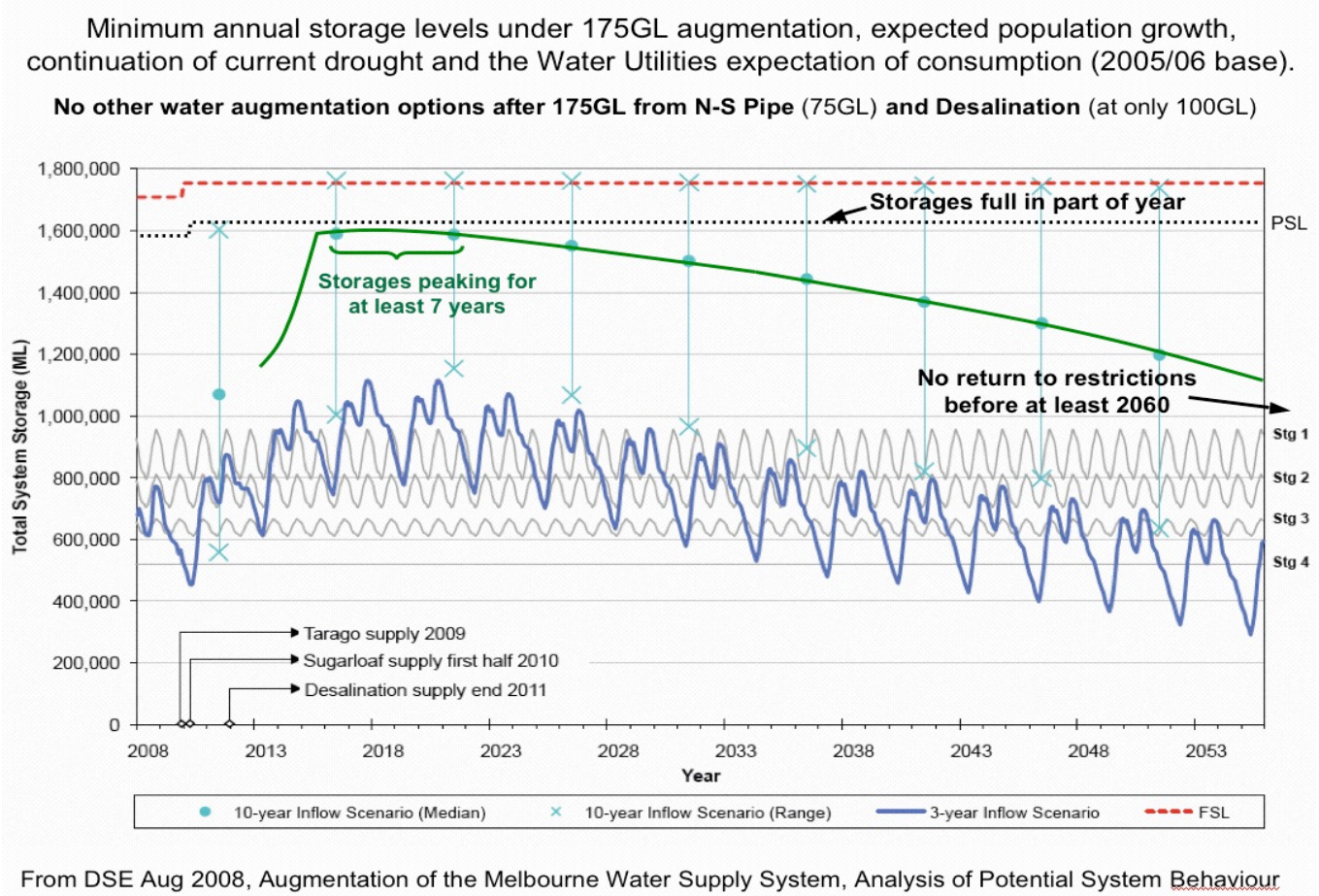
The perils of excessive supply from two large infrastructure projects being implemented to solve Greater Melbourne's water supply problems.

In April 2008, the community group, 'Your Water Your Say Inc" determined that the State Government's current 'Water Plan', involving the sourcing of 225 gigalitres from the North-South Pipe and a Wonthaggi Desalination plant, would see dams overflowing in 2015 (ref 1). This was assuming a continuation of the now 12 year long drought, population increase and without any significant quantity from recycling, or the introduction of stormwater capture or other sustainable augmentation options by that time.

Water experts agree that the sustainability of this water policy must be questioned. 225 gigalitres per annum of additional water from the Government's Water Plan represents more than 60% more water each year than was consumed by industry, households and leakages in 2008. With this huge quantity of water suddenly available, we run the risk that consumption will return to excessive levels over the next decade. It is difficult to see how the consortium building and operating such a large desalination plant would not ensure their profitability. The complacency this would generate, and the sheer excess suddenly available, will shut out the more sustainable water supply options. Those options, which could have captured the same quantity of water, will likely be ignored until dams are low again, and it is once again considered politically too difficult to implement them. We then run the risk of a further decline in our water supply sustainability, with a second desalination plant in the future.

The Department of Sustainability and Environment produced an analysis of how this additional supply would affect storage levels (ref 2). This report confirmed the 'Your Water Your Say' group's finding that under a continuation of the current drought, dams would indeed be full in 2015. It also looked at a very much more severe scenario where the spring rains fail every third year, and consumption is higher than the water utilities predictions, to justify the need for the 225 gigalitres from the 'Water Plan'. However, in both scenarios, the analysis excluded any additional recycling, stormwater capture or other sustainable augmentations. The data on the more likely situation, of the current drought continuing, was extracted by the new community group, 'Watershed Victoria Inc', from the DSE analysis (after 'Your Water Your Say' had been silenced by the Government over court costs). The graph below is derived from Watershed Victoria's report (ref 3). Here we see the green line, representing the minimum storage level in a year, approaching the full level around 2015 and storage levels remaining above any restriction triggers until around 2060. Critical points to note here are that this is with a total augmentation of only 175 gigalitres (less than the Government's proposed 225 gigalitres). It is also worth noting that the same storage behaviour would apply, even if this augmentation came from other water supply options, within the same timeframe.



From DSE Aug 2008, Augmentation of the Melbourne Water Supply System, Analysis of Potential System Behaviour

**** So the question needs to be asked, "how much augmentation do we really need for water security, and should it all be sourced over the next 3 years, as is the Government's desire"?**

Determination of a sensible level of augmentation for Greater Melbourne's water supply.

An initial approach might be to assess by how much the storages have been falling each year since the "step change" in inflows to our reservoirs. We will look at the period 1997-2008 representing the ongoing drought, and capturing the two years 1997 and 2006 when spring rains failed. The following table assesses the average annual water deficit (resulting in dam levels dropping):

Change in storage levels for Melbourne's water storages 1997-2008			
Year	Storage level at start of year	Storage level at end of year	Yearly storage change
	(ML)	(ML)	(ML)
1997	1728700	1290500	-438200
1998	1290500	1230000	-60500
1999	1230000	1030000	-200000
2000	1030000	1092792	62792
2001	1092792	1047636	-45156
2002	1047636	905000	-142636
2003	905000	1002913	97913
2004	1002913	1073000	70087
2005	1073000	1036000	-37000
2006	1036000	691000	-345000
2007	691000	693500	2500
2008	693500	618482	-75018
		Average yearly storage change =	**-92518**

Here we see that, on average, there has been a deficit of 92.5 gigalitres per year over this 12 year period. An initial reaction might be that we need at least this quantity of augmentation annually. However let's first consider that in 1997 water use was at an all time high, and that resulted in the steepest annual fall in storage levels ever. We need to consider what a sustainable usage might be. The Department of Sustainability and Environment used 2005/06 levels as their base, and scaled consumption to expected population change in their study. We will do the same thing here, starting from a 2005 base consumption (approx 210 litres per person per day domestic consumption) and assuming population had been increasing at a rate of 1% per year before then and 1.3% per year after 2005. The following table estimates what annual consumption may have been if we had been more efficient water users before 2005 (although less efficient than we actually were after then as it assumes we were not under water restrictions). Now we can assess how this very reasonable level of water usage, one that we should be comfortable with, would have affected storage levels during the drought.

Storage defecits for Melbourne's water storages 1997-2008 both actual and if efficient water use (2005 equivalent)							
Year	Storage level at start of year	Storage level at end of year	Yearly storage change	Yearly actual consumption (Melb Water)	Yearly consumption based on 2005 with population scaling (less1% before +1.3% after/ yr)	Storage defecit improvement with efficient water use	Yearly storage change if we were efficient water users
	(ML)	(ML)	(ML)	(ML)	(ML)	(ML)	(ML)
1997	1728700	1290500	-438200	538387	408224	130163	-308037
1998	1290500	1230000	-60500	504066	412661	91405	30905
1999	1230000	1030000	-200000	494880	417099	77781	-122219
2000	1030000	1092792	62792	493110	421536	71574	134366
2001	1092792	1047636	-45156	491944	425973	65971	20815
2002	1047636	905000	-142636	482972	430410	52562	-90074
2003	905000	1002913	97913	453091	434848	18243	116156
2004	1002913	1073000	70087	441358	439285	2073	72160
2005	1073000	1036000	-37000	443722	443722	0	-37000
2006	1036000	691000	-345000	449044	449490	-446	-345446
2007	691000	693500	2500	379009	455259	-76250	-73750
2008	693500	618482	-75018	368000	461027	-93027	-168045
Average annual storage deficiency =			**-92518**				
Actual average annual consumption =				**461632**	433295	if efficient	
Average annual storage deficiency with efficient water use =							**-64181**

The table on the last page shows that under 2005 levels of water use the dams would only have dropped by around 64 gigalitres per years over the 12 years of the current drought. This level of consumption should be one we would be more than happy to continue with into the future (i.e. without restrictions but not excessive).

Now this might be a better start to assessing the level of augmentation to supply that is needed. However there are other factors that need considering;

- Further population increase,
- the possibility of further climate change,
- better river health.

Population is currently increasing at around 1.5% a year, or nearly 60000 extra people in Greater Melbourne every year. Should this continue over the next 10 years, we will need 15% more water than we did in 2008. Assuming reasonable usage, this would be 15% of 461 gigalitres = 69 gigalitres a year by 2018. The significance of population increase in the overall water supply equation can be seen, with it requiring more additional water over the next ten years than the dam levels had been falling by over the last 12 years.

The need for the full 69 gigalitre augmentation to cover population increase is not immediate, however should it be implemented over the next few years it would allow building of storage levels as an insurance against further climate change reductions in inflows to our dams. We should remember that the current drought cycle may come and go, and we might return, at least for a time, to inflows more like the historical levels. This would also allow a period of storage level building, giving insurance for future years.

Some river environmental flows have been qualified during the last few years, and it would be reasonable to augment supply to allow for the return, and addition, of promised environmental flows of around 32 gigalitres. This component is not for consumptive use, although it provides a buffer, allowing more security around river pumping to Sugarloaf Reservoir and irrigation releases.

Overall then, augmentation over the next ten years should cover;

- requirement to balance drought years storage deficit	64 GL
- population increase over the next 10 years including some component for further climate change insurance	69 GL
- better river health and security	32 GL
Giving a sensible level of augmentation at around	165 gigalitres per annum.

The green line, 'current level of drought' graph, from DSE's analysis on page 1, shows 175 gigalitres augmentation is excessive, especially as it contains no river health component. Storages fill very quickly, and then take nearly fifty years before restrictions would again be required, with no further augmentation in that time. A sensible level and use of augmentation over the next few years then is 165 gigalitres as above. It would be prudent to restrict consumption for the next two or three years while the new augmentations are being put in place (we support the 155 litres/person/day campaign until new augmentations come on line). In this scenario, for the next ten years we will have more than covered population increase and the current level of drought continuing. We will have time to assess the degree to which drought and climate change are biting, and if need be, further augmentation can be planned without undue haste.

In Summary:

Current Government plans for the augmentation of Melbourne's water supply by 225 gigalitres from the North-South Pipe and the Wonthaggi desalination plant are excessive, and will shut out other beneficial, and lower emission sustainable water options for decades to come. A quantity of 165 gigalitres is more realistic in the time frames being considered. Sustainable options should and can be implemented to source the majority of this quantity of additional supply. If we fall into the trap of a quick fix, large, politically driven solution, we do nothing to improve our environment, and potentially be damned to repeat our mistakes again and again.

References:

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