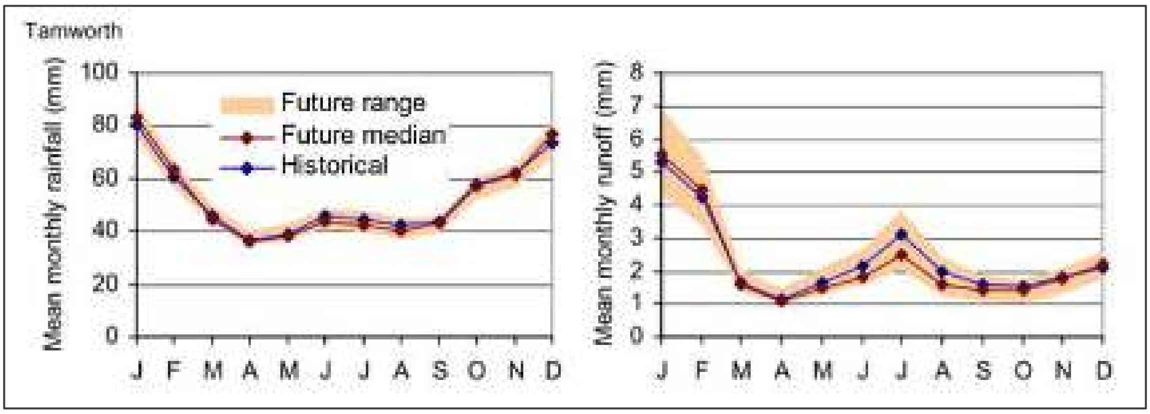


Figure 6.3 Mean Monthly Rainfall and Runoff in Tamworth Region (DWE, 2008)

Table 6-2 and Figure 6.3 illustrate that there is still a high degree of variability in the results from the 15 GCMs. As a general outcome of the DWE study, the median (or best estimate) over the entire NSW and ACT study area is a 5% decrease in mean annual runoff.

NSW Climate Impact Profile report (DECCW, 2010)

The two reports discussed above provide a comprehensive study of rainfall and runoff patterns predicted around the year 2030. The third report predicts the impacts of climate change in NSW further into the future at the year 2050. The report looked at a number of biophysical parameters such as rainfall, runoff, evaporation, flooding risk, soils, and biodiversity with the aim of predicting future impacts on these parameters at a regional scale around NSW. As mentioned previously, the results from this study were based on a previous study conducted by the CSIRO and BOM in 2007.

A total of 16 GCMs were evaluated and assessed based on their ability to accurately predict current day climate based on historical data. Four GCMs were found to show the highest degree of accuracy and hence were chosen for the study. Although the majority of GCMs were omitted from the report, the authors argued that reducing the number of GCMs based on the evaluation described above can reduce uncertainty by removing bias from weaker models.

A summary of the results are shown in Table 6-3 below.

Table 6-3 Rainfall, Runoff and Evaporation Predictions for New England region at 2050 (DECCW, 2010)

Season	Precipitation	Runoff	Evaporation
Annual Change	N/A	-7 to +18%	N/A
Summer Change	+10 to +20%	+6 to 23%	+10 to +20%
Winter Change	-10 to -20%	-21 to +11%	+5 to +20%

The runoff projections in Table 6-3 were based on the IPCC SRES A1B for the year 2030 and the precipitation and evaporation projections were based on IPCC SRES A2 for the year 2050. It should be noted that the authors argue that the A1B results for runoff in 2030 in the DWE study conducted in 2008 (DWE, 2008b) are most likely representative of runoff projections under scenario A2 at 2050. This is based on the idea that IPCC SRES A2 represents a more fragmented, regionalised and heterogeneous global economy growing at a slower rate than A1. The work undertaken by DECCW followed the work of CSIRO and BOM 2007 and DWE in 2008 as these studies were seen as the most informative and comprehensive datasets available at the time for localised runoff projections in NSW.

7 Review of Peel IQQM

7.1 General Model Description

IQQM (Integrated Quantity and Quality Model) is a water resource modelling tool developed by the former DLWC (now NSW Office of Water) in association with Queensland Department of Natural Resources. The primary module of the Peel IQQM is the River System Module, which simulates the movement of water in a river system. The headwater storages in the model are Chaffey Dam and Dungowan Dam, with the primary river component being the Peel River from Chaffey Dam to Carroll Gap (just upstream of the confluence with the Namoi River). A secondary river component, Dungowan Creek, is also modelled between Dungowan Dam and the Peel River.

The Peel River is split into three main river segments:

1. Chaffey Dam to the Piallamore gauge station
2. Piallamore gauge station to Paradise Weir gauge station
3. Paradise Weir gauge station to Carroll Gap gauge station

In simulating the movement of water down the river system, the model takes into account the following major processes:

- Operation of headwater storages (Chaffey & Dungowan Dams).
- Flow routing in rivers (Peel River and Dungowan Creek).
- System inflows such as headwater inflows, minor and major tributaries (Duncans Creek, Cockburn River & Goono Goono Creek), groundwater baseflow and effluent return flow (Tamworth).
- Extractions from the system, including town water demand (Tamworth), domestic & stock extractions (Dungowan pipeline and Peel River) and regulated irrigation extractions (Peel River).
- Losses from the system, including evaporation and groundwater recharge.
- Resource assessment process administered by NOW, including water availability, water orders, dams releases and environmental releases.

The river system is represented in the model by a series of nodes connected by links. Inflows, storages, outflows and other point processes are associated with nodes, while flow routing processes are associated with links – as shown in the Peel IQQM schematic diagrams in Appendix C.

As the Peel IQQM is not able to directly model groundwater sources, the Scott Road Drift Wells are not included in the model. While the Drift Wells may be an important backup supply during severe drought periods, they are not a primary supply source and therefore have not been included in the assessment of TWS yield.

7.2 Status of Model

The Peel IQQM was originally developed in the late 1990s / early 2000s and was subject to a partial peer review by Hunter Water Australia in 2002 in order to determine its suitability for assessing the hydrological impacts resulting from the reduction of effluent return flows from Westdale Sewage Treatment Plant (STP) to the Peel River. In association with the partial review, Hunter Water Australia worked with the modellers to make some minor improvements to the model. Soon after the Hunter Water Australia review, further modifications were made in association with Peel Valley irrigators. This early version of the model was used as the basis for the *Tamworth Bulk Water Supply Augmentation - Options Study* (HWA, 2005).

During the late stages of the above study (in 2004/05) the model was re-calibrated in association with extending the input data up to 2003/04. This first major re-calibration is described in the report, *IQQM Cap Implementation Summary Report – Issue 1* (DNR, 2006). This version of the Peel IQQM was the basis for the study undertaken by GHD on behalf of State Water, assessing the need for augmenting Chaffey Dam (GHD, 2006).

The latest version of the Peel IQQM was re-calibrated in 2008/09, with all input data extended to June 2008. This second major re-calibration of the model was undertaken prior to the preparation of the Water Sharing Plan for the Peel Valley (NOW, 2010) and included flow calibration to the drought period of 2003 – 2008.

The key drivers for this most recent re-calibration included:

1. The model was overestimating flows in the Peel River at Carroll Gap during the 2003 – 2007 dry period (the model had not previously been calibrated to a dry period).
2. The model area irrigated and associated diversions were not matching observed values very well from 2004.
3. The recorded Tamworth town water supply extractions from the Peel River resulted in more releases from Chaffey Dam and lower storage volumes than simulated during the 2003 – 2008 period.
4. The Sacramento modelled derived inflows to Dungowan Dam needed to be revised as the previous calibration was based on limited data.
5. There was potential to improve the calibration on the supplementary (off allocation) usage.

While most of the above issues were addressed in the recent model re-calibration – including a significant improvement in the modelling of flows during dry periods – the model is still subject to ongoing development and improvements.

The key areas for future improvements are the modelling of groundwater extractions near the river (in association with assessing the correlation between groundwater extractions and river losses) and the modelling of unregulated users in tributaries.

Based on Hunter Water Australia's review of the latest version of the Peel IQQM, the model is considered to be sufficiently accurate for the purposes of this study and any further improvements in the model will be subject to more accurate and comprehensive data being collected in the future – particularly in the areas of surface water / groundwater interaction, extractions from tributaries, inflows to Dungowan Dam and planted crop areas.

Schematic diagrams of the latest Peel IQQM have been included in Appendix C.

7.3 Key Model Inputs

Climate Data

The Peel IQQM assesses the long-term behaviour of the Peel River system using 117 years (1892 to 2008) of historical climate data on a daily time step. The key climatic parameters are daily rainfall, evaporation and temperature.

Historical rainfall was sourced from four BOM rainfall gauging stations across the Peel Valley, with the four sites representing the variation in rainfall across the catchment. Evaporation and temperature data were sourced from Tamworth Airport.

Climate data used for assessing various climate change scenarios was taken from the CSIRO Murray-Darling Basin Sustainable Yields Project (CSIRO, 2007) as discussed in Section 6.2. Scenario C was adopted (future growth and current development scenario), with climate change parameters predicted for the year 2030. As there were 15 GCMs and three emission scenarios under Scenario C, a total of 45 scenarios were considered in the CSIRO study. Due to modelling constraints and based on the results of the CSIRO study, a dry estimate (C_{dry}), wet estimate (C_{wet}) and median estimate (C_{median}) were taken from the 45 scenarios and used in the Peel IQQM.

Streamflow Data

Streamflow data is used for both model calibration and model simulation (for periods when streamflow data is available). The main gauge stations used in the calibration were:

- Peel River downstream of Chaffey Dam (GS419045)
- Peel River at Piallamore (GS419015)
- Peel River at Paradise Weir (GS419024)
- Peel River at Carroll Gap (GS419006)

Tributary inflows that were used in both the calibration and model simulations include:

- Dungowan Creek (GS419077)
- Duncans Creek (GS419036)
- Cockburn River (GS419016)
- Goonoo Goonoo Creek (419035)

Irrigation Data

Irrigators in the Peel Valley are represented by clustered groups based on the river reaches between the main streamflow gauges, as shown on the table below.

Table 7-1 Entitlements for each River Reach

Reach	Annual Entitlements (ML/a)				
	TWS	Irrigation (active)	Industrial & Mining	Stock & Domestic	TOTAL
Chaffey to Piallamore		6,010	0	14	6,024
Piallamore to Paradise Weir	16,400	3,663	236	60	20,359
Paradise Weir to Attunga		10,635	114	0	10,749
Attunga to Carroll Gap		8,412	365	11	8,788
Carrol Gap to Namoi River		1,371	0	9	1,380
Total	**16,400**	**30,091**	**715**	**94**	**47,300**

Resource Assessment & Environmental Releases

The current Peel IQQM has been modified to reflect the new operating rules under the Water Sharing Plan (NOW, 2010), including environmental release requirements for Chaffey Dam. The resource allocation process under the Water Sharing Plan is also included in the model.

The Resource Assessment calculation includes an allowance for a carry over reserve (COR), which is an additional allowance for High Security (HS) users, including Tamworth TWS, for the following year's demand under worst case historical conditions. The COR is used in the calculation of the irrigation allocation for any given month. It is added to the HS requirements for the remainder of the water year and forms part of the essential storage requirements for the dam that must be satisfied before water is made available for irrigators. The current COR for the Peel River system is 12 GL. This is approximately equivalent to 80% of the average annual demand for town water (ie 80% of 9 GL = 7 GL) plus an estimated 5 GL deficit between minimum dam inflows (7 GL) and minimum river losses (12 GL) between the dam and the town water extraction point.

The environmental release rules that are included in the model for both the existing (62GL) and proposed augmented (100GL) Chaffey Dam are as follows:

Existing Dam (62GL)

- If at the start of the water year the volume of water stored in Chaffey Dam is greater than 50,000 ML then the next 1,600 ML shall be set aside for a stimulus flow.
- If at the start of the water year the volume of water stored in Chaffey Dam is less than or equal to 50,000 ML then the first time during the water year the volume of water stored increases to more than 50,000 ML, then the next 1,600 ML shall be set aside for a stimulus flow.

- The stimulus flow will be for a period of 7 days with a maximum release of 500 ML/day occurring on the second day and may be released between 1 July and 31 August or between 1 March and 30 June, if a flow of 500 ML/day has not occurred in the Peel River at Piallamore in the preceding 90 days.
- A minimum daily release of 3ML will be made from Chaffey Dam.

Augmented Dam (100GL)

- In the event that Chaffey Dam is enlarged, then an Environmental Contingency Allowance (ECA) is to be set aside. Whenever an available water determination for the regulated source is made, an ECA account will be credited with a volume equal to 5,000 multiplied by the available water determination (generally 5,000ML).
- Water in the ECA account may be released to return some natural flow variability to the upper reaches of the Peel River. There will be no carry-over of unused water remaining in the ECA account at the end of the year.
- A minimum daily release of 3ML will be made from Chaffey Dam.

7.4 Key Model Outputs

The IQQM produces daily results for the historical period of record (117 years) for a variety of key variables, including: streamflows; dam storage levels and releases; TWS demands and extractions; irrigation orders and extractions; and resource allocation. Results are usually presented in statistical form to assist with determining the reliability of the system over the long term.

While the key focus of this study is the reliability of the TWS supply under various demand levels, TWS security cannot be considered in isolation to the reliability of irrigation supplies. This is due to the dual purpose nature of Chaffey Dam and the importance of Chaffey Dam in supplying TWS demands, particularly during dry periods.

The key outputs produced by the model associated with irrigation security and TWS security are discussed below.

Irrigation Security

In order to assess the impact on irrigators from increasing TWS consumption, several parameters that reflect irrigation security were assessed, including:

- Average annual total irrigation diversions
- Maximum allocation on 1 July and 1 October
- Median allocation on 1 July and 1 October

Total irrigation diversions represent the total volume of water extracted from the system by general security irrigators, including both on allocation (extractions of regulated flows) and off allocation (extractions of unregulated flows). Allocations represent the percentage of the licensed entitlement volume that general security irrigators can divert in the current water year during on allocation periods. Whilst allocations can increase during the water year (subject to water availability), they cannot be reduced until the start of the next water year (1 July).

For comparison purposes, it was assumed that irrigation security would become unacceptable once median allocation on 1 October was less than 50% (currently around 74%). The median allocation (or 50th percentile) is indicative of the typical allocation that would be available in most years. 1 October was considered to be a more useful comparison point as allocations typically increase above their starting point on 1 July each year and 1 October is considered to be more relevant to the irrigation season. While allocations may further increase after 1 October, planting decisions have generally been made by then.

TWS Security

Based on the previous bulk water supply study (HWA, 2005), the current definition of TWS security for Tamworth is:

Security of Supply	Total storage should not fall below a minimum total storage equivalent to one years restricted supply (plus any expected inflows and losses) during a repeat of the worst drought on record.
Levels of Service	Restrictions imposed no more than 5% of the time and no more frequently than every 10 years on average.

Based on the experiences of the recent severe drought period, only half of the minimum storage volume in Chaffey Dam would be available for TWS due to losses between the dam and Tamworth and the target for TWS consumption under level 5 restrictions was around 65% average demand. Therefore, in order to satisfy the above security criteria, minimum storage should not drop below a volume equal to TWS demand x 65% x 2 (based on 12 months restricted supply plus 50% losses) during the 117 year historical climate sequence.

The levels of service are not considered as critical as the security of supply criteria as they represent inconvenience and cost to the customer via the imposition of restrictions, as opposed to the security of supply criteria, which represents the risk of running out of water completely. Therefore, the assessment of modelling scenarios to-date has focused on the security of supply criteria only.

Consideration should be given to also adopting levels of service criteria for severe restrictions (ie Level 3, 4 or 5) which have a much larger impact on the community than Level 1 or 2 restrictions, which are more of an inconvenience. An assessment of the levels of service is included in Section 9.3.

8 Future Yield Estimates

The Tamworth Water Supply System has been modelled under existing conditions with Chaffey Dam storage at 62 GL, as well as augmented conditions with Chaffey Dam having an upgraded capacity of 100 GL. State Water has secured local, state and federal government funding to augment Chaffey Dam to 100 GL, with the dual purpose of providing increased security for the Peel River water users and providing improved environmental flows. Construction is currently expected to be completed by 2014/15.

TWS demand scenarios ranging from 9 GL/a to 20 GL/a have also been modelled.

Due to the nature of the Peel River system, the TWS yield cannot be directly calculated using the Peel IQQM. The process used to estimate the TWS yield was as follows:

1. The Peel IQQM was run under various TWS demand scenarios, with water sharing rules optimised (by increasing the COR) for each demand scenario to protect TWS security. If the TWS security criteria was not able to be achieved for a given demand scenario, no further analysis was undertaken.
2. For those scenarios where TWS security was achieved, further analysis of the results was undertaken in order to determine if irrigation security requirements were achieved.
3. The TWS yield for a given system configuration was defined as the maximum TWS demand that could be met while achieving both the TWS security and irrigation security criteria.

As outlined in Section 7.4, the assessment criteria was based on the assumptions that irrigation security would become unacceptable once median allocations on 1 October fell below 50% and that TWS security would become unacceptable if total available storage fell below a minimum total storage equivalent to one years restricted supply (plus any expected inflows and losses) during a repeat of the worst drought on record.

The results for key scenarios are presented below in summary form. The full set of results for all scenarios is included in Appendix B.

8.1 Existing System – Chaffey Storage 62 GL

Linearly Increasing COR

Existing system performance was initially assessed using TWS demands ranging from 9 GL/a to 17 GL/a and a linearly increasing carry over reserve (COR). Under these initial scenarios it was assumed that COR would increase in line with TWS demand.

Table 8-1 below shows the existing system performance under current and future TWS demands using a linearly increasing COR. The COR adopted for each demand scenario is shown in the table below, together with key results, including median irrigation allocations on 1 October, minimum allowable storage to satisfy TWS security criteria and minimum storage for each demand level. The cells shaded red indicate where the scenario failed the particular security criteria.

Table 8-1 Existing System Performance (Linearly Increasing COR)

Model Results	TWS Demands (GL/a)					
	9	10	11	12	14	17
IQQM Run No.	T02	T15	T16	T07	T08	T09
Carry Over Reserve (GL)	12	13	15	16	19	23
Median GS Allocation (1st Oct)	74%	68%	62%	56%	48%	34%
Irrigation Diversions (GL/a)	6.05	5.97	5.89	5.80	5.61	5.29
Minimum Allowable Storage (GL)	11.7	13.0	14.3	15.6	18.2	22.1
Minimum Storage (GL)	13.8	12.0	11.0	11.1	11.6	12.0

From the above results, it can be seen that:

- TWS security drops below the minimum acceptable security level for demands greater than 9 GL/a for a linearly increasing COR
- Irrigation security becomes critical around TWS demand of 13 - 14 GL/a
- The use of a linearly increasing COR does not sufficiently protect TWS security as TWS demands increase.

Based on these results, it was assumed that COR would need to optimised for each scenario (using a trial and error approach) in order to maximise TWS security for any given TWS demand level.

Optimised COR

Existing system performance was then assessed using a COR that had been optimised in order to achieve acceptable TWS security for future demands. The results of these scenario runs are shown in Figure 8.1 and in Table 8-2.

The shaded area in the graph indicates the demand levels at which either the irrigation security fails i.e. median allocation on 1 October falls below 50% or TWS security fails.

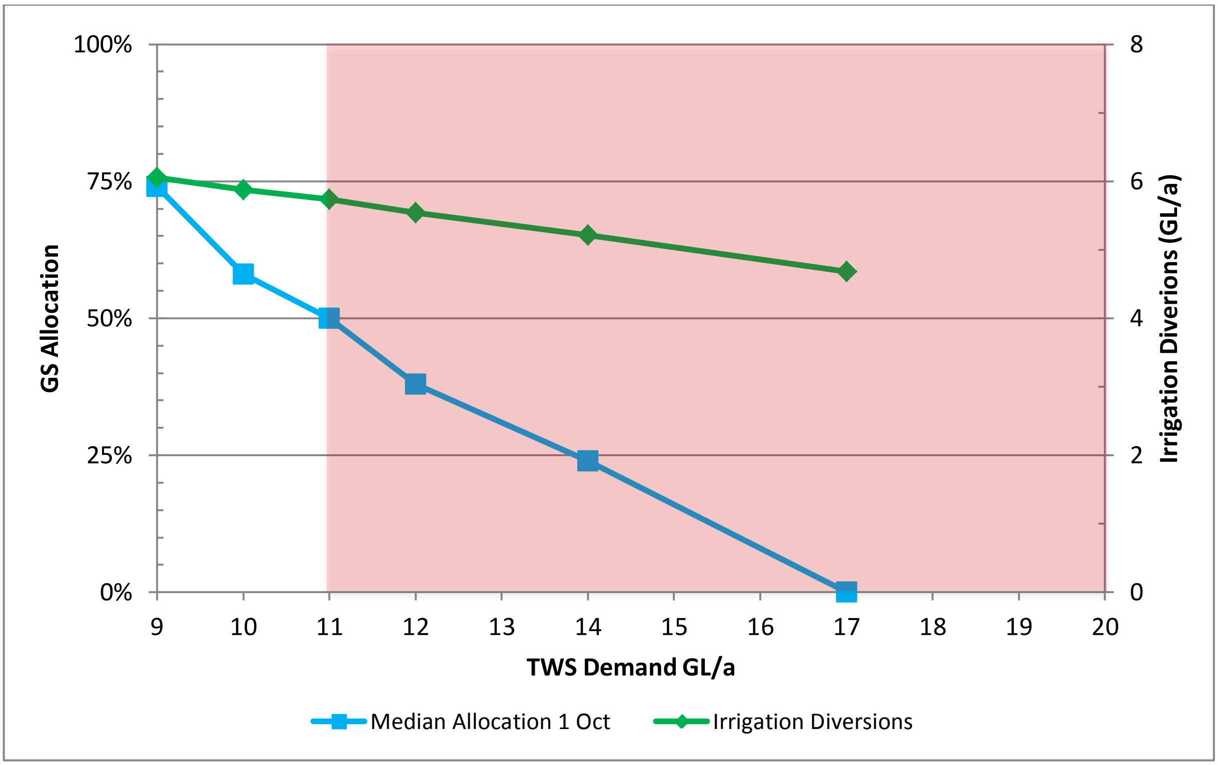


Figure 8.1 **Existing System Performance Results (Optimise COR to Protect TWS Security)**

Table 8-2 shows a tabulated version of the results from Figure 8.1.

Table 8-2 **Existing System Performance Results (Optimise COR to Protect TWS Security)**

Model Results	TWS Demands (GL/a)					
	9	10	11	12	14	17
IQQM Run No.	T02	T17	T18	T11	T12	T13
Carry Over Reserve (GL)	12	16.5	21	25	30	40
Median GS Allocation (1st Oct)	74%	58%	50%	38%	24%	0%
Irrigation Diversions (GL/a)	6.05	5.88	5.74	5.54	5.21	4.68
Minimum Allowable Storage (GL)	11.7	13.0	14.3	15.6	18.2	22.1
Minimum Storage (GL)	13.8	13.2	13.6	16.3	17.9	15.0

Note: Minimum storage requirements for TWS demands of 11GL/a and 14GL/a were assumed to be achievable with further COR optimisation

From the above results, it can be seen that:

- Acceptable TWS security up to demands of around 14 GL/a can be achieved with higher COR. However, acceptable TWS security is not achievable for demands of 17 GL/a, even with a very high COR of 50 GL and 0% general security (GS) allocation most of the time.
- While TWS security is acceptable up to a TWS demand of around 14 GL/a, irrigation security becomes critical around TWS demand of 11 GL/a.

Therefore, while the maximum theoretical TWS yield for the existing system is around 14 GL/a, this level of TWS demand would result in massive impacts on the irrigation industry. Taking into account both TWS and irrigation security, the TWS yield of the existing system is around 11 GL/a.

8.2 Augmented System – Chaffey Storage 100 GL

System performance was also modelled with an increased storage volume at Chaffey Dam of 100 GL. The augmented system performance was assessed with a range of TWS demands from 9 GL/a to 20 GL/a using an optimised COR, with the results summarised below in Figure 8.2 and Table 8-3.

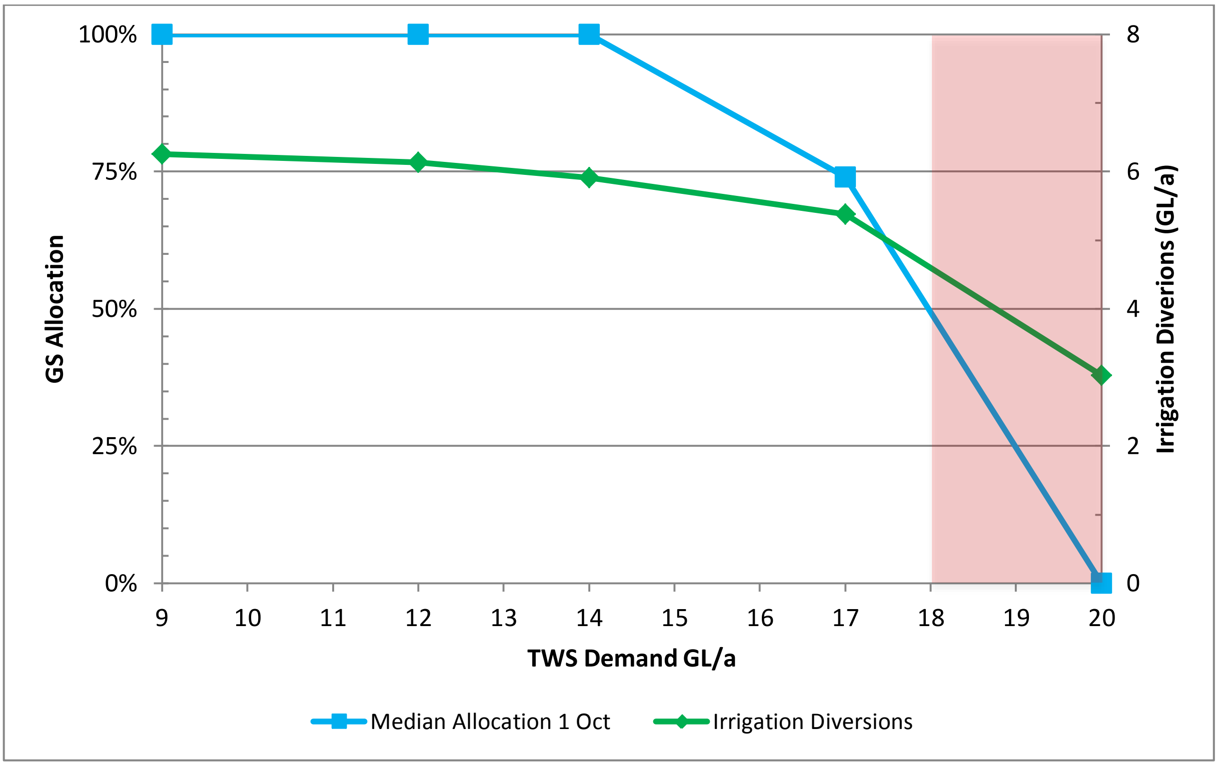


Figure 8.2 Augmented System Performance Results (Optimise COR to Protect TWS Security)

Table 8-3 shows a tabulated version of the results.

Table 8-3 Augmented System Performance Results (Optimise COR to Protect TWS Security)

Model Results	TWS Demands (GL/a)				
	9	12	14	17	20
IQQM Run No.	T32	T33	T37	T38	T39
Carry Over Reserve (GL)	12	16	26.5	36	80
Median GS Allocation (1st Oct)	100%	100%	100%	74%	0%
Irrigation Diversions (GL/a)	6.25	6.13	5.91	5.38	3.03
Minimum Allowable Storage (GL)	11.7	15.6	18.2	22.1	26.0
Minimum Storage (GL)	17.8	16.3	18.4	22.0	26.9

Note: Minimum storage requirements for TWS demands of 17GL/a was assumed to be achievable with further COR optimisation

From the above results, it can be seen that:

- TWS security is acceptable for all TWS demands up to and including 20 GL/a. However, to achieve an acceptable TWS security at 20 GL/a, the COR was increased to 80 GL, which resulted in a 0% GS allocation for most of the time.
- While TWS security is acceptable up to a TWS demand of around 20 GL/a, irrigation security becomes critical around 18 GL/a.

Therefore, while the maximum theoretical TWS yield for the augmented system is around 20 GL/a, this level of TWS demand would result in massive impacts on the irrigation industry. Taking into account both TWS and irrigation security, the TWS yield of the augmented system is around 18 GL/a. This is around 4 GL/a less than the current entitlement of 22 GL/a. However, the TWS yield of 18 GL/a for the augmented system is 7 GL/a more than the yield for the existing system, providing a significant increase in yield – to double the existing TWS demand level of 9 GL/a. In addition to the increase in TWS yield, irrigation security also improves significantly with median GS allocations increasing to 100% for TWS demands up to 14 GL/a, compared to current median GS allocations levels of around 74%.

It should be noted that significant increases in COR are required as TWS demands increase to ensure TWS security is maintained into the future. As the COR is currently set by NOW under the annual resource assessment process and is not directly covered by the Peel Valley Water Sharing Plan, it will be important for TRC to discuss with NOW the importance of increasing COR as TWS demand increase in the future.

While the augmentation of Chaffey Dam will significantly improve water security for users along the Peel River, future climate change conditions will most likely result in a reduction in water security over time. This is discussed further in Section 9.1 below.

9 Sensitivity Analysis

9.1 Climate Change Scenarios

The Peel IQQM was used to assess the potential impacts of climate change on the future yield of the Tamworth Water Supply System. The dry, median and wet results from Scenario C in the CSIRO report (CSIRO and Bureau of Meteorology, 2007) have been commonly used by NOW in recent times to undertake climate change modelling and therefore have been adopted for the Peel IQQM model. Scenario C is considered to represent the most likely climate and development scenario in the next 30 to 50 years. Therefore it could be assumed that the dry, median and wet results under Scenario C provide the most likely range of changes to rainfall and runoff as a result of climate change.

Climate change scenarios were modelled for a range of predicted demands for the years 2030 and 2040, which is consistent with the timing of climate forecasts used in the climate change scenarios discussed in Section 6. The results that follow provide an indicative estimate for changes in runoff and TWS security which may occur around the year 2030.

TWS demands ranged from 12 GL/a to 17 GL/a - representing the lower and upper forecast demands at 2040. All climate change scenarios were modelled on the assumption that the future capacity of Chaffey Dam will be 100 GL.

The impact of climate change was initially assessed by considering the impact on end of system flows, which gives an indication of the net reduction in runoff and therefore total water availability due to climate change scenarios. The potential impacts on TWS security and irrigation security for various TWS demand levels were then also considered.

End of System Flows

Changes in end of system flows at Carroll Gap can provide an indication of how much water is removed or added to the Peel River system under various climate change scenarios.

Table 9-1 shows the results from the Peel IQQM highlighting actual change, as well as percentage change, in flows at Carroll Gap under dry, median and wet future climates scenarios compared to current flows. These percentage changes have been compared to the changes in runoff predicted in the DWE and CSIRO reports discussed in Section 6.

Table 9-1 End of System Flows (Carroll Gap) for Various Climate Change Scenarios

Climate Change Scenario	IQQM Results			DWE 2008 (Tamworth Region)	CSIRO 2007 (Namoi Region)
	Average Flow in 2030 (GL/a)	Average Change from Current Flow (GL/a)	Average Percentage Change from Current Flow	Predicted Percentage Change Mean Annual Runoff	Predicted Percentage Change Mean Annual Runoff
Current Conditions	246	-	-	-	-
Dry	187	-60	-24%	-10 to -20%	-31%
Median	226	-21	-8%	-5 to +5%	-6%
Wet	338	+91	+37%	+10 to +20%	+39 %

The outputs from the Peel IQQM suggest that flows at Carroll Gap under current climate will remain around 250 GL/a for demands between 9 GL/a and 17 GL/a. This is assuming that the COR in Chaffey Dam is increased under each demand level in order to meet TWS demand.

As previously mentioned, the Peel IQQM climate change modelling was based on the results from the CSIRO study. The Peel IQQM results shown in Table 9-1 for all dry, median and wet climate scenarios line up reasonably well with the CSIRO predicated estimates, producing a dry estimate of average percentage change in flow of -24%, a wet estimate of +37% and a median estimate of -8%.

Table 9-1 also shows that the DWE study produced a narrower range of percentage change of mean annual runoff i.e. between -15% (for Dry) and +15% (for Wet) compared with the CSIRO report. The predictions from CSIRO produced a range of volume change for mean annual runoff of -31% as the Dry estimate and +39% as the Wet estimate. The difference in results from the two studies is most likely due to the number of global warming scenarios used in the GCM modelling and hence the number of modelled GCM outputs used to derive the dry, median and wet estimates.

The DWE study focused solely on the IPCC SRES A1B global warming scenario under Scenario C (future climate and current development), discussed earlier in Section 6.3, which produced a total of 15 results from 15 GCMs. The dry, median and wet results were then taken as the *second* driest result for the dry estimate, the median range taken as the median result and the wet estimate taken as the *second* wettest result.

The CSIRO report looked at the 3 subset IPCC SRES global warming scenarios (High - A1F, Medium - A1B, Low - A1T) within Scenario C, also discussed in Section 6.3. Using the same 15 GCMs as the DWE study, a total of 45 results were obtained (3 global warming scenarios x 15 GCMs). Similarly with the DWE study, the dry estimate was taken as the *second* driest result from 45 GCM outputs, the median estimate taken as the median result and the wet estimate taken as the *second* wettest result. It is therefore reasonable to assume that the CSIRO study produced a broader range of results between the dry and wet estimates due to the broader range of global warming scenarios used.

System Yields under Climate Change

The results for TWS and irrigation security under the various climate change and demand levels are shown in Figure 9.1 below.

The darker shaded area indicates the demand levels at which irrigation security fails under a median climate change scenario, while the lighter shaded area indicates the demand levels at which irrigation security fails under a dry climate change scenario.

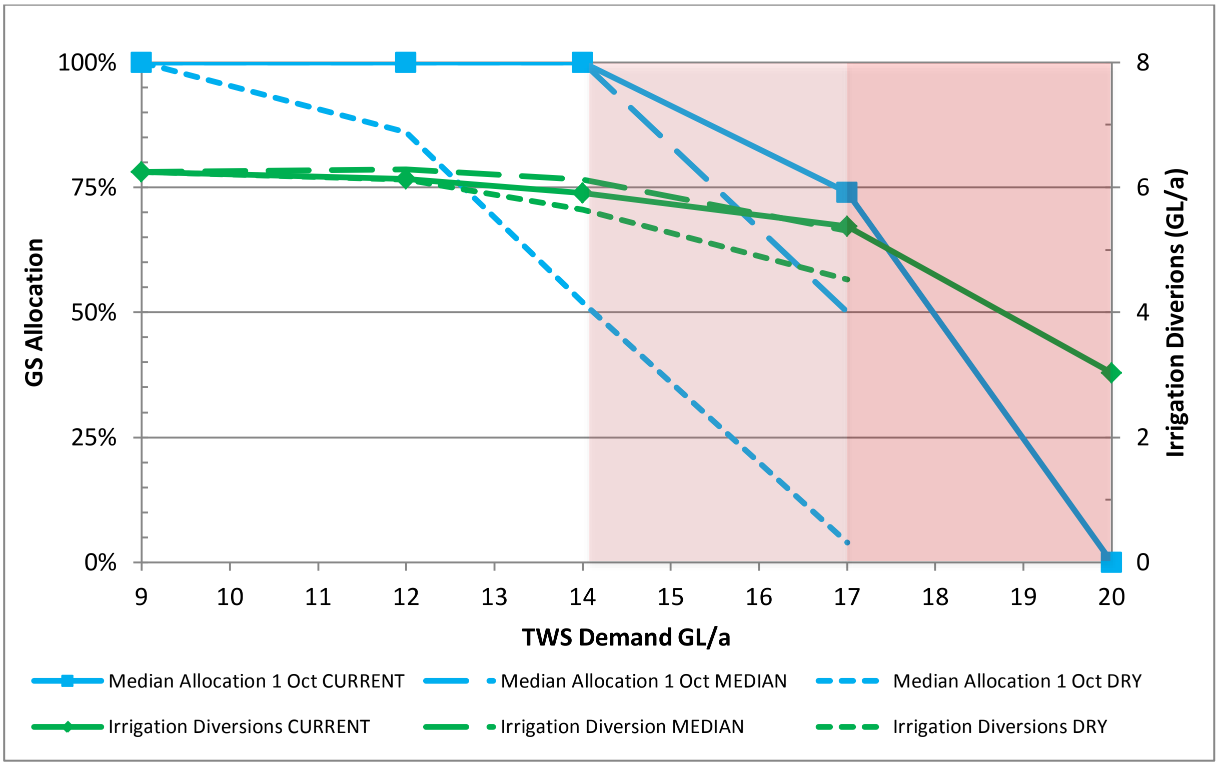


Figure 9.1 Augmented System Performance with Climate Change (Median & Dry Scenarios)

Table 9-2 shows a tabulated version of the results.

Table 9-2 Augmented System Performance with Climate Change (Median & Dry Scenarios)

Model Results	TWS Demands (GL/a)			
	9	12	14	17
Dry Scenarios - IQQM Run No.	T32	T43	T45	T48
Median GS Allocation (1st Oct)	100%	86%	52%	4%
Irrigation Diversions (GL/a)	6.25	6.12	5.64	4.53
Minimum Allowable Storage (GL)	11.7	15.6	18.2	22.1
Minimum Storage (GL)	17.8	15.7	18.4	20.3
Median Scenarios - IQQM Run No.	T32	T44	T46	T49
Median GS Allocation (1st Oct)	100%	100%	100%	50%
Irrigation Diversions (GL/a)	6.25	6.29	6.12	5.3
Minimum Allowable Storage (GL)	11.7	15.6	18.2	22.1
Minimum Storage (GL)	17.8	15.7	18.4	22.4

Table 9-2 shows that if the projected demand under average growth in 2030 is 12 GL/a, the Peel system is able to cope under dry, median or wet climate change conditions. If higher growth occurs resulting in a demand of 14GL/a in 2030 then irrigation allocation on 1st October under a dry climate will fall to 52%, slightly above the irrigation security criteria target. In a median climate however, irrigation security remains at 100% allocation at a demand of 14 GL/a. Beyond 14 GL/a irrigation security continues to deplete with median allocation falling to 4% under a dry climate as demand level approaches 17 GL/a. Under the median climate, median allocation falls to 50% at 17 GL/a.

In summary, the Peel system is able to supply a TWS demand of up to 14 GL/a under dry climate change conditions and up to 17 GL/a under median climate change conditions.

Limitations of Climate Change Scenarios

The results presented above were determined by generating future rainfall patterns in the Peel IQQM from scaled historical rainfall patterns based on the outputs of the dry, median and wet estimates determined in the CSIRO report (CSIRO, 2007). The scaling of historical rainfall to forecast future rainfall patterns is only one aspect of climate change and does not incorporate other climate related impacts such as the frequency and/or duration of drought. This is seen as one of the main limitations of the current inputs into the model as future rainfall patterns may not be represented by historical patterns from the past 100 years, particularly if a drier climate is observed in the future.

Future studies that consider future drought predictions (including frequency and duration of drought) as a direct result of climate change may help in refining the inputs into the Peel IQQM and provide a more accurate prediction of future yield estimates in the TWS system.

9.2 Decommission Dungowan Dam

The increased storage from an augmented Chaffey Dam may provide enough security to service Tamworth's water supply needs without the need for Dungowan Dam, at least in the short term. This is dependent on future demands, irrigation security, and also the potential impacts of climate change . Consequently, scenarios involving the decommissioning of Dungowan Dam have also been assessed.

The Peel IQQM model was adjusted to supply 100% of TWS demand from Chaffey Dam (at 100 GL capacity), with Dungowan Dam only providing environmental releases as required. Median climate change conditions were also included in the scenario and the results are shown in Figure 9.2 and Table 9-3 below.

The results show that without Dungowan Dam, irrigation security becomes critical at a TWS demand of around 15 GL/a, compared to 17 GL/a with Dungowan Dam. Under average demand projections, a TWS demand of 15 GL/a will not be reached before 2040 which suggests that the decommissioning of Dungowan Dam will not dramatically impact TWS security in the short to medium term. However, once TWS demand exceeds 15 GL/a, TWS security will become unacceptable and the additional yield provided by Dungowan Dam (estimated to be around 2 GL/a) will again become critical.

While the above results are not conclusive, the option of decommissioning Dungowan Dam may be worth further consideration within the context of the ongoing costs of maintaining both Dungowan Dam and the Dungowan Pipeline.

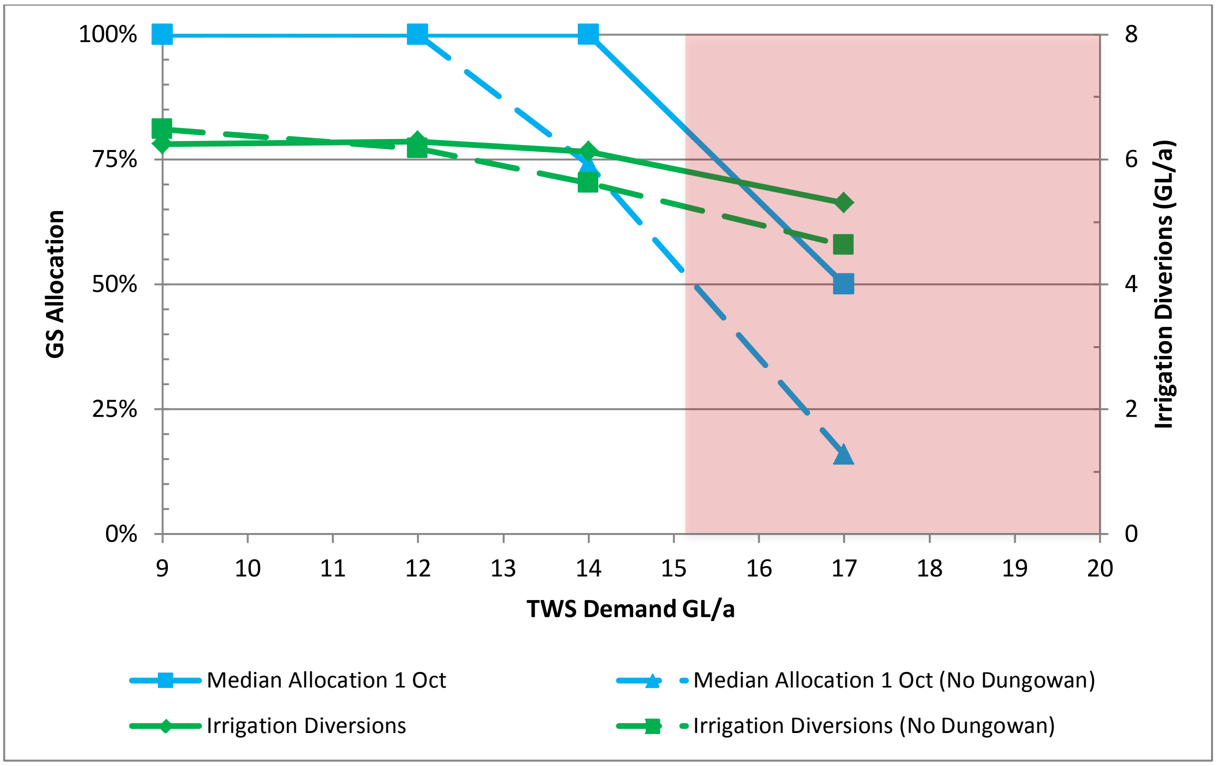


Figure 9.2 Augmented System Performance with 100% Supply from Chaffey Dam (assuming Median Climate Change)

Table 9-3 Augmented System Performance with 100% Supply from Chaffey Dam (assuming Median Climate Change)

Model Results	TWS Demands (GL/a)			
	9	12	14	17
With Dungowan Dam - IQQM Run No.	T32	T44	T46	T49
Median GS Allocation (1st Oct)	100%	100%	100%	50%
Irrigation Diversions (GL/a)	6.25	6.29	6.12	5.3
Minimum Allowable Storage (GL)	11.7	15.6	18.2	22.1
Minimum Storage (GL)	17.8	15.8	18.4	22.4
Without Dungowan Dam - IQQM Run No.	T52	T55	T58	T61
Median GS Allocation (1st Oct)	100%	100%	74%	16%
Irrigation Diversions (GL/a)	6.48	6.17	5.62	4.63
Minimum Allowable Storage (GL)	11.7	15.6	18.2	22.1
Minimum Storage (GL)	14.3	15.7	18.3	22.1

9.3 Levels of Service

The current levels of service criteria adopted for the Tamworth water supply system are based on the average duration and frequency of any restrictions being imposed - ie restrictions of any kind are not to be imposed more than 5% of the time and no more frequently than every 10 years on average. Based on the current Drought Management Plan (HWA, 2007b), restrictions are first imposed when Chaffey Dam falls below 50% total storage or 31 GL based on the current dam storage of 62 GL. The trigger for Level 1 restrictions (Chaffey Dam at 50%) was set by TRC as the logical storage volume for informing the community about the increased scarcity of water. This volume is in line with the volume that would result in a 0% allocation for GS irrigators at the commencement of the water year (1 July).

As shown below in Table 9-4, under the base model scenario which represents existing demand levels and existing system configuration, restrictions occur 10% of the time and every 8 years on average. While these results would fail the above levels of service criteria, the current TWS security is acceptable with TWS yield estimated to be around 11 GL/a. The duration and frequency of moderate to severe restrictions (Level 3 to 5) is more acceptable, with restrictions of Level 3 or worse occurring 4% of the time and every 13 years on average. Under future TWS demand scenarios, higher CORs result in improved levels of service, with the frequency of restrictions exceeding 10 years and the duration being only slightly higher than 5%. This would suggest that the current restriction rules and levels of service criteria are adequate for the existing system configuration – ie Chaffey Dam storage of 62 GL.

Table 9-4 Duration & Frequency of Restrictions

Model Results	TWS Demands (GL/a)			
	9	12	14	17
Existing System Performance – IQQM Run No.	T02	T11	T12	T13
Duration of Restrictions - Level 1+ (% Time)	10%	7%	6%	6%
Frequency of Restrictions - Level 1+ (Years)	1 in 8	1 in 12	1 in 13	1 in 13
Duration of Restrictions - Level 3+ (% Time)	4%	1%	2%	2%
Frequency of Restrictions - Level 3+ (Years)	1 in 13	1 in 29	1 in 17	1 in 19
Augmented System Performance – IQQM Run No.	T32	T33	T37	T38
Duration of Restrictions - Level 1+ (% Time)	10%	13%	14%	12%
Frequency of Restrictions - Level 1+ (Years)	1 in 7	1 in 6	1 in 5	1 in 5
Duration of Restrictions - Level 3+ (% Time)	4%	6%	5%	5%
Frequency of Restrictions - Level 3+ (Years)	1 in 17	1 in 13	1 in 13	1 in 23

Under the augmented system scenarios, with Chaffey Dam storage of 100 GL, the restriction triggers were maintained at the same storage percentage, resulting in higher storage volumes for each trigger – eg 50 GL for Level 1 restrictions compared to 31 GL for the existing system configuration. This resulted in the duration and frequency of all restrictions (Level 1 or higher) being relatively high – around twice the target values (as shown on Table 9-4). This would suggest that the restriction triggers for the Tamworth water supply will need to be reset after the augmentation of Chaffey Dam to ensure the duration and frequency of restrictions are not excessive compared to target levels.

Consideration should be given to adopting additional levels of service criteria that relate to the duration and frequency of moderate to severe restrictions (ie Level 3 or higher). The impacts on the community of moderate to severe restrictions are significantly more costly than minor restrictions, which are more an inconvenience. The Drought Management Plan will need to be reviewed and updated in association with the augmentation of Chaffey Dam. This is an opportunity to review both the restriction triggers and the levels of service criteria.

10 Conclusions

Yield estimates for the Tamworth water supply system have been determined for both the current bulk supply system and the future system, once the planned upgrade of Chaffey Dam from 62 GL to 100 GL is complete. Yield modelling has been undertaken using the Peel IQQM and the study has also considered the potential impacts of climate change on future yields and also the potential impacts of decommissioning Dungowan Dam.

Key results from the study are summarised below, followed by a discussion of opportunities for future work.

10.1 Key Results

TWS yield estimates have been determined for both the existing and future augmented system, along with several sensitivity scenarios, as summarised below in Table 10-1.

Table 10-1 Future Yield Estimates - Summary

Scenario	TWS System Yield Estimate
Existing System / Chaffey Dam 62 GL	11 GL/a
Augmented System / Chaffey Dam 100 GL	18 GL/a
Augmented System / Median Climate Change	17 GL/a
Augmented System / Dry Climate Change	14 GL/a
Augmented System / Decommission Dungowan Dam *(Median Climate Change)*	15 GL/a

The table shows that the TWS yield for the augmented system of 18 GL/a is 7 GL/a more than the yield estimate for the existing system. Therefore, the Chaffey Dam augmentation provides a significant increase in TWS security. In addition, irrigation security also improves significantly. While the augmentation of Chaffey Dam does have a significant impact on TWS security, the current town water entitlement of 22 GL/a is still not achievable. In addition, it needs to be highlighted that significant increases in COR are required as TWS demands increase to ensure TWS security is maintained into the future.

The increase in TWS yield is likely to be at least partly offset by future climate change conditions, with around 1 GL/a reduction expected under median climate change predictions and around 4 GL/a reduction under dry climate change predictions.

Based on the limited modelling undertaken, decommissioning Dungowan Dam would result in around a 2 GL/a reduction in TWS yield. While this is not likely to impact TWS security significantly in the short term, TWS demands could reach 15 GL/a within the next 30 years (based on the high growth scenario) and would therefore trigger the need for an additional water supply source. The option of decommissioning Dungowan Dam may be worth further consideration within the context of the ongoing costs of maintaining both Dungowan Dam and the Dungowan Pipeline, compared to other water supply options.

The TWS yield scenarios have been compared to projected TWS demands to assess the potential timing of when demand may outstrip supply, as shown on Figure 10.1 below. The figure shows that the yield estimate of 18 GL/a for the augmented system is well above all 30 year demand projections. However, the yield estimate under median climate change (17 GL/a) is in line with high growth demand projections for 2040 and under the more severe dry climate change scenario, the yield estimate of 14 GL/a is slightly under the 2040 average growth demand projection.

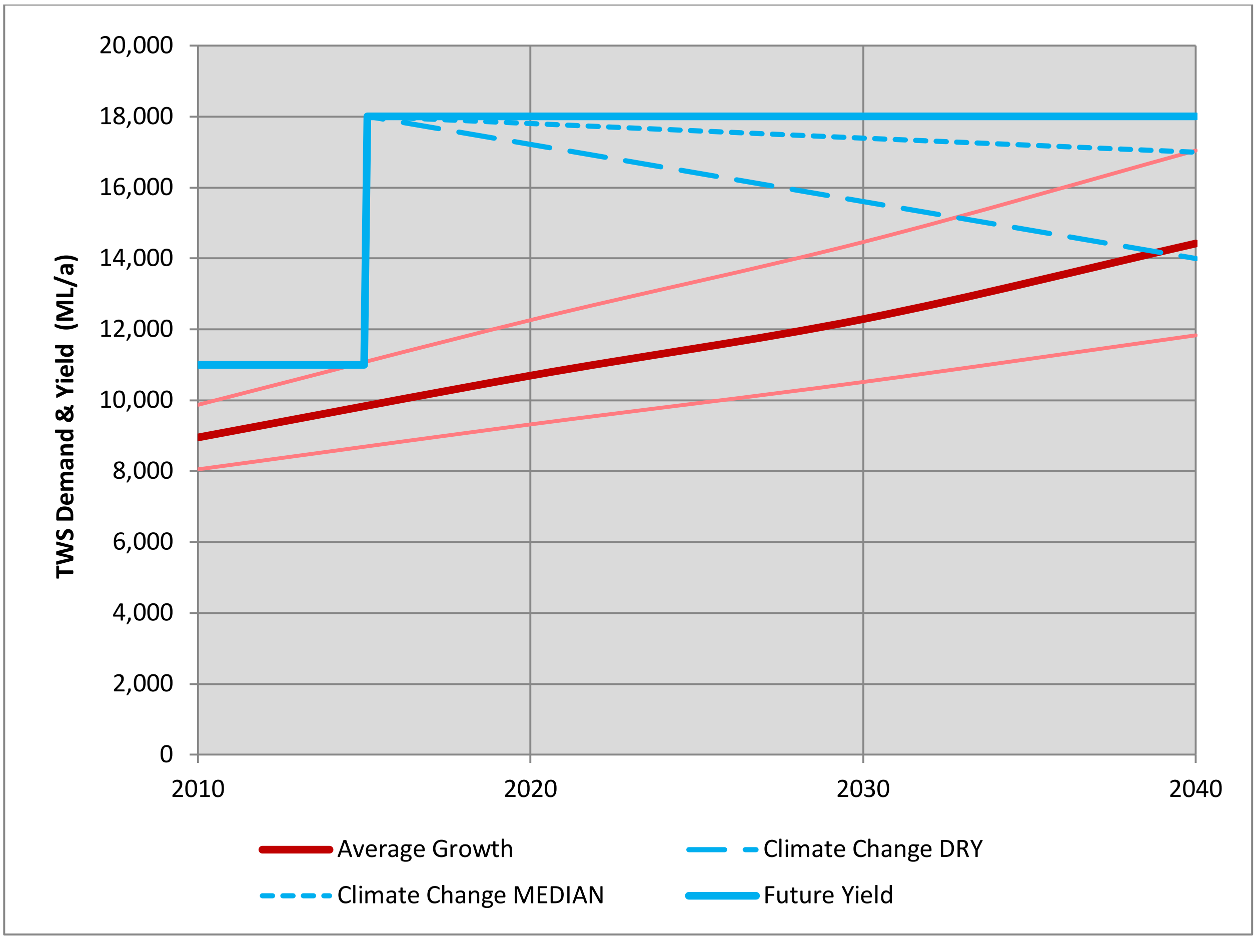


Figure 10.1 Future Yield Estimates versus Demand Projections – Tamworth Water Supply

10.2 Future Work

Estimates of TWS yield for Tamworth are subject to many variables, including model accuracy, future climate variability, future climate change conditions and the criteria for TWS and irrigation security and TWS levels of service. Each of these variables should be periodically reviewed and reassessed in order to improve the accuracy of yield estimates.

Consequently, the following future work is recommended:

- Periodic recalibration of the Peel IQQM in association with NOW (at least 5 yearly)
- Reassessment of TWS yields whenever the Peel IQQM is recalibrated and/or additional climate change scenarios become available
- Review restriction triggers and the levels of service criteria in association with a revision of the Drought Management Plan to coincide with the augmentation of Chaffey Dam. Consideration should be given to adopting additional levels of service criteria that relate to the duration and frequency of moderate to severe restrictions (ie Level 3 or higher).
- Undertake further modelling to further assess the impacts of decommissioning Dungowan Dam in association with assessing the ongoing costs to maintain the dam and pipeline, including potential future safety improvement upgrades. In assessing the viability of decommissioning Dungowan Dam, the cost of alternative supply sources should also be considered.
- Commence discussions with relevant State Government Departments/Enterprises (including NSW Office of Water) concerning increasing carry over reserve in Chaffey Dam as Tamworth's TWS demand increases.

11 References

CSIRO. (2007). *Water Availability in the Namoi - A Report to the Australian Government from the CSIRO Murray-Darling Basin Sustainable Yields Project.* Australia: CSIRO.

CSIRO and Bureau of Meteorology. (2007). *Climate change in Australia: technical report 2007 http://climatechangeinaustralia.gov.au/documents/resources/TR_Web_FrontmatterExecSumm.pdf.*

DECCW. (2010). *NSW Climate Impact Profile.* Sydney: NSW Department of Environment, Climate Change and Water.

Department of Environment Climate Change and Water. (2010). *NSW Climate Impact Profile.* NSW Government.

DIPNR. (2004). *Water Sharing Plan for the Upper Namoi & Lower Namoi Regulated River Water Sources (2004).* NSW Dept Infrastructure, Planning & Resources.

DNR. (2006). *IQQM Cap Implementation Summary Report - Issue 1.* Sydney: NSW Department of Natural Resources.

DWE. (2008b). *Future climate and runoff projections (~2030) for New South Wales and Australian Capital Territory.* Sydney: NSW Department of Water & Energy.

GHD. (2006). *Chaffey Dam Upgrade - Need for Augmentation.* Sydney: Prepared for State Water.

HWA. (2005). *Tamworth Bulk Water Supply Augmentation - Options Study (Final Draft).* Tamworth Regional Council: Hunter Water Australia .

HWA. (2007a). *Tamworth Regional Council Demand Management Plan.* Tamworth Regional Council: Hunter Water Australia.

HWA. (2007b). *Tamworth Regional Council Drought Management Plan.* Tamworth Regional Council: Hunter Water Australia.

HWA. (2008). *Tamworth Water Supply: Options to Improve Efficiency & Management of Raw Water Sources (2nd Draft).* Tamworth Regional Council: Hunter Water Australia.

HWA. (2010a). *Strategic Business Plan for Water Supply Services.* Tamworth Regional Council: Hunter Water Australia.

HWA. (2010b). *Strategic Business Plan for Sewerage Services.* Tamworth Regional Council: Hunter Water Australia.

IPCC. (2007). *Climate Change 2007: The Physical Science Basis. Contributions of Working Group 1 to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.* Prepared by Intergovernmental Panel on Climate Change: Cambridge University Press.

IPCC. (2008). *Climate Change and Water, IPCC Technical Paper VI.*

NOW. (2010). *Water Sharing Plan: Peel Valley Regulated, Unregulated, Alluvial and Fractured Rock Water Sources - Background Document.* NSW Office of Water.

NOW. (2012). *2010-11 NSW Water Supply and Sewerage Performance Monitoring Report.* Sydney: NSW Office of Water.

NSW Water Directorate. (2010). *Tamworth Regional Council Villages Water Loss Investigation Report.* Joint initiative of NSW Water Directorate & Local Government & Shire Association.

TRC. (2011). *TRC Water Sustainability Strategy 2011 - 2014.* Tamworth Regional Council.

Appendix A
Demand Scenarios

Appendix A – Demand Scenarios

Table A1 Tamworth Water Supply System – Adopted Demand Projections

SCENARIO	PROJECTED DWELLINGS				
	2009	2010	2020	2030	2040
Low (0.75% pa)	15,748	15,866	17,097	18,423	19,853
Average (1.0% pa)	15,748	15,905	17,570	19,408	21,438
High (1.25% pa)	15,748	15,945	18,054	20,442	23,146

LOW GROWTH SCENARIO (250 kL/a / 0.75% growth)	DEMAND PROJECTIONS				
	2009	2010	2020	2030	2040
Residential	3,940	3,970	4,270	4,610	4,960
Commercial	810	820	880	940	1,020
Industrial (inc. food processing)	1,390	1,390	1,390	1,390	1,390
Public Parks	400	400	400	400	400
Other (incl rural, institutions)	460	460	500	540	580
Residential Expansion (incl. Kootingal/Moonbi/Nemingha)	200	220	240	280	380
Residential Expansion (incl. Attunga/Duri/Dungowan)	-	-	160	260	370
Future Industrial Expansion	-	-	550	1,050	1,550
Losses (10% fixed)	800	810	930	1,050	1,180
TOTAL	**8,000**	**8,070**	**9,320**	**10,520**	**11,830**

AVERAGE GROWTH SCENARIO (300 kL/a / 1.0% growth)	DEMAND PROJECTIONS				
	2009	2010	2020	2030	2040
Residential	4,720	4,770	5,270	5,820	6,430
Commercial	810	820	900	1,000	1,100
Industrial (inc. food processing)	1,390	1,390	1,390	1,390	1,390
Public Parks	400	400	400	400	400
Other (incl rural, institutions)	460	460	530	570	630
Residential Expansion (incl. Kootingal/Moonbi/Nemingha)	200	220	260	310	450
Residential Expansion (incl. Attunga/Duri/Dungowan)	-	-	210	310	500
Future Industrial Expansion	-	-	660	1,260	2,080
Losses (10% fixed)	890	900	1,070	1,230	1,440
TOTAL	**8,870**	**8,960**	**10,690**	**12,290**	**14,420**

HIGH GROWTH SCENARIO (350 kL/a / 1.25% growth)	DEMAND PROJECTIONS				
	2009	2010	2020	2030	2040
Residential	5,510	5,580	6,320	7,150	8,100
Commercial	810	820	930	1,050	1,190
Industrial (inc. food processing)	1,390	1,390	1,390	1,390	1,390
Public Parks	400	400	400	400	400
Other (incl rural, institutions)	460	470	530	600	680
Residential Expansion (incl. Kootingal/Moonbi/Nemingha)	200	220	320	370	470
Residential Expansion (incl. Attunga/Duri/Dungowan)	-	-	260	380	540
Future Industrial Expansion	-		880	1,680	2,580
Losses (10% fixed)	970	990	1,230	1,450	1,710
TOTAL	**9,740**	**9,870**	**12,260**	**14,470**	**17,060**

Appendix B
Yield Scenarios

IQQM SCENARIOS - TAMWORTH FUTURE YIELD SCENARIOS PROJECT (2850-010)

SCENARIO / RUN #	R107	T01	T02	EXISTING DAM SCENARIOS											
				T15	T16	T07	T08	T09	T10	T17	T18	T11	T12	T13	T14
AUGMENTATION OPTION	OLD BASE	W59 re-run with Effluent Return	NEW BASE W59 re-run without Effluent Return	Future Demands (11 - 20 GL/a)						Future Demands (11 - 20 GL/a)					
COR FIXED / VARIABLE				Linear Increase in COR						COR Increased to Achieve Min Storage Target (where possible)					
CLIMATE CHANGE SCENARIO															
CHAFFEY DAM CAPACITY (GL)	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
REVISED TOWN WATER DEMAND (GL)	9	9	9	10	11	12	14	17	20	10	11	12	14	17	20
REVISED COR (GL)	12.0	12.0	12.0	13.0	15.0	16.0	19.0	23.0	27.0	16.5	21.0	25.0	30.0	40.0	50.0
EFFLUENT RETURN FLOWS (ML/d)	4.3	4.3	-	-	-	-	-	-	-	-	-	-	-	-	-
IRRIGATION DIVERSIONS															
Average annual irrigation diversion (GL/a)	6.58	6.06	6.05	5.97	5.89	5.80	5.61	5.29	5.07	5.88	5.74	5.54	5.21	4.68	5.07
IRRIGATION SECURITY (JULY)															
Percentage of time allocation = 0% on 1st July	9%	9%	10%	10%	16%	21%	26%	40%	68%	16%	22%	28%	44%	100%	68%
Mean allocation on 1st July	55%	52%	51%	46%	40%	34%	25%	12%	3%	38%	30%	20%	9%	0%	3%
Median allocation on 1st July	70%	64%	62%	56%	50%	44%	30%	8%	0%	50%	36%	24%	4%	0%	0%
Max Allocation on 1st July	78%	72%	72%	68%	60%	54%	46%	28%	12%	58%	50%	36%	20%	0%	12%
Probability of 80%+ allocation on 1st July	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Probability of 50%+ allocation on 1st July	68%	67%	65%	58%	55%	44%	0%	0%	0%	50%	31%	0%	0%	0%	0%
IRRIGATION SECURITY (OCT)															
Percentage of time allocation = 0% on 1st Oct	4%	4%	4%	5%	10%	11%	16%	25%	37%	9%	11%	17%	24%	100%	37%
Mean allocation on 1st October	64%	61%	60%	55%	49%	43%	34%	22%	11%	47%	38%	27%	16%	0%	11%
Median allocation on 1st October	78%	74%	74%	68%	62%	56%	48%	34%	18%	58%	50%	38%	24%	0%	18%
Max Allocation on 1st October	78%	78%	78%	72%	66%	60%	48%	34%	20%	64%	50%	40%	26%	0%	20%
Probability of 80%+ allocation on 1st Oct	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Probability of 50%+ allocation on 1st Oct	78%	76%	76%	74%	71%	65%	0%	0%	0%	69%	58%	0%	0%	0%	0%
TWS SOURCE															
TWS Diversion (GL/a)	8.84	8.81	8.78	9.96	10.97	11.98	14.03	16.95	20.16	10.02	11.07	12.09	14.15	17.20	20.16
TWS from Dungowan Dam (GL/a)	5.36	5.36	5.35	5.54	5.60	5.60	5.60	5.60	5.60	5.54	5.60	5.60	5.60	5.60	5.60
TWS from Chaffey Dam (GL/a)	3.48	3.46	3.43	4.42	5.37	6.38	8.43	11.35	14.56	4.48	5.47	6.49	8.55	11.60	14.56
TWS from Chaffey Dam (% TOTAL)	39%	39%	39%	44%	49%	53%	60%	67%	72%	45%	49%	54%	60%	67%	72%
TWS Release / Demand Chaffey Dam (GL/a)	3.81	3.79	3.75	4.79	5.78	6.82	8.96	11.97	15.28	4.85	5.89	6.96	9.09	12.26	15.28
TWS SECURITY OF SUPPLY															
Minimum Allowable Storage (ML)	11,700	11,700	11,700	13,000	14,300	15,600	18,200	22,100	26,000	13,000	14,300	15,600	18,200	22,100	26,000
Chaffey Dam minimum storage (ML)	15,500	15,800	13,800	12,000	11,000	11,100	11,600	12,000	7,700	13,200	13,600	16,300	17,900	15,000	7,700
Year of minimum storage	1966	1966	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Minimum Drought Security Achieved?	YES	YES	YES	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES	NO	NO
TWS LEVELS OF SERVICE															
No. of Years where storage < LEVEL 1	14	13	15	15	16	15	21	19	23	15	14	10	9	9	23
Freq. of Restrictions (years)	8.3	8.9	7.7	7.7	7.3	7.7	5.5	6.1	5.0	7.7	8.3	11.6	12.9	12.9	5.0
Percentage of time Chaffey Dam storage < LEVEL 1	9%	8%	10%	10%	10%	10%	11%	11%	15%	9%	8%	7%	6%	6%	15%
No. of Years where storage < LEVEL 3			9							7	4	4	7	6	9
Freq. of Restrictions LEVEL 3, 4, 5 (years)			12.9							16.6	29.0	29.0	16.6	19.3	12.9
Percentage of time Chaffey Dam storage < LEVEL 3			4%							2%	1%	1%	2%	2%	6%
END OF SYSTEM FLOWS															
Average annual flow at Carroll Gap (GL/a)	251	251	250	250	249	248	246	245	243	250	249	248	247	244	243

IQQM SCENARIOS - TAMWORTH FUTURE YIELD SCENARIOS PROJECT (2850-010)

SCENARIO / RUN #	100 GL AUGMENTED DAM SCENARIOS										
	T31	T32	T33	T34	T35	T36	T32	T33	T37	T38	T39
AUGMENTATION OPTION	Augmented Chaffey Dam 100 GL Future Demands of 9 - 20 GL/a						Augmented Chaffey Dam 100GL Future Demands of 9 - 20 GL/a				
COR FIXED / VARIABLE	Linear Increasing COR						COR Increased to Achieve Min Storage Target				
CLIMATE CHANGE SCENARIO											
CHAFFEY DAM CAPACITY (GL)	100	100	100	100	100	100	100	100	100	100	100
REVISED TOWN WATER DEMAND (GL)	9	9	12	14	17	20	9	12	14	17	20
REVISED COR (GL)	12.0	12.0	16.0	19.0	23.0	27.0	12.0	16.0	26.5	36.0	80.0
EFFLUENT RETURN FLOWS (ML/d)	-	-	-	-	-	-	-	-	-	-	-
IRRIGATION DIVERSIONS											
Average annual irrigation diversion (GL/a)	6.25	6.25	6.13	6.02	5.78	5.31	6.25	6.13	5.91	5.38	3.03
IRRIGATION SECURITY (JULY)											
Percentage of time allocation = 0% on 1st July	3%	3%	9%	11%	17%	24%	3%	9%	16%	24%	100%
Mean allocation on 1st July	86%	85%	78%	71%	60%	44%	85%	78%	63%	40%	0%
Median allocation on 1st July	100%	100%	100%	94%	70%	48%	100%	100%	78%	40%	0%
Max Allocation on 1st July	100%	100%	100%	100%	100%	94%	100%	100%	100%	82%	0%
Probability of 80%+ allocation on 1st July	80%	79%	67%	58%	41%	20%	79%	67%	48%	14%	0%
Probability of 50%+ allocation on 1st July	85%	85%	79%	75%	63%	47%	85%	79%	66%	43%	0%
IRRIGATION SECURITY (OCT)											
Percentage of time allocation = 0% on 1st Oct	1%	1%	4%	7%	10%	17%	1%	4%	8%	15%	100%
Mean allocation on 1st October	90%	90%	85%	80%	72%	63%	90%	85%	76%	56%	0%
Median allocation on 1st October	100%	100%	100%	100%	100%	82%	100%	100%	100%	74%	0%
Max Allocation on 1st October	100%	100%	100%	100%	100%	100%	100%	100%	100%	86%	0%
Probability of 80%+ allocation on 1st Oct	84%	84%	78%	72%	63%	52%	84%	78%	64%	49%	0%
Probability of 50%+ allocation on 1st Oct	92%	92%	84%	81%	75%	64%	92%	84%	78%	64%	0%
TWS SOURCE											
TWS Diversion (GL/a)	8.87	9.09	12.03	14.06	17.03	20.45	9.09	12.03	14.12	17.19	20.86
TWS from Dungowan Dam (GL/a)	5.35	5.39	5.60	5.60	5.60	5.60	5.39	5.60	5.60	5.60	5.60
TWS from Chaffey Dam (GL/a)	3.52	3.70	6.43	8.46	11.43	14.85	3.70	6.43	8.52	11.59	15.26
TWS from Chaffey Dam (% TOTAL)	40%	41%	53%	60%	67%	73%	41%	53%	60%	67%	73%
TWS Release / Demand Chaffey Dam (GL/a)	3.85	4.04					4.04	6.88	9.04	12.23	16.07
TWS SECURITY OF SUPPLY											
Minimum Allowable Storage (ML)	11,700	11,700	15,600	18,200	22,100	26,000	11,700	15,600	18,200	22,100	26,000
Chaffey Dam minimum storage (ML)	18,500	17,800	16,300	13,600	13,800	12,300	17,800	16,300	18,400	22,000	26,900
Year of minimum storage	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Minimum Drought Security Achieved?	YES	YES	YES	NO	NO	NO	YES	YES	YES	YES	YES
TWS LEVELS OF SERVICE											
No. of Years where storage < LEVEL 1	16	16	21	23	25	26	16	21	23	22	9
Freq. of Restrictions (years)	7.3	7.3	5.5	5.0	4.6	4.5	7.3	5.5	5.0	5.3	12.9
Percentage of time Chaffey Dam storage < LEVEL 1	10%	10%	13%	15%	16%	18%	10%	13%	14%	12%	4%
No. of Years where storage < LEVEL 3		7	9				7	9	9	5	4
Freq. of Restrictions LEVEL 3, 4, 5 (years)		16.6	12.9				16.6	12.9	12.9	23.2	29.0
Percentage of time Chaffey Dam storage < LEVEL 3		4%	6%				4%	6%	5%	3%	1%
END OF SYSTEM FLOWS											
Average annual flow at Carroll Gap (GL/a)	250	249	248	246	245	243	249	248	246	245	243

IQQM SCENARIOS - TAMWORTH FUTURE YIELD SCENARIOS PROJECT (2850-010)

SCENARIO / RUN #	CLIMATE CHANGE SCENARIOS													
	T33	T40	T41	T42	T43	T44	T37	T45	T46	T47	T38	T48	T49	T50
AUGMENTATION OPTION	CLIMATE CHANGE SCENARIOS (12 GL/a TWS) Augmented Chaffey Dam 100GL						CLIMATE CHANGE SCENARIOS (14 & 17 GL/a TWS) Augmented Chaffey Dam 100GL							
COR FIXED / VARIABLE	COR FIXED				VARIABLE COR		COR Increase to Achieve Min Storage Target							
CLIMATE CHANGE SCENARIO	Current	Dry	Median	Wet	Dry	Median	Current	Dry	Median	Wet	Current	Dry	Median	Wet
CHAFFEY DAM CAPACITY (GL)	100	100	100	100	100	100	100	100	100	100	100	100	100	100
REVISED TOWN WATER DEMAND (GL)	12	12	12	12	12	12	14	14	14	14	17	17	17	17
REVISED COR (GL)	16.0	16.0	16.0	16.0	26.0	21.0	26.5	37.5	26.5	16.0	36.0	65.0	45.6	16.0
EFFLUENT RETURN FLOWS (ML/d)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IRRIGATION DIVERSIONS														
Average annual irrigation diversion (GL/a)	6.13	6.34	6.38	5.94	6.12	6.29	5.91	5.64	6.12	5.96	5.38	4.53	5.30	5.83
IRRIGATION SECURITY (JULY)														
Percentage of time allocation = 0% on 1st July	9%	17%	10%	3%	20%	14%	16%	33%	16%	4%	24%	70%	36%	8%
Mean allocation on 1st July	79%	66%	76%	87%	55%	71%	63%	34%	62%	83%	40%	0%	18%	78%
Median allocation on 1st July	100%	84%	100%	100%	59%	91%	78%	32%	73%	100%	40%	0%	22%	100%
Max Allocation on 1st July	100%	100%	100%	100%	100%	100%	100%	86%	100%	100%	82%	18%	58%	100%
Probability of 80%+ allocation on 1st July	67%	50%	61%	76%	36%	55%	48%	12%	46%	72%	14%	0%	0%	67%
Probability of 50%+ allocation on 1st July	79%	66%	76%	87%	55%	71%	66%	34%	62%	83%	43%	0%	18%	78%
IRRIGATION SECURITY (OCT)														
Percentage of time allocation = 0% on 1st Oct	4%	10%	8%	1%	12%	8%	8%	20%	8%	1%	15%	46%	25%	4%
Mean allocation on 1st October	85%	76%	82%	94%	67%	81%	76%	52%	73%	89%	56%	0%	50%	87%
Median allocation on 1st October	100%	100%	100%	100%	86%	100%	100%	52%	100%	100%	74%	4%	50%	100%
Max Allocation on 1st October	100%	100%	100%	100%	100%	100%	100%	88%	100%	100%	86%	24%	63%	100%
Probability of 80%+ allocation on 1st Oct	78%	60%	72%	86%	55%	67%	64%	34%	61%	80%	49%	0%	0%	76%
Probability of 50%+ allocation on 1st Oct	84%	76%	82%	94%	67%	81%	78%	52%	73%	89%	64%	0%	50%	87%
TWS SOURCE														
TWS Diversion (GL/a)	12.03	12.22	12.28	12.43	12.36	12.34	14.12	14.00	14.00	14.00	17.19	17.06	17.00	17.00
TWS from Dungowan Dam (GL/a)	5.60	4.70	5.50	6.70	4.72	5.47	5.60	4.74	5.49	6.74	5.60	4.71	5.48	6.75
TWS from Chaffey Dam (GL/a)	6.43	7.52	6.78	5.73	7.64	6.87	8.52	9.26	8.51	7.26	11.59	12.35	11.52	10.25
TWS from Chaffey Dam (% TOTAL)	53%	62%	55%	46%	62%	56%	60%	66%	61%	52%	67%	72%	68%	60%
TWS Release / Demand Chaffey Dam (GL/a)	6.88	7.95	7.25	6.20	8.13	7.36	9.04	9.85	9.07	7.87	12.23	13.06	12.23	10.97
TWS SECURITY OF SUPPLY														
Minimum Allowable Storage (ML)	15,600	15,600	15,600	15,600	15,600	15,600	18,200	18,200	18,200	18,200	22,100	22,100	22,100	22,100
Chaffey Dam minimum storage (ML)	16,300	11,084	12,897	27,455	15,672	15,755	18,400	18,400	18,400	26,200	22,000	20,300	22,400	23,500
Year of minimum storage	2007	2007	2007	1920	1940	2007	2007	1940	2007	1920	2007	2007	1940	1983
Minimum Drought Security Achieved?	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES
TWS LEVELS OF SERVICE														
No. of Years where storage < LEVEL 1	21	30	27	12	29	24	23	32	27	13	22	18	14	17
Freq. of Restrictions (years)	5.5	3.9	4.3	9.7	4.0	4.8	5.0	3.6	4.3	8.9	5.3	6.4	8.3	6.8
Percentage of time Chaffey Dam storage < LEVEL 1	13%	22%	16%	7%	21%	16%	14%	18%	15%	7%	12%	12%	10%	9%
No. of Years where storage < LEVEL 3	9			3	15	13	9	9	13	5	5	6	5	7
Freq. of Restrictions LEVEL 3, 4, 5 (years)	12.9			38.7	7.7	8.9	12.9	12.9	8.9	23.2	23.2	19.3	23.2	16.6
Percentage of time Chaffey Dam storage < LEVEL 3	6%			2%	9%	8%	5%	6%	7%	2%	3%	4%	2%	4%
END OF SYSTEM FLOWS														
Average annual flow at Carroll Gap (GL/a)	248	189	228	339	187	227	246	188	226	337	245	185	224	337

IQQM SCENARIOS - TAMWORTH FUTURE YIELD SCENARIOS PROJECT (2850-010)

SCENARIO / RUN #	Remove TWS Demand from Dungowan Dam						
	T52	T55	T58	T61	T64	T54	T57
AUGMENTATION OPTION	CLIMATE CHANGE (9 - 20 GL/a TWS) Augmented Chaffey Dam 100GL						
COR FIXED / VARIABLE	COR Increase to Achieve Min Storage Target						
CLIMATE CHANGE SCENARIO	Median	Median	Median	Median	Median	Dry	Dry
CHAFFEY DAM CAPACITY (GL)	100	100	100	100	100	100	100
REVISED TOWN WATER DEMAND (GL)	9	12	14	17	20	12	14
REVISED COR (GL)	12.0	22.2	35.9	63.0	70.0	32.8	53.0
EFFLUENT RETURN FLOWS (ML/d)							
IRRIGATION DIVERSIONS							
Average annual irrigation diversion (GL/a)	6.48	6.17	5.62	4.63	3.58	5.81	5.10
IRRIGATION SECURITY (JULY)							
Percentage of time allocation = 0% on 1st July	8%	15%	25%	65%	100%	30%	48%
Mean allocation on 1st July	79%	65%	41%	6%	0%	40%	14%
Median allocation on 1st July	100%	59%	26%	0%	0%	38%	4%
Max Allocation on 1st July	100%	100%	90%	22%	0%	100%	50%
Probability of 80%+ allocation on 1st July	70%	52%	16%	0%	0%	19%	0%
Probability of 50%+ allocation on 1st July	79%	64%	45%	0%	0%	43%	9%
IRRIGATION SECURITY (OCT)							
Percentage of time allocation = 0% on 1st Oct	4%	10%	16%	41%	100%	19%	33%
Mean allocation on 1st October	85%	74%	56%	14%	0%	56%	25%
Median allocation on 1st October	100%	100%	74%	16%	0%	58%	28%
Max Allocation on 1st October	100%	100%	92%	28%	0%	100%	52%
Probability of 80%+ allocation on 1st Oct	80%	64%	43%	0%	0%	41%	0%
Probability of 50%+ allocation on 1st Oct	84%	75%	63%	0%	0%	59%	29%
TWS SOURCE							
TWS Diversion (GL/a)	9.04	12.28	13.94	16.97	20.19	12.41	14.09
TWS from Dungowan Dam (GL/a)	-	-	-	-	-	-	-
TWS from Chaffey Dam (GL/a)	9.04	12.28	13.94	16.97	20.19	12.41	14.09
TWS from Chaffey Dam (% TOTAL)	100%	100%	100%	100%	100%	100%	100%
TWS Release / Demand Chaffey Dam (GL/a)	9.40	12.75	14.49	17.66	21.01	12.89	14.66
TWS SECURITY OF SUPPLY							
Minimum Allowable Storage (ML)	11,700	15,600	18,200	22,100	26,000	15,600	18,200
Chaffey Dam minimum storage (ML)	14,300	15,700	18,300	22,100	14,000	15,800	18,300
Year of minimum storage	2007	2007	1940	1940	2007	1940	1940
Minimum Drought Security Achieved?	YES	YES	YES	YES	NO	YES	YES
TWS LEVELS OF SERVICE							
No. of Years where storage < LEVEL 1	20	20	20	14	15	34	23
Freq. of Restrictions (years)	5.8	5.8	5.8	8.3	7.7	3.4	5.0
Percentage of time Chaffey Dam storage < LEVEL 1	16%	18%	14%	8%	8%	22%	13%
No. of Years where storage < LEVEL 3	13	16	6	5	6	11	6
Freq. of Restrictions LEVEL 3, 4, 5 (years)	8.9	7.3	19.3	23.2	19.3	10.5	19.3
Percentage of time Chaffey Dam storage < LEVEL 3	7%	9%	4%	2%	3%	7%	3%
END OF SYSTEM FLOWS							
Average annual flow at Carroll Gap (GL/a)	230	228	227	226	224	189	188

Appendix C
Peel IQQM Schematics

Appendix C – Peel IQQM Schematics

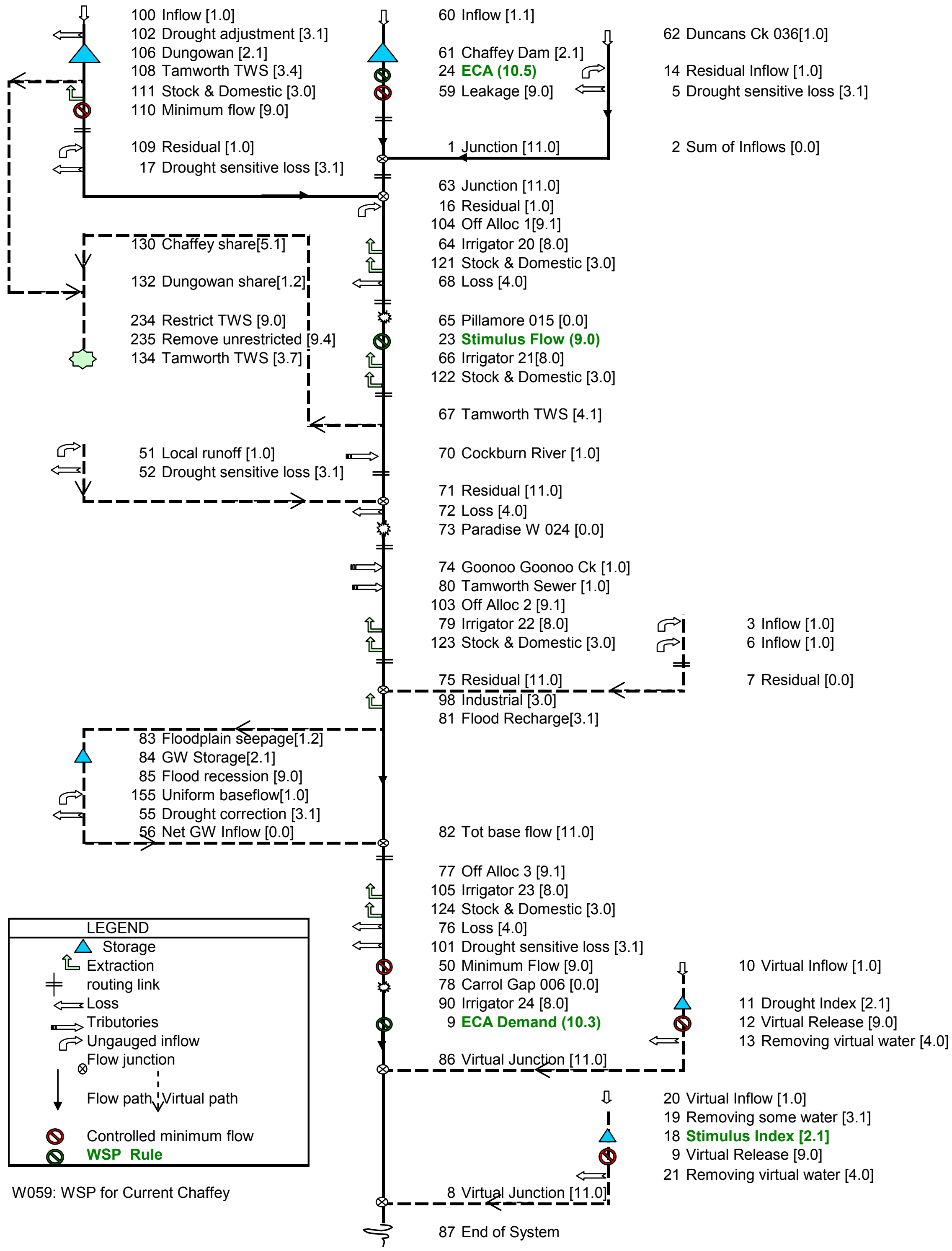


Figure C1 Peel IQQM Schematic – Base Model (W59)

Appendix C – Peel IQQM Schematics

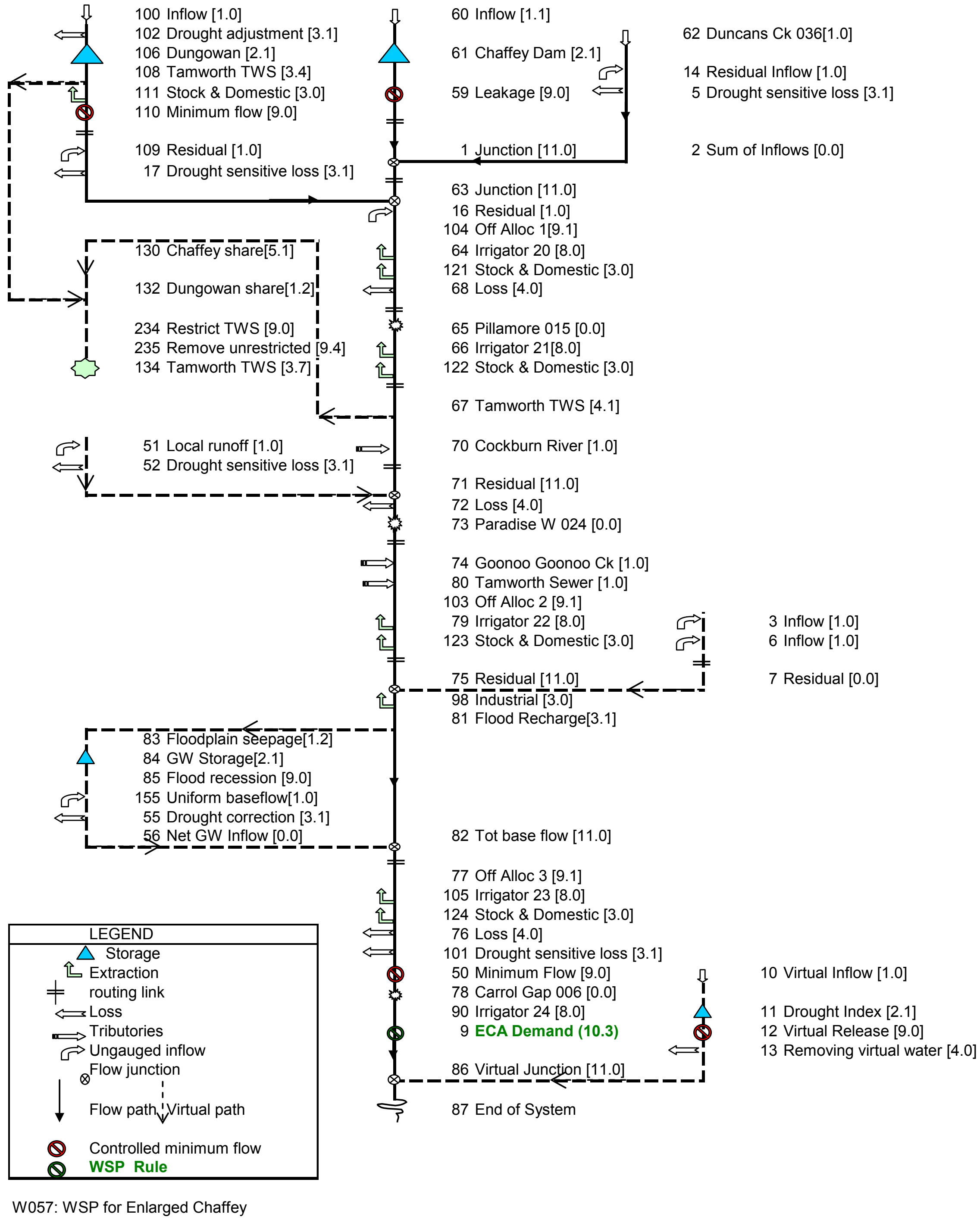


Figure C2 Peel IQQM Schematic – Augmented Chaffey Dam Model (W57)