Chapter 6

Other Alternatives

6.1 This chapter will detail the evidence discussed at length during the inquiry on alternatives other than the proposed Traveston Crossing Dam and the Wyaralong Dam. The alternatives include the raising of the Borumba Dam, the proposal of transporting water from the Northern Rivers area of New South Wales to South East Queensland and other supply alternatives such as rainwater tanks and recycled water.

The need for a new source of water supply

6.2 Questions were raised during the inquiry around whether a new water supply source was necessary given the challenges facing the State of Queensland, namely the high levels of population growth in South East Queensland (SEQ), low capacity levels in major catchments and a continuing drought. The committee sought evidence on whether a combination of initiatives including demand management, water efficiency systems and other technology such as desalination, recycled water and stormwater harvesting, once on-line, would be sufficient to meet projected demand and secure the future water supply of SEQ.

6.3 The *Review of Water Supply-Demand Options for South East Queensland – Final Report* (the Review Report) analysed the supply and demand situation in SEQ and concluded that the Traveston Crossing Dam was not necessary and that existing initiatives undertaken by the Queensland Government would secure supply until 2030:[1]

> If the suite of demand and supply-side options currently being implemented to address the current drought, excluding the Traveston Crossing scheme is implemented, this will mean that the medium to long-term supply-demand balance will be met until approximately 2030. This provides significant time to determine the most appropriate strategy to meet the supply-demand balance in the longer term with lower cost and more risk averse options using an adaptive management approach.[2]

6.4 The Review Report also recommended that another new supply source, the proposed Wyaralong Dam, be further investigated and compared against a new suite of demand and supply-side options to see if it is an appropriate supply alternative.[3]

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1 A.Turner, G.Hausler, N. Carrard, A. Kazaglis, S. White, A. Hughes, T. Johnson, *Review of Water Supply-Demand Options for South East Queensland*, Institute for Sustainable Futures, Sydney and Cardno, Brisbane, February 2007.

2 *Review of Water Supply-Demand Options for South East Queensland*, p. 71.

3 *Review of Water Supply-Demand Options for South East Queensland*, p. 72.

6.5 Many witnesses commented that constructing new dams should not be the solution to the water supply issues in SEQ.[4] The Australian Water Association commented that there is general agreement among their members that 'dams, generally, are no longer the obvious water supply solution they once were. They are now regarded as one of many solutions'.[5] Witnesses and submitters suggested the need for a non-rainfall dependent solution as rainfall patterns in the affected areas of Traveston Crossing and Wyaralong had changed considerably over time in both volume and variability. Mr Kevin Ingersole, Chairman of the Save the Mary River Coordinating Group stated 'I would seriously investigate non-rainfall-dependent solutions. I think there is plenty of scope to provide the water for south-eastern Queensland on a go forward basis without any problem'.[6]

6.6 Professor Stuart White, one of the authors of the Review Report, when asked if there was a need for a new primary source of water responded '[n]o, we do not. That is a very clear conclusion of our work. Not only is it not necessary it would be quite dangerous to buy, particularly at this point, a single large source of water which is rain fed. That would not be the right strategy. It is not needed and it is quite risky'.[7]

6.7 Mr Jeff Seeney, Leader of the Queensland Coalition, commented that 'there is a need for a new primary water source' and that if the Queensland Coalition were in government, the new sources would include 'dam sites that have been planned since the abandonment of the Wolffdene dam site…a series of smaller dams–the Wyaralong Dam, the Glendower Dam…the raising of the Borumba Dam and the construction of the Amamoor Creek Dam…'.[8] Dr David Williams, academic, also stated that a new water source was needed:

> The population will go up. We will need other primary sources of water…Including dams; we will need to look at that…It is almost based on common sense. The population of South-East Queensland is predicted to go up by a factor of about 2½ by the year 2050, I think, to a population of about five million. Clearly, we will need other sources of water.[9]

6.8 The majority of evidence received during the inquiry requested that the Queensland Government consider alternatives other than the proposed new dams at Traveston Crossing and Wyaralong. Many submitters listed alternatives which

4 For example, see *Submission* 45; *Submission* 118; *Submission* 145; *Submission* 183.

5 *Submission* 103, p. 2.

6 *Committee Hansard*, 17 April 2007, p. 29.

7 *Committee Hansard*, 17 April 2007, p. 53.

8 *Committee Hansard*, 18 April 2007, p. 71.

9 *Committee Hansard*, 18 April 2007, p. 8.

included rainwater tanks, water recycling, storm water harvesting, desalination and continued demand management and efficiency strategies.[10]

Raising the Borumba Dam

6.9 The Queensland Government includes the raising of the Borumba Dam as part of a three phase development of water infrastructure in the Mary River catchment. The three phases include Stage 1 and Stage 2 of the Traveston Crossing Dam and the raising of the Borumba Dam. The Borumba Dam proposal includes the intention to raise the full supply level (FSL) to approximately 163.7 metres (an increase of approximately 30 metres) which will provide a capacity of approximately 350,000 megalitres.[11]

6.10 The committee received evidence from submitters calling for the immediate raising of Borumba Dam and many asked for the dam to be raised to a higher level than proposed by the Queensland Government.[12] Mr Ronald McMah commented that for a long time the Borumba Dam has not been utilised to its full potential and if it was, it would provide a significant contribution to South East Queensland's water demand. Mr McMah suggested the following proposal:

> …to build a new dam wall approximately 300 metres in front of the existing dam wall at Borumba and make it as high as possible. My advice is that it would be able to go high enough to obtain or get very close to 2 million Mlgs with the inclusion of two small saddle dam walls. The second part of my plan is that one or two opening boom gate weirs be built on the Mary River at suitable locations ie. Coles Creek, Moy Pocket. If further water is required then these boom gates could be closed when the river is flowing in abundance and water be pumped from them to Borumba via a pipline and pumping station. The third part is that a pipeline be built from Somerset dam and its partner Wivenhoe, to Borumba Dam.[13]

6.11 Mr Alan Sheridan, a professional civil engineer and Secretary of the Save the Mary River Coordinating Group stated:

> It should be noted that the GHD desk top study report of identified dam and weir sites actually states that additional yield from Borumba might be possible with a higher dam wall. While the catchment area is fairly limited (460 sq km), there is no doubt that when it does rain heavily in this area, the runoff is enormous. The State Government has produced performance curves which clearly show that a 1,000,000 ML capacity dam at Borumba could have safely provided 70,000 ML/a yield for the last 50 years. A dam at Borumba could also be supplemented with water harvesting from the

10 For example, see *Submission* 20; *Submission* 22; *Submission* 33; *Submission* 55; *Submission* 75; *Submission* 114; *Submission* 138; *Submission* 146; *Submission* 160; *Submission* 167.

11 Queensland Government, *Submission* 166, p. 105.

12 For example, see *Submission* 41; *Submission* 49.

13 *Submission* 79, p. 1.

> Mary River during times of high flows by using a system of weirs and high volume pumps.[14]

6.12 The Queensland Government conducted a preliminary hydrological assessment of harvesting flood flows from the Mary River and storing these flows in a raised Borumba Dam. The proposal considered that as an upper limit Borumba Dam could be raised from its current size of 46,000 megalitres to 2,000,000 megalitres. The Queensland Government stated:

> In terms of being able to deliver yields similar to that produced by Traveston Crossing Dam Stage 1, it was found there was the need to have a very large pumping capacity to take water from the Mary River to make the most of the flood flow in the Mary River. It was also found that there would be the need to raise of Borumba Dam to a level larger than that contemplated in Stage 3 raising of Borumba Dam. In addition to the very large pumping capacity it was found that Borumba Dam would need to be raised to a size larger than 1,500,000 ML to deliver yields similar to that from Stage 2 Traveston Dam.
>
> Further hydrologic-based statistical analysis found that the water harvesting proposal would be significantly more vulnerable in the short to medium term due to:
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> • much greater dependency on large flows needed to sustain significant pumped transfers to Borumba Dam; and
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> • failure during protracted periods when such high flow conditions did not occur.[15]

Transferring water from the NSW Northern Rivers region

6.13 In November last year, the National Water Commission commissioned a desktop feasibility study of the interstate transfer of water from northern NSW catchments (including the Clarence River and Tweed River catchments) to SEQ. The Snowy Mountains Engineering Corporation Australia (SMEC), through a competitive bidding process, undertook the study and published the report titled *Integrated Water Supply Options for north east New South Wales and SEQ* (the SMEC Report).

6.14 Mr Amir Deen representing SMEC, appeared before the committee and advised that the 'study was undertaken at a desktop level—that is, basically on information already available and not undertaking more detailed studies on the ground, and by using and synthesising and collecting and synthesising available information to develop our requirements'. Mr Deen then explained the objectives of the study:

> In its broadest terms, the questions that were raised in this investigation were: what were the urban water requirements of north-east New South

14 *Submission* 68, p. 2.

15 *Submission* 166, pp 118–119.

> Wales and south-east Queensland currently and to about 2050; what were the water utilities in north-east New South Wales and south-east Queensland doing about meeting these requirements; and was there any water available in the rivers of north-east New South Wales that could be utilised for urban water supplies and how much would it cost to get that waster [sic] across to south-east Queensland and north-east New South Wales. We were also asked to comment on any issues in relation to economic, environmental and social issues that could arise from our proposals.[16]

6.15 The SMEC Report identified five options for further investigation which were considered viable from hydrologic, engineering and economic perspectives. However, the report clearly states that 'it should also be emphasised that all options proposed require further detailed environmental and social assessment in line with the NSW Government laws, regulations and policies, as they can be expected to have significant impact on the environment'.[17]

Table 6.1 – Five Options

Option	River	Description	Estimated Yield (ML/year)	Unit Cost of Bulk Water ($/kL)
TW7	Tweed	Dam on Oxley River. Pipeline from Brays Park Weir to Nerang River	20,000	$1.42
CL3b	Clarence	Dam on Clarence Upstream of Duck Creek. Pipeline to Logan River	100,000	$1.73
CL5b	Clarence	Dam on Tooloom Creek. Pipeline/tunnel to Logan River	20,000	$1.65
MA1	Clarence	Weir on Mann River. Pipeline to Logan River	50,000	$2.12
MA2	Clarence	Dam on Mann River. Pipeline to Logan River	100,000	$2.04

Source: SMEC. (2007) *Integrated Water Supply Options for north east New South Wales and south east Queensland*, p. 2.

6.16 The Review Report included commentary on the transfer of water from northern New South Wales' rivers. The report highlighted that the Tweed and Clarence catchments have '…significant runoff, and have relatively insignificant storage development. On hydrological grounds there appears to be significant

16 *Committee Hansard*, 11 May 2007, p. 63.

17 SMEC. (2007) *Integrated Water Supply Options for north east New South Wales and south east Queensland*, p. 1.

potential for further water resources development…'.[18] However, the Report indicates that there are a number of factors, which may limit the opportunities for short or long-term utilisation of these resources for urban use in SEQ. The limitations include:

> • Environmental impacts;
>
> • NSW State Government policies on granting additional allocation of water from these catchments;
>
> • NSW State Government legislation regarding interstate transfer of water from these catchments;
>
> • The distance of the potential sources from the demand centres in SEQ (the proposed Tugun Desalination Plant has the capacity to provide all of the urban demands for the southern part of the Gold Coast area, therefore any additional supply would need to be piped north as far as the areas south of Brisbane); and
>
> • The rugged topography separating the northern NSW catchments from the coastal SEQ catchments, which would mean high pumping heads and energy costs for the most direct routes.[19]

6.17 The committee sought clarification on the extent of assessments undertaken on possible social and environmental impacts of the five options. Mr Deen reiterated to the committee that the study was undertaken on available information and included very broad assessments:

> It is the next stage that would involve assessment of costs and benefits for these proposals.[20]
>
> …
>
> From our perspective we believe that a second stage is needed, where one would be looking at a full feasibility study of these options.[21]

6.18 Mr Robert Hales and Mr Adam Anderson provided a report to the committee which analysed the SMEC Report and concluded '[a] more comprehensive assessment is needed before any conclusions can be drawn concerning the viability of any of the options listed in the SMEC Report'. The Report identified the following concerns:

> 1) Climate change impacts have not been considered on yield estimates.
>
> 2) Climate change has not been factored into environmental flow and regulation issues.

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18 A.Turner, G.Hausler, N. Carrard, A. Kazaglis, S. White, A. Hughes, T. Johnson, *Review of Water Supply-Demand Options for South East Queensland*, Institute for Sustainable Futures, Sydney and Cardno, Brisbane, February 2007, p. 52.

19 *Review of Water Supply-Demand Options for South East Queensland*, pp 52–53.

20 *Committee Hansard*, 11 May 2007, p. 74.

21 *Committee Hansard*, 11 May 2007, p. 78.

3) Issues with climate change and methods of assessment lead to lower expected yields and therefore increase costs of water.

4) There remain serious questions over the methods of assessment of storage sizes, yields and regulation of all the selected preferred options.

5) The preferred options impacts on the nationally listed endangered Eastern River Cod and other fauna.

6) The preferred options will significantly impact National Parks.

7) It fails to acknowledge Indigenous Land Use Agreements.[22]

6.19 The costs detailed in the SMEC Report are made on a 'very conservative basis' and SMEC stated that they are 'fairly confident' of the numbers produced and assessed the cost based on their 'experience designing dams, building pipelines, pump stations et cetera. We have used the most recent information that we have available. We very recently developed a number of pipeline projects, and that information is also brought in'.[23]

6.20 The committee notes that 'NSW government agencies were invited to contribute to the SMEC Report but did not offer any assistance'.[24] The committee received a number of submissions from members of the communities affected by the five options identified in the SMEC Report. The major areas of concern identified include:

- the appropriateness of the information contained in the SMEC Report;[25]
- the failure to adequately address the economic, environmental and social impacts including indigenous issues for the five identified options;[26] and
- ability to maintain adequate environmental flows.[27]

Rainwater tanks

6.21 Many witnesses and submitters suggested that introducing water tanks to homes in Brisbane and SEQ would be a viable alternative to supply water to the region.[28] Mr Roger Currie, Water Resources Policy Officer, Wide Bay-Burnett Conservation Council Inc. commented:

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22 *Submission* 69B, p. 1.

23 Mr Amir Deen, SMEC, *Committee Hansard*, 11 May 2007, p. 64.

24 SMEC. (2007) *Integrated Water Supply Options for north east New South Wales and south east Queensland*, p. 5.

25 For example, see *Submission* 214; *Submission* 217; *Submission* 222; *Submission* 232; *Submission* 233; *Submission* 239.

26 For example, see *Submission* 215; *Submission* 216; *Submission* 237; *Submission* 240; *Submission* 241; *Submission* 242; *Submission* 243.

27 For example see *Submission* 207; *Submission* 212; *Submission* 217; *Submission* 240.

28 For example, see *Submission* 22; *Submission* 31; *Submission* 65; *Submission* 123.

> It is cheaper for Beattie to buy tanks for everyone in Brisbane; it is cheaper for Beattie to recycle; it is cheaper for Beattie to desalinate. They are all cheaper than Traveston.
>
> …
>
> Mr Currie—We are saying that tanks, desalination and recycling are the key to the future.
>
> CHAIR—You are saying that we can put another 1.5 million people in there and do it on tanks?
>
> Mr Currie—Yes, providing that we can get Australians to come to their senses and stop wasting water.[29]

6.22 The Queensland Government has included the use of rainwater tanks in its urban demand initiatives. In June 2006, the government launched a series of rebate schemes to promote the take-up of water saving appliances and rebates of up to $1000 are available for water tanks.[30] Also, in addition to this rebate scheme, the Queensland Government has legislated that every new house in SEQ must supply 70,000 litres from a rainwater tank or other type of rainwater harvesting or local water recycling. Rainwater tank retrofits and recycled water applications will need to be considered on a case by case basis.[31]

6.23 Suggestions were made in evidence that the Queensland Government should be implementing further strategies to encourage residents to install and use rainwater tanks:

> Where a householder or business is willing and able to install larger tanks, the subsidy should be increased and new houses aught to be required to install larger tanks.[32]
>
> …
>
> Maybe it's the urgency of the situation but southeast Queenslanders are showing themselves more than willing to look at other options. Rainwater tank rebate schemes have proven enormously popular though work needs to be done to build in more encouragement to purchase larger tanks. Councils are at last seeing tanks as an asset, especially when the houses are in higher rainfall areas than their dam catchments. Tank installation is a labour-intensive industry which keeps pace with growth.[33]

6.24 The Australian Conservation Foundation (ACF) provided the committee with a report commissioned by the ACF, the Nature Conservation Council (NSW) and Environment Victoria titled *The economics of rainwater tanks and alternative water*

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29 *Committee Hansard*, 11 May 2007, pp 53–54.

30 *Submission* 166, p. 15.

31 *Submission* 166, p. 49.

32 Ms Gillian Pechey, *Submission* 36, p. 1.

33 Mr Ian Mackay, *Submission* 75, p. 3.

supply options (the MJA Report).[34] This report was prepared by Marsden Jacob Associates (MJA) and conducted research into the potential rollout of rainwater tanks in Sydney, Melbourne and SEQ. The research undertaken included 'an analysis of the potential water savings, the energy savings from avoiding dams and desalination plants, and the cost of rolling out rainwater tanks on a massive scale'.[35]

6.25 The MJA Report concluded that if rainwater tanks were rolled out to five per cent of households each year, based on the SEQ demand scenario adopted by the Queensland Government, expenditure required in 2010 to cater for demand growth across the system (excluding emergency supply options) could potentially be delayed:

> - to around 2019 in SEQ if all potential housing (i.e. detached and semi-detached houses…78 per cent of SEQ dwellings) could install a rainwater tank.
>
> - to around…2018 in SEQ if only 50% of total dwellings could install a rainwater tank; and
>
> - to around…2013 in SEQ if only 10% of total dwellings could install a rainwater tank.[36]

6.26 The MJA Report also indicated that rainwater tanks are more than five times as energy efficient as desalination plants per kilolitre of water produced and estimated that the cost to roll out rainwater tanks to 5 per cent of households in SEQ would be approximately $140-$200 million per annum.[37]

6.27 The Review Report considered an extension of the rainwater tank program for existing households as a new demand-side option to reduce the demand for water. The Report states that:

> This program would require connection of the tank to outdoor and selected indoor end uses to optimise the rainwater tank savings. In some locations in (for example) Brisbane there are localised constraints experienced by the stormwater system or peak water supply. Rainwater tanks in such areas could reduce costs associated with upgrading stormwater or water reticulation systems (Turner et al, 2003). This is very area-specific and requires further research, but it can be assumed that such opportunities will reduce the unit cost of rainwater tank retrofits, which would otherwise be very high. It is assumed that a high uptake could be achieved in this option if it were linked to regulations that affect specific zones that would benefit from avoided stormwater infrastructure upgrading and mains upgrading

34 Marsden Jacob Associates, 2007. *The economics of rainwater tanks and alternative water supply options*. Prepared for the Australian Conservation Foundation, Nature Conservation Council (NSW) and Environment Victoria, April 2007.

35 ACF, Answer to question on notice, 4 June 2007 (received 14 June 2007).

36 *The economics of rainwater tanks and alternative water supply options*, p. 6.

37 *The economics of rainwater tanks and alternative water supply options*, p. 7.

associated with fire fighting. Savings of 70 kL/household/a have been assumed (Coombes & Kuczera, 2003).[38]

Recycled Water

6.28 The Queensland Government is implementing the Western Corridor Recycled Water Project which will have the combined capacity to supply 210 megalitres per day of purified recycled water:

> This project is a bulk recycled water supply initiative linking Luggage Point on Brisbane's east to Caboonbah in the north-west. It is Australia's largest water recycling project, the 3rd largest advanced recycled water treatment project in the world and the 4th largest recycled water scheme in the world. This water will be used by power stations, industrial users and possibly for agriculture, as well as providing additional supplies into Wivenhoe Dam to supplement potable water supplies.[39]

6.29 The Western Corridor Recycled Water Project will involve the following stages:

> • Stage 1A: An advanced water treatment plant at Bundamba will treat water from existing wastewater treatment plants at Bundamba and Goodna to supply Swanbank power station by 31 August 2007;
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> • Stage 1B: The advanced water treatment plant at Bundamba will be expanded to incorporate additional volumes of water from existing wastewater treatment plants at Oxley and Wacol. A pipeline will then link to Caboonbah for off-take to supply recycled water to Tarong power station. This stage is scheduled for completion in 30 June 2008; and
>
> • Stage 2: Two new advanced water treatment plants to be constructed alongside existing wastewater treatment plants at Luggage Point and Gibson Island will provide larger volumes of purified recycled water for delivery to Wivenhoe Dam scheduled for completion by 31 December 2008.[40]

6.30 Professor Don Bursill, former Chief Scientist with the South Australian Water Corporation and founding member of the Global Research Coalition, expressed caution about recycling wastewater to supplement potable water supplies. Professor Bursill commented that the necessary parts of the system must be followed properly and reliably to ensure a fail-safe operation:

> It is my view that this option for a public water supply should only be taken up if all other reasonable water sources and non-potable recycling options are already fully utilised or are unavailable. My reservations are not related

38 A.Turner, G.Hausler, N. Carrard, A. Kazaglis, S. White, A. Hughes, T. Johnson, *Review of Water Supply-Demand Options for South East Queensland*, Institute for Sustainable Futures, Sydney and Cardno, Brisbane, February 2007, p. 38 and Appendix B.

39 Queensland Government, *Submission* 166, p. 18.

40 *Submission* 166, p. 18.

> to technical performance of the processes and technology involved but more because of what might happen in terms of a significant failure occurring in a system and its severe potential public health outcomes for the community served by the scheme.[41]

6.31 The committee heard evidence from Professor Paul Greenfield, Chair of the Queensland Water Commission Expert Advisory Panel on Purified Recycled Water who provided detailed explanations of the system being implemented by the Queensland Government. Professor Greenfield commented that traditional water treatment effectively uses a three-barrier process. However, the process being implemented in Queensland has '…seven barriers. The risk level at the end of those seven barriers is reduced to as low as or lower than the risk that we currently tolerate. I cannot promise you that it is absolutely lower but it is as low as'.[42]

6.32 Professor Peter Collignon, an infectious diseases physician and clinical microbiologist, talked about the use of an aquifer as an added safety factor and commented:

> If you need the water, I think that would be much better. That is my understanding of what happens in the US. They put it in an aquifer where it may take up to 10 years before it actually arrives at the point. So you have this added safety factor. The other thing is that, with your monitoring, if something should go wrong then you have more time to realise it. I think that a lot more monitoring needs to be done than is the current practice. We need to have better tests to look for viruses and to be able to detect more quickly if they are in the water that is being released, because currently that sort of technology does not seem to exist.[43]

6.33 The Review Report considered recycled water options and said that there are approximately 60 wastewater treatment plants in SEQ many of which are small capacity plants. The report lists a number of potential recycled water indirect potable reuse (IPR) schemes in Queensland which will offer significant recycled water supplies and commented that:

> The recycled component of each of the supply sources mentioned…is a time-averaged figure. The recycled component will increase during drought periods, and reduce during periods of high runoff and overflows.
>
> Some of the…IPR options may require upgrading of the downstream water treatment plants to include ozonation and BAC [Biologically Activated Carbon] filtration processes as additional measures of protection against possible failure of the advanced wastewater treatment plants due to such events as lightning strikes.

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41 *Committee Hansard*, 4 June 2007, p. 52.

42 *Committee Hansard*, 4 June 2007, p. 72.

43 *Committee Hansard*, 11 May 2007, p. 28.

> IPR options will be affected by demand management initiatives. In future detailed modelling both the yield and costs of such options will need to take this into consideration.[44]

6.34 Mr Barry Dennien, Queensland Water Commission, confirmed that there was approximately 200 megalitres per day of recycled water still available and this latent capacity is distributed throughout a series of smaller councils. Mr Dennien emphasised that they were concentrating on the Western Corridor Project and would then consider other water recycling schemes in Queensland:

> Our focus has been to build one scheme, and it really tied back to Don Bursill's point: we wanted one very large scheme with single-point operation, well managed, well controlled; the gold standard of design. We want to make this work and be a showpiece of Australia. That was the plan and that is still the plan: to have our eggs in just one basket and get it right. Then, when our strategic plan is released in about three or four months time, we will showcase some of the other schemes that may come on line later as the scheme proves itself and, as and when they are required, we will bring on the other schemes.[45]

Conclusion

6.35 The Queensland Government has implemented a diverse strategy of both demand and supply side options to redress the challenges it faces in meeting the demand for water in their state. The committee received mixed evidence on whether a new source of water supply was needed. The majority of submitters and witnesses clearly called for the Queensland Government to explore options other than the Traveston Crossing Dam and the Wyaralong Dam. However, most submitters and witnesses did not suggest alternatives for bulk water supply.

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44 A.Turner, G.Hausler, N. Carrard, A. Kazaglis, S. White, A. Hughes, T. Johnson, *Review of Water Supply-Demand Options for South East Queensland*, Institute for Sustainable Futures, Sydney and Cardno, Brisbane, February 2007, p. 50.

45 *Committee Hansard*, 4 June 2007, p. 79.