Planning Panels Victoria
Level 1
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Submission on the Environmental Effects Statement

Victorian Desalination Project

28th September 2008

I wish to make the following submission to the planning panel inquiry considering the Environmental Effects Statement for the Victorian Desalination Project.

I would like to request that I be able to submit my findings in person to the public hearings of the inquiry panel.

Please feel free to contact me directly should you have any queries in regard to these matters.

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An analysis of the scale of the proposed desalination plant on other water augmentation options within the Victorian Government's Water Plan.

1. Introduction

The scoping document produced by the Department of Planning and Community Development (1) for the Environmental Effects Statement (EES) of the proposed desalination plant, being part of the governments Water Plan (2), requires that the scale of the plant and its impacts on other augmentations within Government policy must be considered.

p14 - 'the EES report should include:

- A description of the project's objectives and rationale, as well as its relationship to strategic policies and plans'

p20 - 'describe, explain, and if relevant also assess, feasible concept alternatives for:

- the scale and staging of the plant development'

The EES rightly states that; 'Scale is without precedent', this plant will be larger than any currently operating worldwide, and as such it's place within Greater Melbourne's water supply network and its effect on other supply options must be considered. Further, the economic and environmental effects of a single plant of this unprecedented scale would be proportionately reduced if the scale could be reduced while still allowing the governments to satisfy overall system needs, perhaps with the addition of other augmentations. Other policy initiatives such as recycling are recognised as having beneficial environmental spinoffs and should not be excluded by the adoption of excessive scale of desalination.

p21 - 'Economic effects …. In relation to a plant capable of producing **up to** 150 or 200 GL …..

- Explain the considerations underlying the proposed scale and potential staging of the desalination plant, in terms of supply capacity"

2. Summary

This modelling and analysis of Government data and referenced studies confirms the following:

- In a future scenario approximating a continuation of the last 10 years of drought water storages will be spilling or close to it for typically five years with desalination operating at a 100 GL or 150 GL scale. Additional augmentation of 55GL to supply, above these desalination levels, leads to storage levels at or near spilling for 25 to 40 years.

- In a future scenario where the lowest on record 2006 inflow repeats every third year, demand returns to unrestricted levels under permanent water saving rules, and desalination scale is at 150 GL, additional augmentation produces a similar result. A 55GL additional augmentation has storages at or near spilling for more than 20 years.

This presents a compelling case that the proposed scale of this project is excessive and will have an adverse effect on the uptake of alternatives that are part of current Government policy or may be part of future policy.

Consideration also needs to be given to this scale of desalination tying up storage infrastructure, in particular Cardinia Reservoir, and the adverse effects that this may have on the ability to implement other supply options.

Government policy is rightly to diversify and boost supply to meet future demand, however the current proposal looks like restricting diversity largely to a single option, desalination. Given the Victorian community has considerable economic investment in and desire to implement supply options such as recycling, and that it is Government policy to implement large scale recycling, this scale of desalination seems at odds with the communities expectations of their Government. It should be noted that Government does not have a mandate to implement desalination, in fact it has a mandate that it should be a last resort.

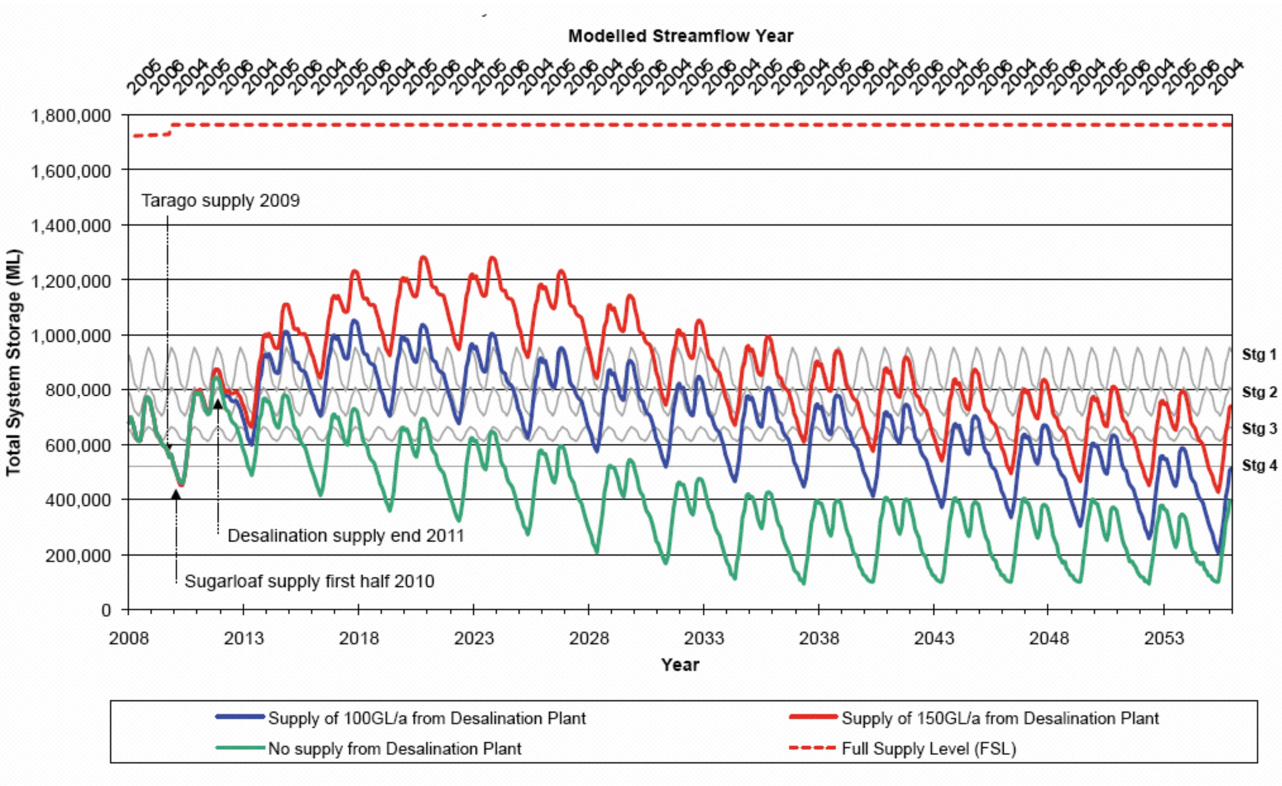
The community also requires their Government to limit Victoria’s greenhouse gas emission to the extent practicable, in order that future generations do not bear too large a costs from climate change. By limiting augmentation largely to the option that produces the greatest greenhouse emissions, the offsets required are significantly larger than would be the case with a more diverse range of supply options. This will mean that a greater quantity of feasible renewable energy is tied up in water infrastructure, and is thus unable to be used to offset other existing Victorian emissions.

3. Background

The Victorian Government's Department of Sustainability and Environment produced a report (3) used in the EES that modelled water supply storage levels on two different climate change induced inflow scenarios;
- 10 year drought inflows continuing,
- 2004 - 2006 repetition scenario, with the lowest on record 2006 inflow being repeated every three years.

A high population increase scenario modelled on the 2006 census continuing was used.
Two consumption scenarios were considered, both based on 2005/2006 levels of consumption when Melbourne had permanent water saving measures but no water restrictions. One of these scenarios involved a return to past water use practices once restrictions are removed while the other followed the Water Utility's views that future demand would be tempered by a growing awareness that water is a finite and increasingly expensive resource.

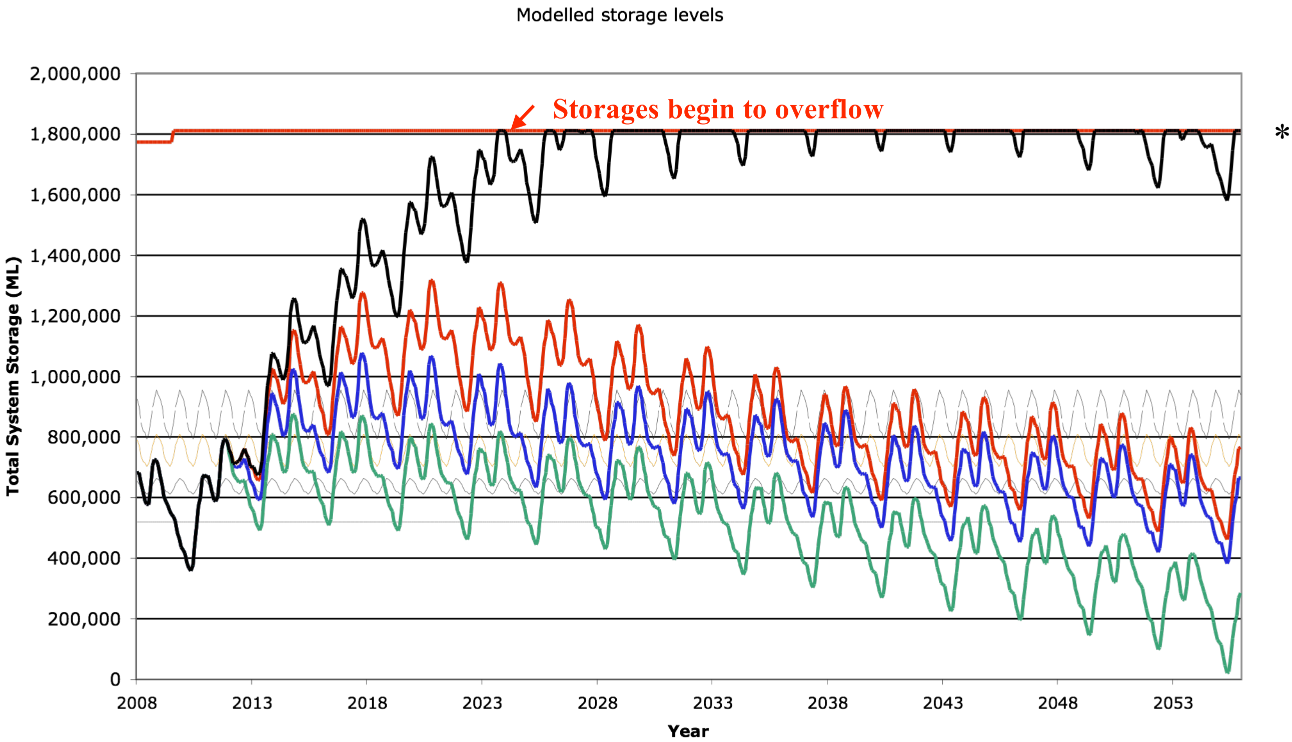
The Victorian Government has taken the most severe combination of the above scenarios from the report, and provided the following figure from this report as the only technical justification in the EES for the scale of the project at 150 gigalitres (GL).



It would appear from this graph that the additional 50 GL between the desalination plant operating at 100 GL and 150GL gives only a 10%-15% increase in storage capacity allowing restrictions to be lifted for 15-20 years. This is not intuitive as one might expect that the additional 50 GL annually during that time would build storage levels to a greater extent. One might have expected storage levels 10 years after augmentation to build by say 50 GL x 10 years = 500 GL. The reason this is not happening is that the majority of that additional supply (between the plant operating at 100 GL and 150 GL) is still to go to new or returned environmental flows.

4. Effects of plant capacity on government policy and other potential augmentations

Now, we need to consider what effect the plant operating at 150 GL would have on system behaviour if another augmentation to supply is introduced. This might for example be under the Government's commitment to make use of recycled water. DSE have excluded from their analysis any effect from further augmentation. I have modelled the scenario used to produce the graphs in the EES and used this modelling to investigate system behaviour if other policy initiatives are implemented. The graph below represents storage behaviour with an additional augmentation of 55 GL. Once all commitments to demand, including environmental flows have been met, this new augmentation will go to building storage until demand again outstrips supply in the future. It will be noted that storages will be near full or overflowing past the 2055 study period even with this one additional augmentation.

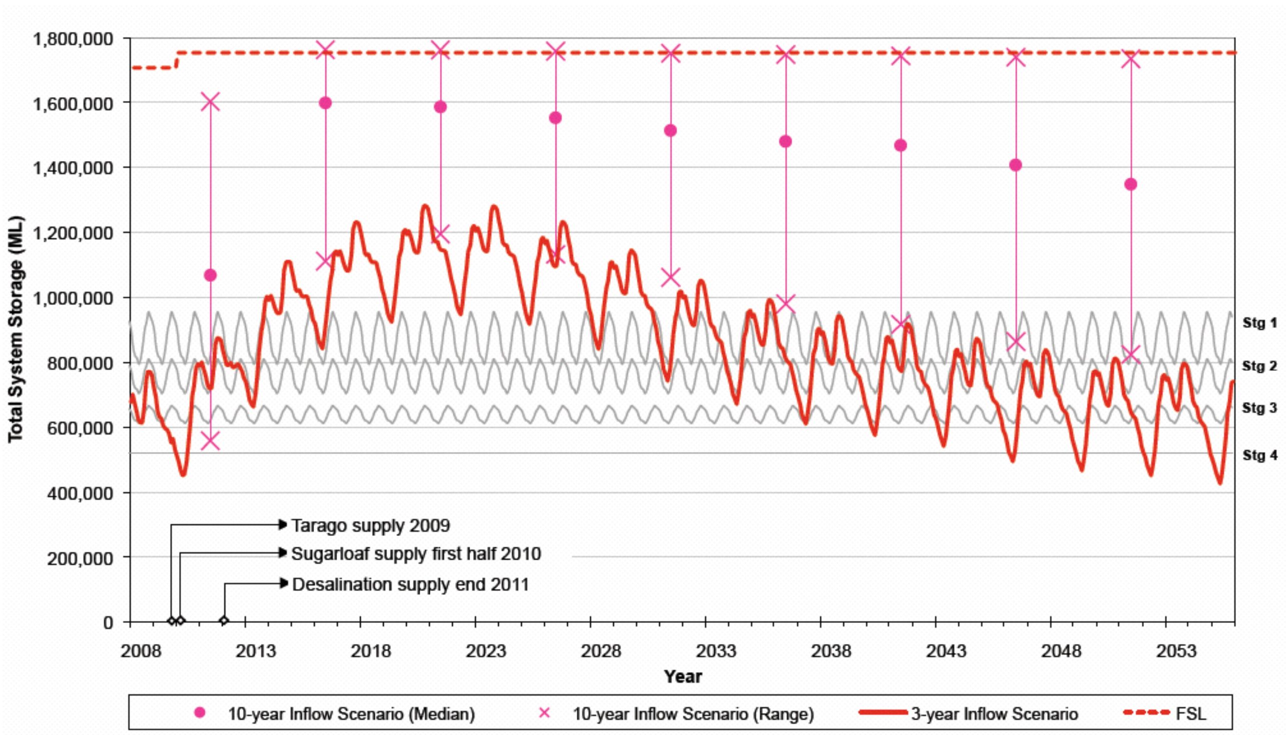


It should be noted that this is the most severe of all scenarios modelled by Government in the DSE report and that others modelled will see even further spillage with the same augmentation.
This then brings in to question the justification for operating the desalination plant at 150 GL as it produces a situation of excessive storage levels. One could argue that it in fact provides a disincentive for the use of recycled water, or other policy augmentations that have or may be considered.

* Note that behaviour of storages near spilling point will depend on future ability to capture or otherwise divert some of that quantity, see attachment 2.

If we look at system behaviour for the plant operating at 150 GL in the less severe supply scenarios presented in the DSE report (3), of a continuing inflow at the levels of the last 10 years of drought, and again consider an additional augmentation, the situation is more severe. Unfortunately the Government would not release the report (3) before the EES and in fact I did not get a copy until 2 weeks after the EES release even though it is referenced in the EES. I have not had time to generate a modelling program to produce a graphical representation of system behaviour as above. However it is possible to see what will likely happen in the less severe scenario of a repeat of the last 10 years of drought, by following the dots on the bars which show likely behaviour for this 10 year inflow scenario.

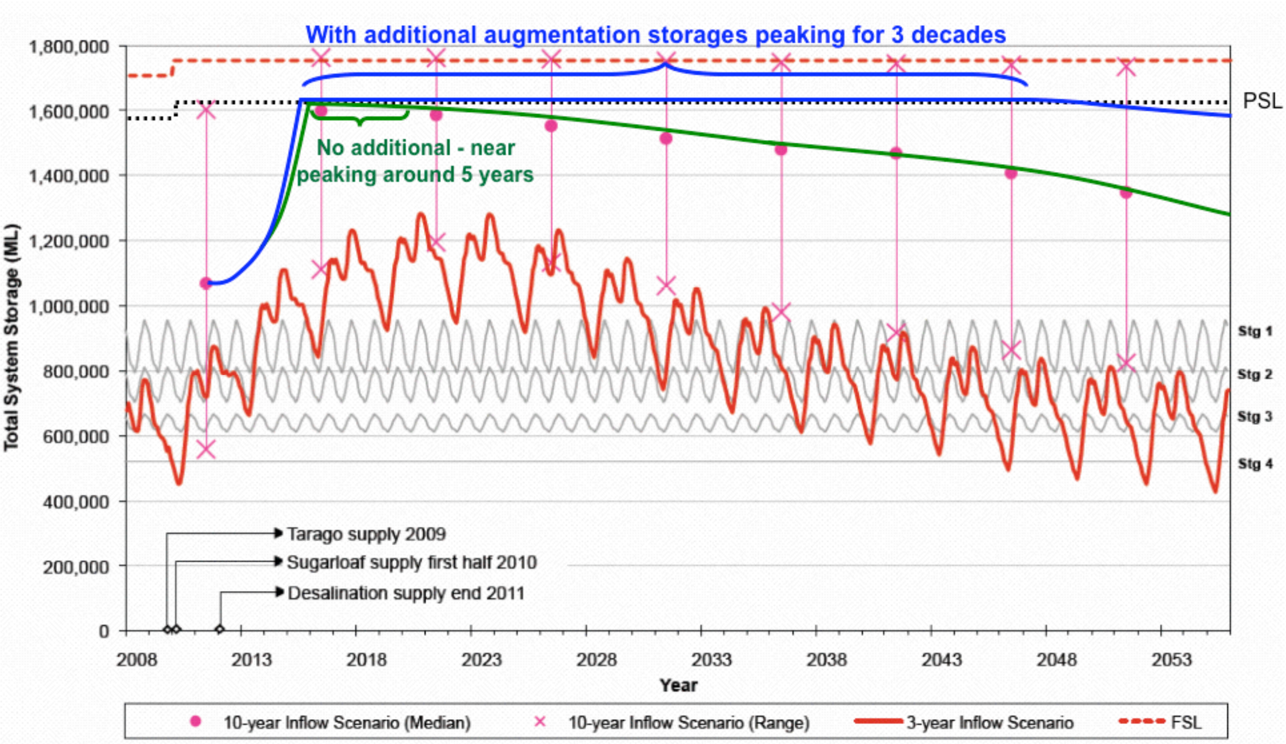
Below we have the most severe of the 10 year inflow scenarios from the report (3) reproduced. Equivalent to Figure 5.5 in report (3), more severe demand scenario modelled.
(Look at the dots rather than the line graph to see 10 year inflow scenario):



The median dots (which represent the 10 year scenario) would appear to show storage levels climbing to within nearly 150 GL from the full level and then falling by 200 plus GL over the next 40 years. This isn't entirely the case however as the dots have been chosen to show storage levels around June or July in their respective years. This is the time of year when storages are typically at their lowest before the spring rains. A quick look at the last 10 years of annual storage variation from the DSE report (3), fig 2.3 (reproduced for 1998-2007 in Attachment 1 at end of this submission), shows an average variation from this mid-year to the late year level of around 130GL. Hence storage levels can be expected to actually be varying between these dot values and 130 GL higher. It can therefore be assumed that storages will be at or near peaking (potentially overflowing) for around five years between 2015 and 2020 even in this most severe of 10 year inflow scenarios. Further, annual storage levels 40 to 50 years from now would likely be at levels around 1300GL to 1430GL, or 72% to 78% full, and this is with no further augmentation to supply of any kind after the desalination plant.

Should an additional augmentation of the order of 55 GL, as previously modelled be implemented within the next decade or so then storages would likely be peaking for most of the remaining period studied to 2055. In order to see this behaviour superimposed over the graphs presented in the report (3) I propose a new 'Peaking Storage Level' (PSL) line be dotted in at a level around 130 GL below the FSL line on the graphs. Thus whenever the mid year data points are near this line it indicates that the end-year storage levels will be at or near spilling.

Below is the same most severe 10 year inflow scenario as on the last page with this spilling line shown. A green line tracks the median points given for desalination as the only augmentation considered (after Tarago and Sugarloaf) and the blue line is an indication of storage annual minima with an additional augmentation as above. When these lines approach the PSL line the storages can be considered to be at or near spilling for some part of each year.



Desalination at 150 GL, more severe demand scenario, storage peaking times with and without additional 55 GL augmentation. Equivalent to Fig 5.5 in report (3). 10 year scenario has no reintroduction of restrictions in either case past 2055.

Should we consider system inflows of the order of the last 10 years of drought to be the likely scenario into the future then again we must question the desirability of operating the desalination plant at 150 GL. This action would mean that other augmentation options could not be justified as storages would be operating between peaking and 70 odd percent over the next 50 years even with no further augmentation, and under the most severe demand scenario modelled.

Attachment 3 shows similar analysis of the other, 10 years of drought continuing, scenarios. In every case, with desalination supply at either 100 GL or 150 GL, the storages are shown at or near spilling for some time with no other augmentation. Should the additional augmentation be implemented there will be decades of storage spilling in every case.

A further problem might well arise should desalination be implemented at the proposed scale and staging. Supply from the proposed plant will go to Cardinia Reservoir and possibly Silvan as well. These reservoirs are likely to be largely committed to the desalination supply as their combined capacity is only about twice that of the desalination proposal.* Other augmentation options would likely also need to rely on the storage capacity of these reservoirs. This presents another reason why implementing desalination at the scale proposed is likely to exclude other augmentation options.

* This loss of Cardinia availability is discussed in (3), 'Potential for Harvest Foregone', in relation to another potential loss of about 25 GL harvested from Yarra tributaries downstream of the Upper Yarra Reservoir if the desalination project goes ahead.

5. Conclusions

Current Government water augmentation policy has been shown here to be establishing desalination as the major component in solving Greater Melbourne's water security problems. I have demonstrated that desalination is intended to be established at a scale that will exclude significant use of other supply initiatives. Such initiatives as recycling which, 'must be made available as part of a strategy to diversify supply', would seem to be excluded with desalination at the scale proposed in the EES.

Other supply options may also be excluded by the practicalities of desalination having tied up infrastructure required to implement those other options.

Greenhouse emission implications of a project of this scale are, that a greater quantity of available renewable energy will need to be tied up in water infrastructure to offset desalination and pumping emissions than would be the case for almost all other options. Thus existing Victorian emissions will not be able to be reduced to the extent they would if less greenhouse intensive options comprised a greater part of the supply mix.

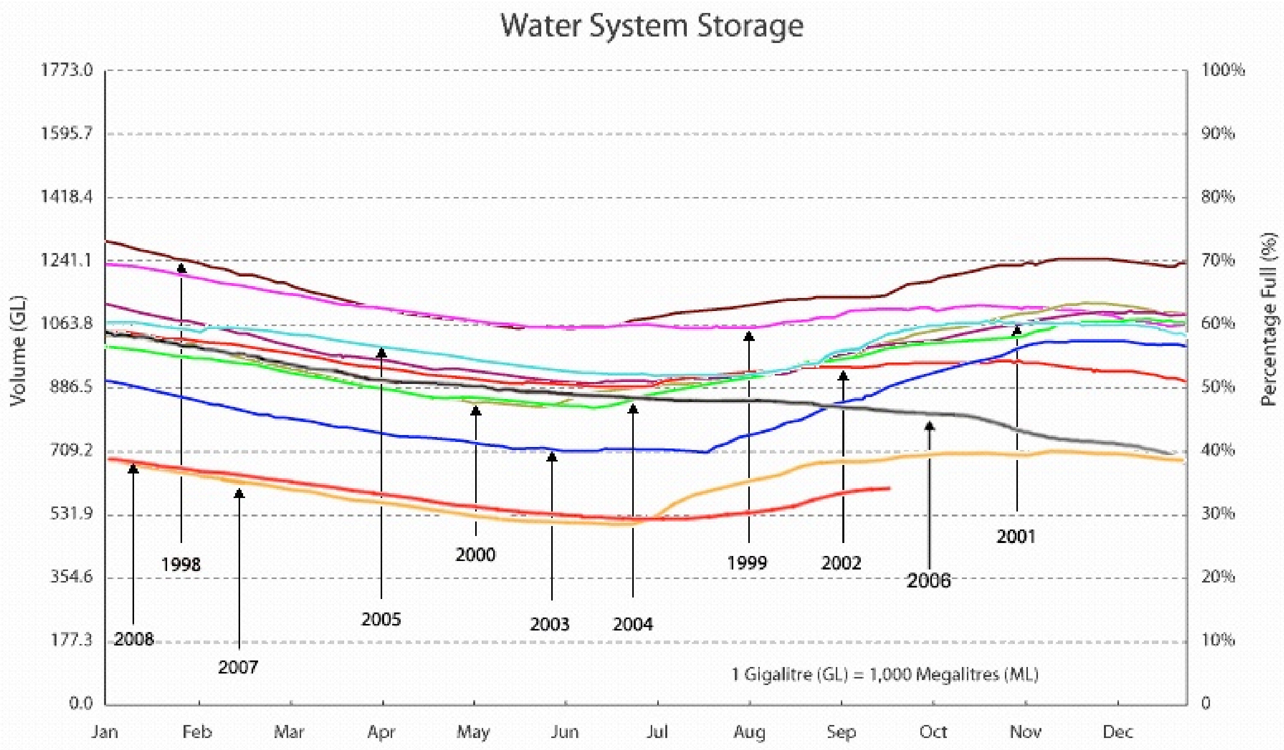
In broad terms, should desalination be required, I believe it must be seen as a component only in the overall Water Plan. Its scale and staging must be considered in the context of other augmentation options. As an example here, the most severe scenario, where desalination at 150 GL is proposed, would be covered just as adequately by desalination at 100 GL and indirect substitution of ETP treated water for 50 GL of additional supply. The same time frame of around 20 years before further augmentation was required would apply. However if the desalination project proceeded at 150 GL, then this analysis shows that the considerable investment already committed to the ETP will not lead to a cheap and environmentally beneficial source of supply.
It would seem that this generation will be incurring the economic costs of water infrastructure while future generations will be inheriting the costs associated with global warming that this project will have reduced our ability to tackle. Contrary I would say to government policy that the project's outcomes should involve; 'maximisation of overall community benefits to ensure no generation or group incurs unwarranted extra costs…' (4). Contrary also I would say to the principles of ecologically sustainable development. The scale is unprecedented and excessive, with adverse effects on ability to implement sustainable alternatives, and unknown and unquantifiable effects on the environment. Hence the precautionary principle must come into play.

References.

(1) Scoping Requirements, Desalination Project, Environment Effects Statement. Department of Planning and Community Development, May 2008.
(2) Our Water Our Future, The Next Stage of the Government's Water Plan, Department of Sustainability and Environment, June 2007 and
Central Region Sustainable Water Strategy (CRSWS), October 2006.
(3) Augmentation of the Melbourne Water Supply System, Analysis of Potential System Behaviour, Department of Sustainability and Environment, August 2008.
(4) Department of Sustainability and Environment, 18 Dec 2007, CRSWS - Annual Review 2006-2007.

Attachments:

Attachment 1. - Melbourne Water storage capacity data as per Figure 2.3 from DSE report reference (3), 1998-2007:



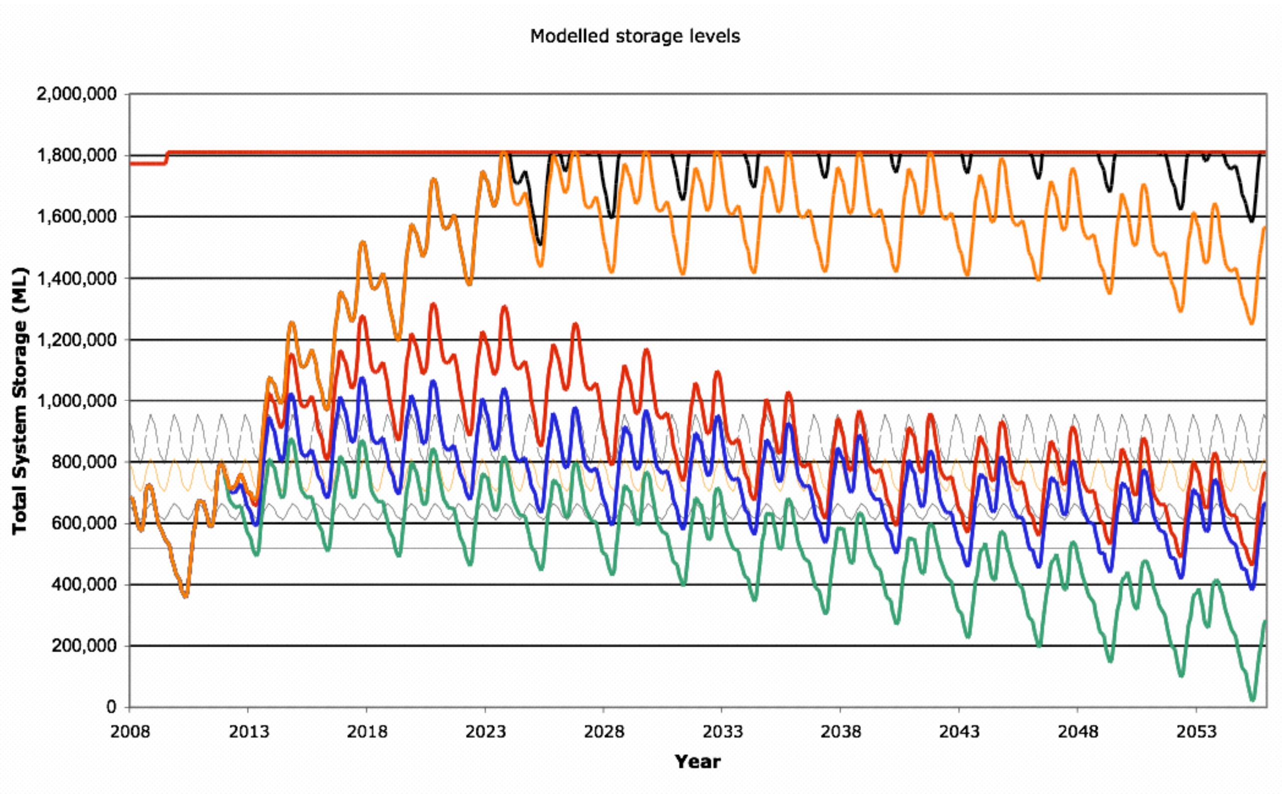
It can be seen that storage levels are typically at their lowest level mid-year and at their highest toward the end of each year. The following table gives the average variation from mid to end of year as 130 GL.

<table>
<tr><th>YEAR</th><th>Storage level change mid to End year</th><th colspan="2" rowspan="11">7.1% of full capacity = approx 130 GL</th></tr>
<tr><td>1998</td><td>10%</td></tr>
<tr><td>1999</td><td>0%</td></tr>
<tr><td>2000</td><td>14%</td></tr>
<tr><td>2001</td><td>10%</td></tr>
<tr><td>2002</td><td>1%</td></tr>
<tr><td>2003</td><td>16%</td></tr>
<tr><td>2004</td><td>15%</td></tr>
<tr><td>2005</td><td>5%</td></tr>
<tr><td>2006</td><td>-10%</td></tr>
<tr><td>2007</td><td>10%</td></tr>
<tr><td>Average</td><td>7.1%</td><td>Average storage level change mid to end year</td><td>approx 130 GL</td></tr>
</table>

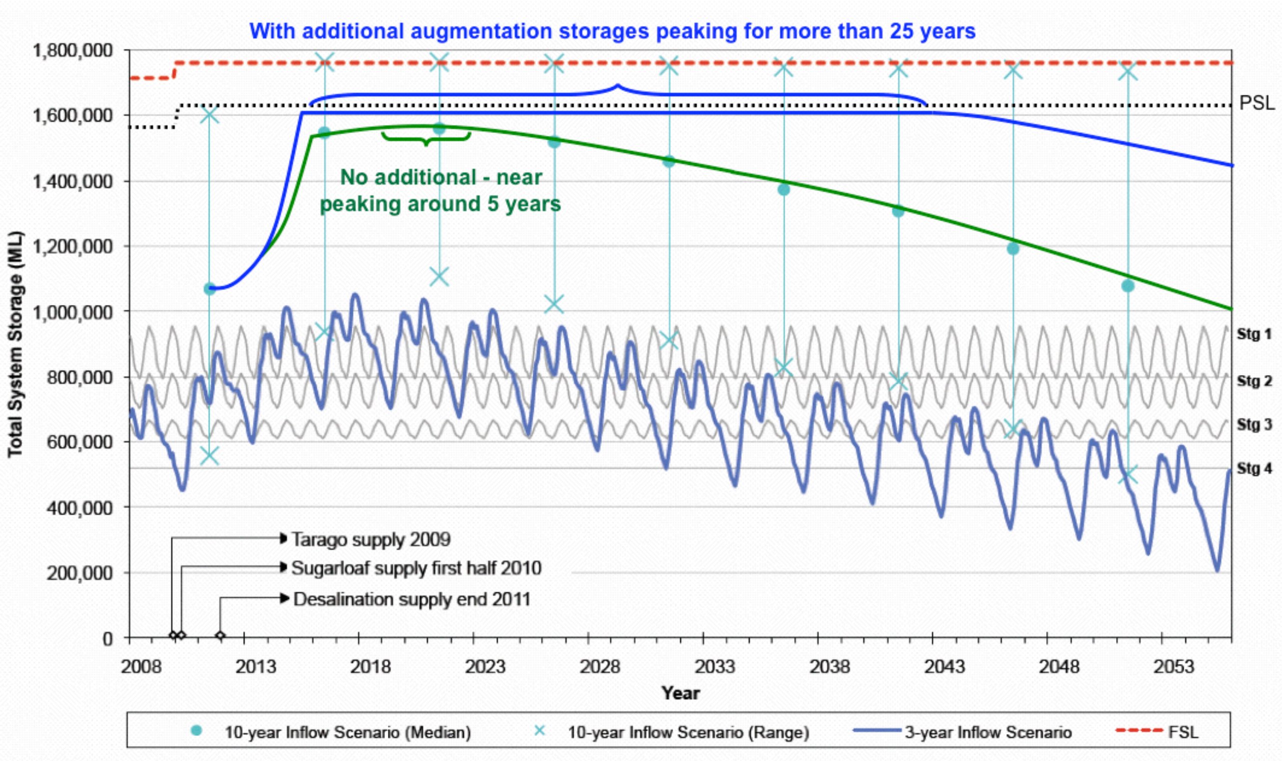
Attachment 2. Behaviour of storage near spilling point.

In reality all current storages could not be filled simultaneously. Once a storage fills any further inflow is wasted by spillage and thus capacity does not increase. While supply remains above demand storage levels will oscillate around the cycle, peaking at highest value. Should the cycle of supply and demand have a deficit over the cycle then storages will reduce again.

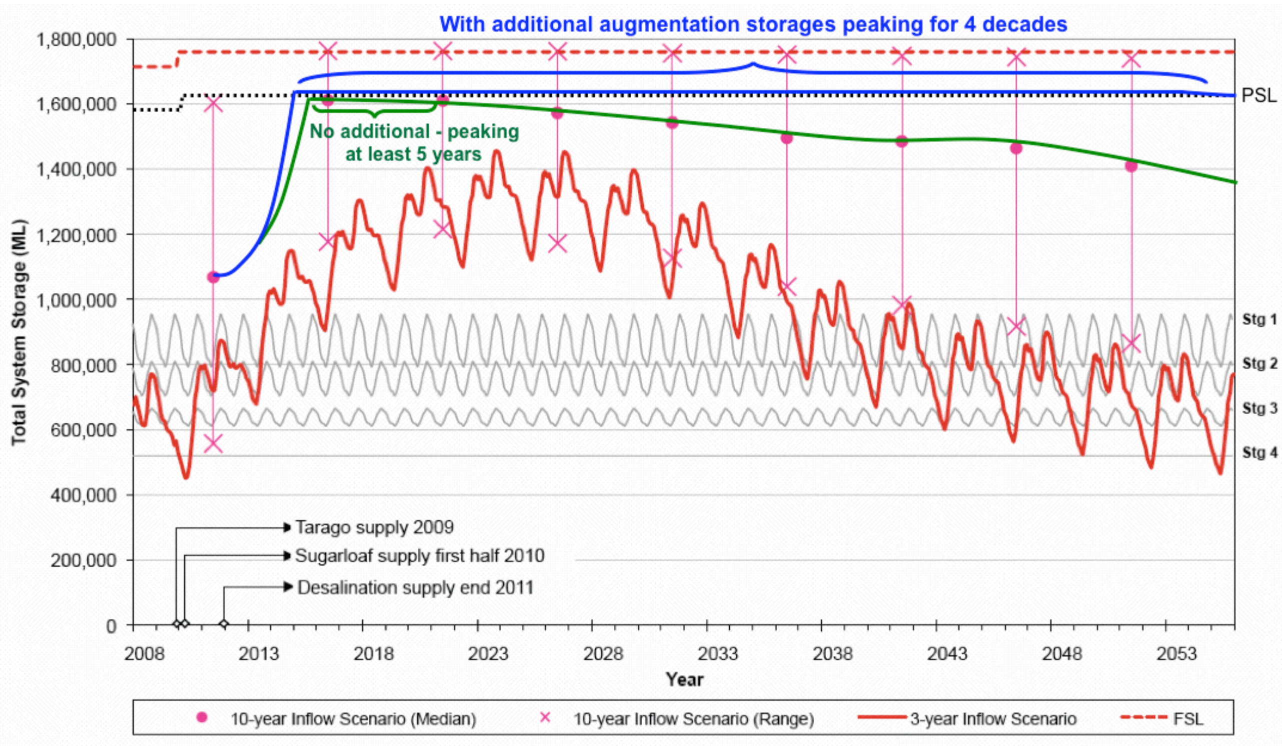
If the system was in a situation where, long term, supply was above demand, with the storages near full for extended periods, it would be imagined that some way to divert, store or otherwise use the excess would be found. This could for example involve reconnection of disconnected storages, new storages, transfer banking, etc. Storage level if all excess could be used would then be more like the black graph in this scenario. Reality would probably be somewhere between the two.



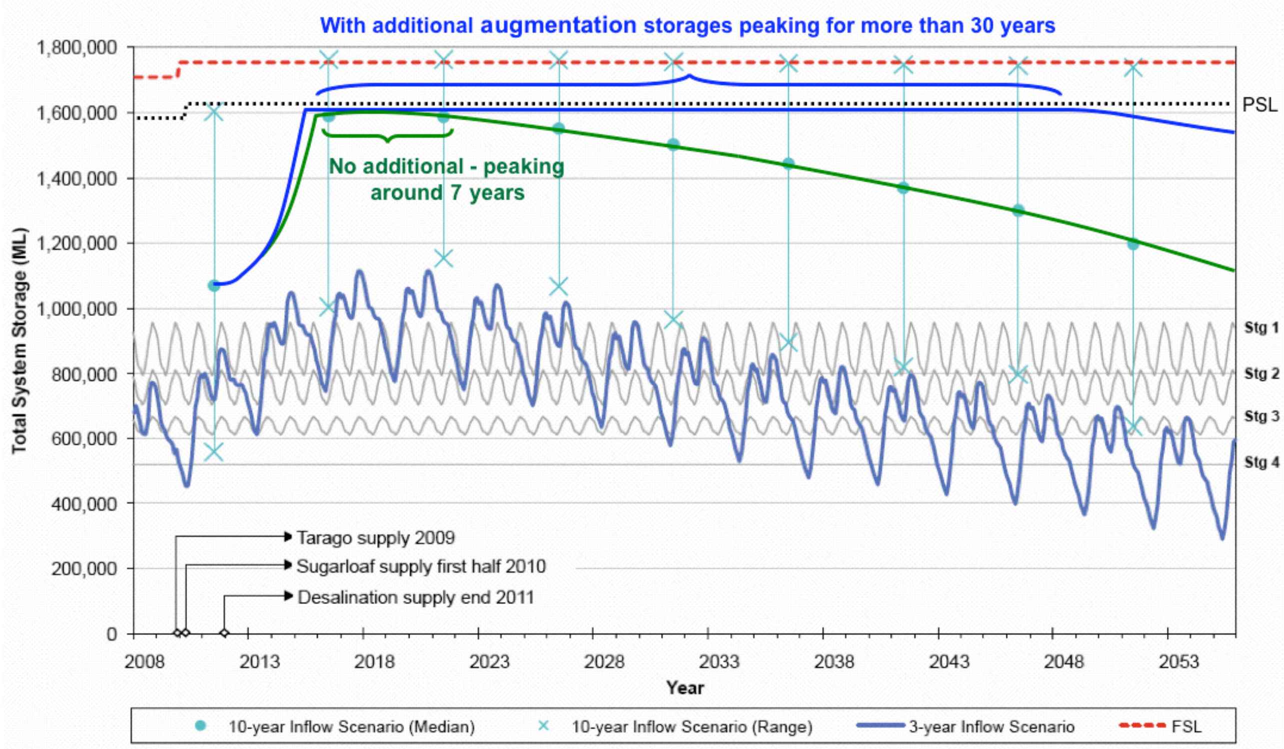
Attachment 3.



Desalination at 100 GL, more severe demand scenario, storage peaking times with and without additional 55 GL augmentation. Equivalent to Fig 5.6 in report (3). 10 year scenario has no reintroduction of restrictions in either case past 2055.



Desalination at 150 GL, less severe demand scenario, storage peaking times with and without additional 55 GL augmentation. Equivalent to Fig 5.7 in report (3). 10 year scenario has no reintroduction of restrictions in either case past 2055.



Desalination at 100 GL, less severe demand scenario, storage peaking times with and without additional 55 GL augmentation. Equivalent to Fig 5.8 in report (3). 10 year scenario has no reintroduction of restrictions in either case past 2055.

----- End.