

**Submission  
No 126**

**INQUIRY INTO RATIONALE FOR, AND IMPACTS OF,  
NEW DAMS AND OTHER WATER INFRASTRUCTURE IN  
NSW**

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Submission by Peter Gill

## **PORTFOLIO COMMITTEE No. 7 – PLANNING AND ENVIRONMENT**

Inquiry into the rationale for, and impacts of, new dams and other water infrastructure in NSW.

### **GENERAL DISCUSSION**

The primary thrust of my submission is based upon the Peel River, the New Dungowan Dam and water security for Tamworth including Irrigators between the headwaters and Carroll Gap. However where appropriate my views apply to all the projects referenced in the Inquiry and on occasion I will specifically extend the comments I make to other situations as appropriate.

It is very clear that water sources have been dramatically over-allocated and that quite apart from climate change aspects, these sources have increasingly failed during periods of drought. In particular the Peel River has recently (2017 to current) seen record low inflows to “drought of record” status.

Historically (and hailing from the Riverland) in probably 55 years of active memory I have witnessed immense growth in large acreage intensive irrigation as distinct from traditional horticultural/dairying/pasture in the QLD and NSW areas that were formerly dryland cropping and grazing.

This is not to be construed that I am anti irrigation/Industry. In fact rather the converse, I appreciate the economic benefits arising, however, I maintain the stance that there must be a connected river system from headwaters to the sea and that industrial/irrigation use must allow balance with the environment/recreational usage and town water supplies.

The economics of Irrigation/Industrial use are often used as a wedge against those who advocate for town, environmental and recreational reservation of water. Having said this, I can say that I have not been provided with, nor have I seen any economic analysis of the dis-benefit of not having town, environmental and recreational water.

A situation that I am particularly familiar with is the situation with Lake Bonney and the township of Barmera in the S.A. Riverland. The lake was a popular tourist destination. During the millenium drought in 2006/7 the lake was disconnected from the Murray river and due to misconceptions many thought it was empty. Tourism suffered, tourists bypassed the town/went elsewhere and subsequently the fortunes of the town nosedived dramatically. My family home of mid 1950's to 2018 was a financial casualty arising. The fortunes of township of Barmera should serve as a lesson in what happens when environmental/recreational water is lost.

Economics aside, there is also an environmental aspect to the debate, ie the damage caused through alterations to the un-improved basis of our river systems and the knock-ons that arise from these alterations.

**It would be fair to say in observation, that the fundamental driver behind the issues around water in NSW is mismanagement in the guises of:**

- Over allocation to Irrigation and Industry in excess of SDL's
- Failure to oversight extraction limits
- Allowing Flood Plain Harvesting (FPH) and a rearguard legislative agenda to legalise this
- Calculation of SDL's
- Setting of annual entitlements AWD's
- Action of Lobby groups
- Manipulation/Adjustment of the rules to suit Big Irri agenda's
- Political donations

### **From an Environmental Perspective:**

- Migratory Birds and fauna react to weather conditions, not an artificial release of water
- Fish are dependent on stable water levels and need access from mouth to headwaters. Other aquatic life requires floodplain activation in the correct weather sequence
- Flora are dependent upon a range of natural events, flood plain activation, eg River Box trees germinate where floods have been.
- Value from Environment in economic terms translates into recreational and tourism opportunities.

### **Points to consider regarding water useage:**

- In terms of Town supply there is a Service Standard NSW Office of Water 2013 quoted as 5/10/20 ie 5% of time in drought conditions, 10% of years , 20% reduction in effect/use. This is a guideline/practice for sizing of Town supplies.
- Rationing of town useage leading to essential “critical human needs” saves very little, until the point where the need for “critical human needs” is invoked and the supply needs to be stretched
- Algorithms for Town Supply need to align more closely with the climatic/weather conditions leading to the Fill/Empty cycle of dams. This may be a cycle of 5-6 years versus the 2 year process currently used. Agreed that this would require the keeping of a larger reserve compartment for Town Water Supplies
- Only allocate water actually held in Dams once the Town supply Compartment is satisfied.

### **In terms of Industrial/Irrigation use consider:**

- Implementation of restrictions applied to annually set AWD's matching those applied to towns in order that all are treated equally when Townships enter restrictions during the water year.
- The philosophy that water be used to make a living, not maintain a lifestyle, where there is a balance between applying enough water to achieve an acceptable yield versus using significantly more water for a marginally better yield.
- When water is valued at \$4.69 per ML (Murray and Lower Darling General Security) it is a very cheap way of guaranteeing a lifestyle, compared to not using it on a crop.

### **Water Grid(s)**

It is the view of the writer:

- In terms of Township Supplies that a water grid linking water storages, allowing transfer between storages may reflect a better cost benefit and security than constructing new storages.
- Further to the above point, this allows for interconnection with desalination plants and other sources of water eg. borefields.
- At 10 ML per Ha applied for irrigation, the concept of “Bradfield” schemes for irrigation becomes a scale driven exercise, considering for example Warragamba Dam is 2,000 GL with pipelines delivering 1.6 GL per day ie 600 GL annually which would sustain 60,000 Ha of irrigation. In terms of scale, whilst do-able, the scaling needs to be multiples of Warragamba.
- Above all, economics will determine the viability of these options.

### **Water Sharing Plans**

These are discussed under Terms of Reference f) below

### **The Chaffey Dam Situation**

This is discussed generally under the pre-amble to Terms of Reference. Chaffey dam must be considered as part of the discussion in determining the need for a New Dungowan Dam.

### **The Chaffey Dam Pipeline**

This was hastily implemented late 2019 being commissioned in June 2020. This solution was implemented to overcome water losses as high as 100% on delivery of water to the TRC Pump station via the channel of the Peel River. At times of critical need this option has the effect of doubling the endurance of remaining stored water. The pipeline was sized to deliver 4may 3 ML per day being L3 Consumption at predicted 50 year growth. Currently average demand for Tamworth is 26 ML per day without restrictions doubling at peak summer times.

A more liberal consideration of the use of this pipeline outside critical periods may provide better security of supply for Tamworth.

### **The Peel River Groundwater (Alluvium Situation)**

This is the stratum underlying the bed of the Peel River and a source of bore water. TRC have a licence for Paradise Drift wells and this is a source used in peak times. At issue is the connection between the river and the alluvium, with connectivity being regarded or dis-regarded to suit the positions of opposing parties.

This drought has provided experience and a little more objectivity to the question with it becoming evident that there is a connection between a wet bed of the Peel River and levels in wells and bores in the Peel Alluvium. It appears that many General Security users able to do so, hold dual licences for Surface and Alluvium sources.

### **TERMS OF REFERENCE**

The referenced program (subject of this enquiry) of new dams and mass water storage projects proposed by Water NSW is not supported.

These appear to be knee jerk reactions to outcomes of a recent drought (of record in many places) and a failure of Water NSW to manage water supplies to ensure connected rivers, environmental outcomes and town supplies were maintained.

Management of water in NSW appears to be driven by Big Irrigation which is funded, organized and vocal at the expense of the average citizen of NSW who are typically limited in resources and time. The issue of lobbying and political donations is also a fundamental issue.

What is presented is a supposedly urgent program that will span a delivery period over 4 to 5 years which by deliberate design is premised to shortcut due processes.

The outcome of this is a charade of feigned public consultation that will attempt to shortcut critical elements where public scrutiny should be applied in accord with due democratic process.

This will mean that critical elements including the Funding, Business Case, Workings of Water Sharing plans, Cost of Water, EIS will not be available until well into the construction period after works have commenced.

Based on personal observation the process appears to portray an impression that Water NSW and the Government knows best. In better times I would ordinarily support this organisation being a competent operator on behalf of the public interest, however, as evidenced we now see such bodies unable to operate with independence away from political influence driven by major lobby groups.

The comments I make are based on my own situation/sphere which revolve around the proposed New Dungowan Dam in detail necessary for this submission. To follow all the proposed projects in detail is a physical impossibility for a single person to resource.

Regarding the New Dungowan Dam in particular

As recently as Monday 21 September 2020 we have the local press (Prime 7) reporting the lack of clarity around the lack of defined allocation of water from this dam, the Mayor of Tamworth Regional Council stating that he was unaware of this detail. However Water NSW has publically made statements to the effect that Tamworth will receive 7 GL per annum from this dam.

Very surprisingly on October 13 2019 an announcement was made by the Prime Minister and NSW Premier that \$500m of funding would be applied to construction of a new dam and pipeline. I had been aware of some discussion regarding the feasibility of a New Dungowan Dam in light of the safety concerns with the Existing Dungowan Dam, however, reportedly it was considered to be non-feasible at that time.

In terms of dam construction, the essential requirements are a catchment, a dam site and funding. One would have thought these should have been in place prior to the announcement of October 2019.

It is fair to say that construction of dams historically has been a process which has invoked extremely strong public interaction, with many proposals failing to gain traction. The approach I take is not based opposition as a matter of principle, rather it is based on sound principles of judgement.

If “fast tracking” was such a necessitous requirement of implementation, then surely the time before the announcement and between then and now should have been applied to commencement of elements such as an EIS, Business case, Water Sharing protocols and Funding. It is reported that construction is due for completion in 2025.

It is difficult to draw any conclusion other than “Fast Tracking” being used as an excuse to delay production of critically important reviewable elements prior to construction commencing in an attempt to push through (with limited scope for public review and comment) with a project (and the other referenced projects) with extremely dubious justification.

Quite interestingly, I took part in a Water NSW webinar session on 29 August 2020, one of a series conducted. It had been stated that the dam wall was being constructed downstream of Terrible Billy. I asked a question relating to the catchment area. The question was not able to be answered and it was also stated that hydrological studies were still being conducted.

Those answers do not endanger me with faith that a duly sequenced analysis has nor is being conducted, as surely those issues are fundamental to the viability of the project (appreciating that figures may need a final tweek of a few percent once design is finalized).

It is quite usual in engineering to proceed on the basis of confidence limits because not all answers can be made accurately in the first incidence until final detailed design is complete.

Very importantly Tamworth has been regarded by Government to be a regional location that has been favored for growth as a regional centre. Water security will be a major impediment to this objective.

**a) The need for the projects, including the historical allocation of water and consideration of other options for ensuring water security in inland regions,**

Existing Dungowan Dam

- Capacity 6.3 GL.
- Catchment 125 km<sup>2</sup>.
- Subject to Dam safety concerns in Maximum Probable Event.
- Rectification cost Circa \$65m (2015).
- Existing pipeline to Calala WTP is at end of economic life and has a capacity constraint.
- Traditionally this dam has provided 40% of the current Tamworth treated water demand.

New Dungowan Dam

- Whilst a philosophy of every little bit helps in terms of capture and storage, there are a range of inter-related issues between Security for Town/Industrial/Irrigation users, environmental and recreational uses.
- Comprises (based on publically available information):
  - A dam wall downstream of Terrible Billy.
  - The revised catchment area is approximately double the existing 125km<sup>2</sup> of the existing dam.
  - Storage of 22.5 GL (net increase of 16 GL over existing).
  - Cost of circa \$500m which includes \$120m for 60km of new pipeline from dam to the Calala WTP.
  - Current advice that new dam will back up to base of existing dam.
  - Old Dam has safety issues and will be decommissioned.
  - Potential exists and there is an undercurrent of discussion regarding implementation of a pumped Hydro electricity scheme.
- The need for the dam is highly questionable.
  - The resultant net capacity increase of 16GL (22.5 GL total) covers the Tamworth Regional Council (TRC) High Security (HS) licence of 16.4 GL for 12 months demand.
  - A purported long term average yield of 12.7 GL per annum has been provided in a water NSW flyer dated February 2020, allocated Town supply 7.0 GL, irrigation 5.7 GL.
  - During the most recent drought (of record) the existing catchment/dam supplied no water to Tamworth for a period of 18 months.
- Aspects of the business case are discussed under point b) below, there is insufficient information given to assess the parameters in b) below.
- Effectively constitutes takeover of a Tamworth Regional Council asset by stealth.
- At a construction cost of \$380m for 22.5 GL this represents a cost of \$17m per GL additional. By comparison Tillegra Dam (abandoned) in 2010 was \$380m for 380 GL ie \$1m per GL. Allowing for a doubling of 2010 costs to now the New Dungowan dam is still 8.5 times the considered norm for dams.
- Amortisation of Capital costs over 50yrs gives:
  - Dam \$380m over 50yrs x 12.7 GL = \$ 0.60m per GL
  - Pipeline \$120m over 50yrs x 7 GL = \$ 0.34m per GL
- Interest based on 50 yrs @ 2.5% reducing principal, calculated multiplier 0.753
  - Dam \$380m x 0.753 = \$286m over 50yrs x 12.7 GL = \$ 0.45m per GL
  - Pipeline \$120m x 0.753 = \$90.36m over 50yrs x 7 GL = \$ 0.26m per GL

- The current High Security charges for Peel Valley are \$70.64 per ML. (total collected by Water NSW) <https://www.waternsw.com.au/customer-service/ordering-trading-and-pricing/pricing/2019-20-water-pricing#stay>
- The position regarding pumped hydro is unknown.
- There is also potential that the NSW Gov. will sell the water assets.
- Based on considerations above and the many unknowns around financing and cost recovery the figures and discussion above support the notion that the New Dungowan will provide very expensive water and will not secure the water supply of Tamworth (excluding irrigation use by irrigators at 5.7 GL per annum). If irrigation use is taken into account the New Dungowan dam will on average supply about 40% of the annual licenced township needs.
- The upgrading of Chaffey dam from 62GL to 100GL was completed to fanfare announcements by elected representatives in 2016, that the water security of Tamworth was guaranteed for years to come. In the current drought through management by Water NSW some 26 GL of Chaffey water passed Carroll Gap into the Namoi river. Significant amounts of Environmental water from Chaffey became a free for all once this water reached the Namoi. This situation also arose from the manner in which the Peel river WSP had been prostituted by downstream users. That release was the straw that broke the camel's back with regard to the water supply situation in Tamworth leading to a hastily contrived pipeline from Chaffey (sized too small).
- It is a well recorded fact that a record cotton crop was grown in the middle of a drought.
- Tamworth Regional Council (TRC) in their Drought Management Plan 2015 (developed prior to Chaffey Augmentation and pending unknown advice from Water NSW) had assumed based on prior practice that General Security releases from Chaffey would stop at 40% as was the case for a smaller Chaffey. This proved not to be the case and Water NSW ran the dam down to just short of 20% capacity before ceasing General Security releases on 30 June 2019. Clearly there was little communication between TRC and Water NSW in relation to this issue.

***b) The economic rationale and business case of each of the projects, including funding, projected revenue, and the allocation and pricing of water from the projects,***

**New Dungowan Dam**

- Very little if any information has been made publically available. This is premised on the NSW Gov. fast tracking the proposal and claiming that details are dependent upon a final design proposal. This manner of proceeding is certainly contrary to any practice I have experienced in over 45 years within Construction.
- It is surprising when it is considered some work would have been completed prior to the Official Announcement in October 2019 and the fact that a further 12 months has since elapsed. Perhaps whilst it is true that the finalization is subject to a final design, it is entirely possible to frame the cases based on best available information subject to finalization once all details are confirmed and locked in.
- I participated in a NSW Water "Web Information Session" that confirmed the dearth of information. A question raised requesting the catchment area was unable to be answered, despite a decision placing the dam wall below Terrible Billy. Likewise questions about dam size and capacity.
- Likewise queries regarding yields, allocation of water and how the Water Sharing Plan would work were unable to be answered.

- In summary the situation appears contrary to any vestige of good practice and does not allow members of the public to consider and input to any of these matters ie funding, revenue allocation and pricing of water, a totally unsatisfactory situation.

**c) *The environmental, cultural, social and economic impact on any national or state water agreements, or in international obligations,***

New Dungowan Dam

- Being located in the headwaters of the Peel system, the dam itself acts as a storage in the upper part of the system.
- Apart from amending existing flow patterns between the existing Dungowan Dam and Carroll Gap the New Dungowan Dam whilst working to an unknown water sharing plan (currently flows of less than 10 ML per day bypass the Existing Dungowan Dam) otherwise operates within an already accepted and disturbed river system.
- Apart from the actual Dam works and impoundment area (presumably as catered for in a yet to be released EIS) cultural social and economic impacts remain very much as is.
- It is assumed (again no information is available at this juncture) that the New Dungowan Dam will fit within provisions of state and national water legislation.
- Within the Peel Valley, there are no internationally significant wetlands, however, in terms of environmental flows there is the issue that Peel environmental water ceases to exist once this enters the Namoi.
- Noting this issue, it is considered that the issue of environmental flows in the Namoi is outside the ambit of discussion on the New Dungowan Dam.

The Macquarie River re-regulating storage project:

- This will impact Ramsar listed wetlands by storing water upstream of the wetlands. Science tells us that the flooding necessary for these wetlands must occur on a natural basis to suit the cycle of migratory birds and to that point it is not possible to simulate those conditions artificially.

**d) *The impacts of climate change on inland waterways, including future projections, and the role of dams and other mass water storage projects in securing security of water supply for social, economic and environmental outcomes,***

Appreciating that there is much debate on the subject of climate change around whether we are dealing with a naturally occurring drought cycle with effects outside the limited range of human observation or dealing with the effects of climate change, I cautiously ascribe to the position of climate change being a real event which is characterized by more frequent drought cycles.

New Dungowan Dam

Irrespective of other merits or otherwise in constructing the dam, the impact of climate change serves to:

- Down-rate inflows (drought of record).
- Produce more severe wet events.
- Create wet/dry issues downstream of the storage in that a lesser spill frequency is likely due to the increased dam capacity.
- More frequent dry periods will exacerbate demand on stored water.
- All in all, once the dam is constructed the main issue resulting from climate change will be the manner in which the dam is managed in order to provide security of supply.



**e) *Water infrastructure technologies that may promote enhanced environmental outcomes,***

Points I wish to make are:

Conservation Strategies/Town Usage

It is significant that over an observed period of more than 20 years (apart from periods of severe restrictions where demand dropped considerably) that treated water use measured at Tamworth's Calala WTP has stayed relatively constant despite the growth which has occurred during that 20 years.

- This indicates that conservation strategies have worked to reduce demand.
- The issue of the Service Standard (now 5/10/20) remains a point of contention. Whilst ostensibly used for capacity determination, this is also practically the sustainable limit of a reasonable standard a community will endure being at a L3 phase of water restriction.
- Arising from the current drought L5 restrictions applied for almost 12 months September 2019 to August 2020, and the town is now on L4.
- It is important to note that there should be some spin off in terms of awareness and experience of residents (and measures they have taken) during these periods of severe restriction translating to improved water management practices.

Industrial Usage

Seemingly TRC is expected to be the arbiter of water efficiency and application of restrictions/drought management plans. It would be fair to say that in the current drought TRC felt they had been ignored by water NSW and the Minister and had perhaps deferred to the causator of the issue.

It may be prudent to adopt annual efficiency/reduction targets with industry (accounting for growth) that seek to drive down water use and encourage efficiency.

Irrigation Usage

Similarly to the case for industry above a similar target reduction could be applied here.

The concept of unfettered and non-adjustable licence allowances to cater for drought situations is at variance with what the remainder of the community are asked to do.

We also have a situation where the input price of water is a very cheap way of enhancing income between getting a crop/earning a living and getting a bonanza and sustaining a lifestyle.

Aquifer Recharge and Storage

Aquifers have the potential to store vast amounts of water without effects of evaporation.

The concept put forward here is that in higher flow situations water could be diverted into aquifer recharge.

- There are a range of variables to consider, however for a start a series of low level and removable weirs could be implemented to great effect.
- Construction of offstream storages and recharge wells is another technique.

Desalination

Given the location of Tamworth from a source of saltwater, desalination would only be a consideration should the concept of a "water grid" linking dams and town centres be adopted. (see separate heading)

### Recycling

It is significant to note that TRC effluent is already recycled to a re-use farm for fodder cropping. Approximately 40% of the Town treated supply is available. (4 GL per year)

An issue with this is the significant salt content of the effluent.

Recycling can take two forms.

- Direct Potable Re-use

This involves directing a portion being re-directed to raw feed into the WTP.

- Current thought is this is about 10% re-use, not overly significant in the overall scheme ie saves about 1 GL per annum.
- A major issue is the chemicals, drugs, bacteria and toxins contained in the raw feed and community perceptions in consuming such additives.

- Indirect (Treated) Re-use

This involves treatment to render the product bacterially safe to potable standards and possibly the option of reverse osmosis to achieve more optimal characteristics.

- This path is being explored by TRC with purple pipe and onsite treatment at large industrial users proposed for the new Tamworth Global Gateway Park.
- Implementation of purple pipe schemes into residential is a little way off yet due to the lead times involved.
- An issue remains with osmosis type treatments in that 20 -25% of the feed volume is lost as brine and there is an issue regarding disposal of this brine.

### Water Grid – Town Supplies

The concept here is to interconnect dams across the state so that a range of water catchments may be interlinked during drought.

- To be workable such system would likely have to be sized to transfer 100 to 150 ML per day being a 1200 mm dia to 1500mm dia pipeline. The idea being that water may be transferred around the state as needed. This would also allow connection to borefields and desalination plants should this be desired.
- In light of the looming effects of climate change this may be a more efficient way of providing a more robust protective net across the whole state.
- It also lends itself to utilizing over production of renewable energy in excess of network requirements in that pumping may be ramped up in key over supply periods.
- Note: This concept is only proposed for Town supplies and not irrigation due to the volumes required for irrigation.

### Water Scheme – Irrigation (“Bradfield type”)

Typically the scale necessary for use in high application irrigation with reliability of supply year to year will dictate a storage capacity of around 5 years annual usage.

- Dependent on the actual location the size of the irrigated area areas of 100,000 plus Ha would be needed for viability (at the lower end of scale). Such an area would require delivery of 1,000 GL and storage of 5,000 GL.
- Whilst do-able, it is the required scale which becomes a limiting factor in that dam sites with the necessary storage capacity are extremely difficult to find in suitable rainfall areas.

**f) Any other related matter.**

Water Sharing Plans

These remain an important part of supply security. This writer certainly believes that over many years NSW operatives have been party to significant over allocation (quite apart from the Flood Plain Harvesting issue) and that these operatives have been influenced by vocal lobby groups.

The preparation, maintenance, review and adjustment of these plans has been obfuscated and performed without reference to those who have made input and in the case of TRC having made approaches to the Minister actually being shunned by that Minister.

By legislation the Minister is required to give due consideration to Town supply, Environmental and Industrial/Irrigation users. It may perhaps be anecdotal that we seem to see a bias to Industry and irrigation.

We have further seen intransigence of the Government as to using the best available information on ‘drought of record’ inflows. This comment references the discounting of the Millenium Drought and more recently for the Peel river, the current drought.

Water Security Algorithms- Town Supply

Currently AWD’s (Available Water determinations) are based on a 2 year cycle. This is not synchronous with the ongoing needs of Townships and a climatic cycle that is more a 5 to 6 year cycle.

Such water for Towns needs to be separately accounted/compartimentalised and held in storage within dams (environmental water similarly)

Such algorithms need to consider and be based on drought of record inflows. I will not go into detail on the algorithm methodology at this juncture.

Available Water Distribution (AWD’s)

It appears as an adjunct to the Water Security algorithms discussed above and the very issue of “drought of record” information being used that drought has simply been trotted out as an excuse by those responsible for water management.

One key point regarding AWD’s should be that only water actually stored stored without regard to predicted inflows (less/once allowance has been made for storage compartments of/for Environmental and Town/High Security) should be available for General Security.

Irrigation – Differences in type of use and timing

As far as the irrigators of the Peel River are concerned they have a different cycle more based on an as needed basis rather than fitting into an annualized program based on July to June water years. Exploration of these aspects and the ability to make adjustments “on the run” may lead to better and more flexible outcomes.

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