



**Government
of South Australia**

18EW0002146

Your reference: RC18D01693

**Office of the Minister for
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Royal Commissioner
Murray-Darling Basin Royal Commission
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Dear Commissioner

I write in response to your letter dated 24 August 2018 requesting clarification of aspects of the South Australian Government submission to the Murray-Darling Basin Royal Commission.

The South Australian Government submission was prepared to assist the Royal Commission in respect of the numerous terms of reference and, like yourself, anticipated the participation of certain organisations to speak to matters within their knowledge and expertise.

The South Australian Government has prepared additional technical and background explanations to assist your enquiry, to the extent those matters are validly within our knowledge and experience.

Yours sincerely

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Minister for Environment and Water

Date: 06/09/2018

Encl: Response to request for clarification of South Australian Government Submission



Murray-Darling Basin Royal Commission
Response to Request for clarification of South Australian
Government Submission
September 2018

Response to Request for clarification of South Australian Government Submission

1. At [49] of the Submission, the Government states that "the Authority determined the amount of water needed for the environment was between 3,000 GL per year and 7,600 GL per year". This does not reflect the Commissioner's full understanding. Page 114 of the "Technical Background Guide to the Proposed Basin Plan" contains a table concerning "Reductions in Diversions Required to achieve Environmental Watering Requirements": Exhibit RCE 2. The opinion expressed there by the Authority was that a total reduction in diversions of 3,856 GL was required to achieve environmental water requirements at a level of "high uncertainty". To reach a level of "low uncertainty", a total reduction in diversions of 6,983 GL was required. The figure of 3,000 GL is only reached by applying a confidence limit of -20% to the high uncertainty target: see page 115, Exhibit RCE 2. The figure of 7,600 GL is reached by applying a +10% confidence limit to the low uncertainty figure.

The ordinary and natural meaning of the words, together with the view of various scientists who have given evidence at the Commission's hearings, is that the term "high uncertainty" should be interpreted to mean that a reduction in diversion of 3,856 GL is highly unlikely to achieve the environmental watering requirements set by the Authority. In relation to this:

- a. Does the Government have a different view?

Yes: the uncertainty being discussed is the confidence that the ecological target will be met. In this case low uncertainty means that there is a high confidence that the ecological target will be met and high uncertainty means that there is a much lower confidence that the ecological target will be met.

South Australia understands the process for determining uncertainty used for the Guide to the Proposed Basin Plan (Guide) was similar to the process used for the Northern Basin Review. Appendix B of the report Environmental outcomes of the Northern Basin¹ outlines the process and the following text attempts to explain more simply what occurred.

Environmental Water Requirements reports outline target frequencies for particular flows. These target frequencies are set based on known ecological outcomes and are generally expressed as a range. Ranges are used because our knowledge of the exact water requirements of particular species and ecological communities is not perfect.

There are 43 flow indicators distributed across the northern Basin catchments. Each of these flow indicators is assessed against the nine recovery scenarios using hydrological modelling. Running the models determines how often each of the 43 flow indicators are met over the modelled 114 years. The number of times that the flow indicator was met divided by the years modelled provides a frequency. A frequency was determined for each of the individual flow

¹ Environmental Outcomes of the Northern Basin Review, Murray-Darling Basin Authority, October 2016, Licensed from the Murray-Darling Basin Authority under a Creative Commons Attribution 3.0 Australia Licence.

indicators for each of the nine recovery scenarios, and under baseline and without development (WOD) scenarios.

The frequency of each of these flow indicators is then compared to the target frequency range outlined in the respective Environmental Water Requirements reports. If the frequency of the flow indicator falls within the target range it is described as low uncertainty, meaning that there is a high confidence that meeting the flow indicator will achieve the ecological target. If the frequency of the flow indicator falls outside the target range then there is high uncertainty, meaning there is low confidence that meeting the flow indicator will achieve the ecological target. The image below from Environmental outcomes of the Northern Basin provides an actual example.

Example flow indicator for the Lower Balonne (frequency target is underlined). The numbers in the table represent the modelled frequencies of the flow indicator for each of the different scenarios. Bold, asterisked frequencies are those that meet (fall within) the target range.

38,000 ML/day on the Culgoa River, measured at the Brenda gauge, for a minimum of six days, any time of the year. The frequency target is to have, on average, no longer than 10 (low uncertainty) to 20 (high uncertainty) years between events.

Baseline	278 GL	320 GL A	320 GL B	320 GL C	345 GL	350 GL	390 GL	415 GL
28.5	38.0	38.0	22.8	22.8	28.5	22.8	19.0*	16.3*

Bold, asterisked frequencies are those that meet (fall within) the target range.

- b. Given the high uncertainty range of 3,856GL and the low uncertainty range of 6,983GL, what is the Government's view as to the appropriateness of the Authority only examining scenarios between 3,000GL and 4,000GL in the Proposed guide to the Basin Plan?

The South Australian Government submission provided to the Murray-Darling Basin Authority (Authority) on matters in the Guide² in 2010 expressed concern that the Authority's own assessment of returns of 4,000 gegalitres per year "would only restore the Murray catchment to a less than moderate health rating" and noted that the Authority would not be fulfilling its obligations if parts of the Basin were returned to a poor to moderate condition under the Basin Plan.³ Further, the Government requested the Authority provide the models, assumptions and data used in the Sustainable Diversion Limit (SDL) scenarios on the grounds that serious concerns were raised that the volumes under consideration would not maintain key environmental assets and functions within South Australia.⁴

² Letter from the Hon Paul Caica MP to M Taylor, MDBA, dated 30 November 2010 with attachment.

³ Above n2, p2.

⁴ Above n2, Attachment 1, p4.

Modelling for the Basin Plan

The Authority's ESLT Report used a different modelling approach to the Guide. To assist the Murray-Darling Basin Royal Commission, the following text attempts to explain in simple terms the assumptions and the differences between the two modelling approaches as explained in *Bloss et al. (2012)*.⁵

SDLs proposed by the Guide in 2010 were determined based on a simple end-of-system flow analysis across 19 locations in the Basin.⁶ Hydrological models were in development at the time of the preparation of the Guide, however, due to technical and time limitations, SDLs were proposed without input from hydrological models.⁷

Modelling of the Guide scenarios was completed after the release of the Guide in early 2011. Modelling of the Basin was undertaken using the Integrated River System Modelling Framework (IRSMF) developed by CSIRO⁸ for the Murray-Darling Sustainable Yields Project. The IRSMF links together the twenty-four separate river system models of the Murray-Darling Basin into a consolidated modelling tool.

The hydrological modelling did not directly inform the setting of the 3,000, 3,500, 4,000 or 7,600 gigalitres water recovery volumes in the Guide. Rather, the modelling was used to test how the recovered water might be delivered to key environmental assets and which of the environmental water requirements (EWRs) could be met.

Modelling undertaken for the Guide represented the recovered environmental water as planned environmental water, which was prioritised over water held for entitlements. This meant that allocations for other users would have been impacted, particularly in years of low water availability and the years immediately following these (when many demands would be sought). In addition, the Guide modelling was only able to order and supply River Murray EWRs from River Murray storages, such as Hume and Dartmouth, since there were no mechanisms in the modelling to supply demands from other rivers such as the Murrumbidgee and the Goulburn. Similarly, modelling for the Guide scenarios did not include any consideration of operational constraints.

The Australian Government's commitment to 'Bridge the Gap' through water-saving infrastructure and water purchases from voluntary sellers in order to meet SDLs, meant that water recovered for the environment would no longer be planned environmental water but held environmental water.

⁵ Bloss CM, Steggles T, Bald M & Heneker TM (2012), Hydro-ecological Analysis of the Proposed Basin Plan – South Australian Floodplain, DFW Technical Report 2012/11, Government of South Australia, through Department for Water, Adelaide.

⁶ Murray-Darling Basin Authority (2011), The proposed 'environmentally sustainable level of take' for surface water of the Murray-Darling Basin: Methods and outcomes MDBA publication No: 226/11 Murray-Darling Basin Authority Canberra.

⁷ Above n5.

⁸ Murray-Darling Basin Authority (2012), Hydrologic modelling to inform the proposed Basin Plan - methods and results MDBA publication no: 17/12 Murray-Darling Basin Authority Canberra.

Held environmental water has the same characteristics as irrigation water. In other words, irrigator water access rights would not be compromised as a result of the Basin Plan and irrigators' existing reliability will be maintained.

To achieve the SDLs set out in the Basin Plan, the hydrological models were revised to include environmental water accounts to reflect this commitment. Another major revision to the modelling by the Authority is the introduction of Environmental Event Selection Tools (EESTs). These tools are designed to improve coordination and efficiency of watering events across multiple sites and valleys in the Basin and overcome some of the deficiencies of the IRSMF, such as looking for water upstream in valleys such as the Murrumbidgee and Goulburn to meet demands at the South Australia border. EESTs use an interactive process where the modeller manually selects and schedules which flow events to deliver to hydrological indicator sites using available water from the environmental water account. The Revisions to the hydrological models also enabled additional EWRs to be included, such as base flows and freshes.

Similar to the Guide, hydrological modelling of environmental demands was not solely used to determine the magnitude of the SDL. The Authority described the approach as the indicator site method, which uses the hydrological modelling to test the environmental outcomes of nominated SDLs rather than being used to determine what is required. The Authority promoted this approach as being able to take into account not only the ecological targets and flow requirements of indicator sites, but also opportunities and constraints for environmental water delivery.

2. *At [60] and [64] of the Submission, the Government describes the sustainable diversion limit determined for the Basin Plan, and the adjustment mechanism, as a "negotiated result." There has been unchallenged evidence called at the Commission's hearings which could form the basis for a finding that the SDL and ESLT determinations were not made solely on the basis of "the best available scientific knowledge (s.21(4)(b) of the Water Act), or even the best available scientific knowledge coupled with some unspecified consideration of social and economic outcomes. In relation to this and the reference in the submission to "negotiated result":*

a. Does the Government suggest that part of the Water Act allows for the environmentally sustainable level of take, the long term average sustainable diversion limit, or the SDL adjustment mechanism, to be determined by means of "a negotiated result" rather than "on the basis of the best available scientific knowledge"?

No: the environmentally sustainable level of take, the long term average SDL and the results of the SDL adjustment mechanism must achieve the requirements of the Water Act. Determining and adopting these are solely the responsibility of the Authority and the Commonwealth Minister respectively.

The South Australian Government's submissions to the Authority during the drafting of the Basin Plan continuously submitted that the SDL must be produced in accordance with the criteria of the *Water Act 2007* (Cth) (Water Act), namely the environmental considerations listed in the

definition of “environmentally sustainable level of take” and international obligations, together with “the best available scientific knowledge”.⁹ This was particularly the case with respect to the proposed water recovery target of 2,750 giganlitres. In the Notice of disagreement by the South Australian Murray-Darling Basin Ministerial Council Member under section 43A of the *Water Act 2007*, the Government proposed that the Authority re-determine the environmentally sustainable level of take using “only the scientific data and modelling to determine the functions, assets and outcomes that are key to meeting international obligation and determine the maximum level of take, above which those assets, outcomes and ecosystem services would be compromised”.¹⁰

The Authority’s response to South Australia’s submission was formally documented in their response to the matters raised by the Murray–Darling Basin Ministerial Council which stated:

“The Authority is satisfied that the proposed Basin Plan complies with the Water Act. We consider that a water recovery target of 2750 GL/y on a long-term average is the right starting point to return enough environmental water to the Basin to achieve environmental objectives, while also ensuring that social and economic effects are best managed. Some higher flows cannot be achieved due to the current constraints in the system.

“The Murray-Darling Basin River Management review, the operation of the proposed SDL adjustment mechanism, and the constraints management strategy will provide opportunities to take into account new information in any future reviews of the Basin Plan. This includes any efficiencies gained through environmental works and measures, as well as new science that complements the current best available science. This means our numbers represent ‘a starting point’ for an adaptive process that will allow further adjustments to be made in the future.”¹¹

Subdivision E – Procedure for the making Basin Plan sets out a number of points where the Authority consults and seeks comments from the Murray-Darling Basin Ministerial Council and the Commonwealth Minister. The chronological progress of the Basin Plan starting from draft Basin Plan in November 2011 and the processes that contributed to the subsequent versions of the Plan are documented on the Murray-Darling Basin Authority (MDBA) website,¹² including jurisdictional comments and the Commonwealth Minister’s suggestions to the Authority. Changes from the draft Basin Plan include the SDL adjustment mechanism including efficiency measures, constraints management strategy, Northern Basin review, removal of ambiguities, revision of certain groundwater SDLs, future reviews to include management of climate change risk, apportionment and clarification of reporting obligations. These changes are a negotiated outcome.

⁹ See, for example, 9 July 2012, Notice of disagreement by the South Australian Murray-Darling Basin Ministerial Council Member under section 43A of the *Water Act 2007*. p2.

¹⁰ Above n9, p3.

¹¹ Proposed Basin Plan Authority’s views and consultation on the matters raised by the Murray–Darling Basin Ministerial Council – Volume 2, p 38.

¹² <https://www.mdba.gov.au/publications/archived-information/basin-plan-archives/steps-development-basin-plan>.

Regardless of any negotiations undertaken in the development of the Basin Plan, the Authority must ensure the environmentally sustainable level of take and the long-term average sustainable diversion limit are produced in accordance with the Water Act.

b. How was the result “negotiated”, and who participated in the negotiation of the result?

The proposed Basin Plan prepared as a result of the public consultation and submissions process was provided to Ministerial Council on 28 May 2012. According to the process outlined in the Water Act, the Authority is then required to seek comments from members of the Murray–Darling Basin Ministerial Council. Ministers have six weeks to respond to the Authority on the draft Basin Plan.

The members of the Murray–Darling Basin Ministerial Council provided a collective response as well as individual State and Territory views. The key matters they reached agreement on and requested changes were to:

- include an SDL adjustment mechanism;
- determine downstream apportionment, and
- develop a constraints management strategy.

Under the Water Act, the Authority has the discretion as to whether it is necessary or appropriate to consult on the Basin Ministers' comments. On receipt of the Ministers' comments, the Authority considered the matters raised and determined further consultation would be beneficial. The Authority sought advice from the Basin Community Committee, national peak bodies, key scientists and technical experts, indigenous representatives and local government representatives from areas most likely to be affected by the Ministers' propositions.

The Authority prepared a report on these consultations and its views in response to the Ministers' comments. It also prepared an altered Proposed Basin Plan for presentation back to the Murray–Darling Basin Ministerial Council. The Authority provided the Altered Proposed Basin Plan to the Murray–Darling Basin Ministerial Council on 6 August 2012.

The Commonwealth Minister subsequently requested the Authority per s 44 of the Water Act to make further refinements to the revised proposed Plan based on additional comments he had received from the Ministerial Council in August 2012. These requests largely refined the more fundamental changes requested in July 2012.

Basin jurisdictions advocated for their best interests at this time in trying to resolve issues and the Commonwealth Minister for Water provided a number of suggestions to the Authority under s 44(1) based on these discussions, lastly on 1 November 2012. The Commonwealth Minister returned the Altered Proposed Basin Plan to the Authority for finalisation on 20 November 2012 and subsequently adopted the Basin Plan on 22 November 2012. On 29 November 2012 the Basin Plan received bipartisan support in Parliament.

All members of the Murray-Darling Basin Ministerial Council participated in the negotiations. South Australia was represented by the Minister for Water and the River Murray at that time, the Hon. Paul Caica MP.

The Water Act requires the Authority to develop a Basin Plan in consultation with the States through the Ministerial Council and the provisions outlined above. Furthermore, the Basin Plan must ultimately be adopted by the Commonwealth Minister, and approved by the Parliament of Australia. The processes described and defined by the Water Act imposes a negotiated outcome for the Basin Plan within the confines of the Water Act's requirements.

- c. Does the Government have information concerning how much, "in volumetric terms", social and economic considerations influence the determination of the ESLT or the Basin-wide SDL?*

The South Australian Government does not have information that specifies a volumetric impact that social and economic considerations had on the determination of the ESLT or the Basin-wide SDL.

- 3. Still on [60] of the Submission, it is asserted that a water recovery of 3,200 GL per year has been "reviewed extensively by the department as being able to achieve key environmental outcomes". Should the Commissioner view this as a submission that if the Basin Plan provides for 3,200 GL per year to be recovered for the environment that this reflects an "environmentally sustainable level of take" as that term is defined in the Water Act? If so, what is the scientific basis for holding that view?*

The South Australian government submission on the draft Basin Plan is clear that the proposed sustainable diversion limit did not achieve key environmental outcomes and as such needed to be re-modelled by the Authority with higher recovery amounts.¹³

The South Australian Government analysis described in the Submission to the Royal Commission was conducted to ascertain whether certain water recovery scenarios considered by the Authority, for which sufficient modelling information was shared with South Australia, would satisfy certain environmental watering requirements within South Australia. That analysis showed that, of the options presented by the Authority, water recovery of 3,200 gigalitres per year with relaxation of constraints would achieve the best environmental outcomes for South Australia.

As such, the Commissioner should not view [60] as per his current description. Paragraph 60 is a submission that the South Australian Government satisfied itself as to whether particular outcomes could be achieved with a recovery of 3,200 gigalitres per year and used that information when participating in Ministerial Council meetings and advocating for South Australia's interests.

¹³ South Australian Government Submission on the Murray-Darling Basin Authority's Draft Basin Plan dated April 2012.

4. *Still on [60] of the Submission, it is stated that “delivery of 450 GL in efficiency contributions provides real additional water for the entire system and in particular, benefits to the Coorong”. In relation to this assertion:*

a. Should the Commissioner understand that the Government's position is that efficiency contributions (referred to as efficiency measures in the Basin Plan) will result in an extra 450 GL of real water for the “entire system”. If so, what is the scientific basis for holding that view?

The efficiency measures program under the SDL adjustment mechanism is available across all catchments in both the northern and southern Basin. Efficiency measures will result in the transfer of water entitlements to the Commonwealth Environmental Water Holder (CEWH). Subject to river operating constraints, there are no restrictions on where the CEWH uses the water within the Basin, hence the view that efficiency measures will result in an extra 450 gigalitres of real water for the entire system.

Water is being provided to the Coorong through flows used first at other sites. The more water that is recovered for the environment, the more water flows down to the end of the Basin. South Australia's analysis shows that the Coorong benefits from any additional water recovery.

b. How will 450 GL of real water be achieved for the enhanced environmental outcomes outlined in Schedule 5 of the Basin Plan in circumstances where the efficiency measures now will be largely off-farm, rather than on-farm?

An ‘efficiency measure’ is one that makes savings in the amount of water required for consumptive purposes. Both on-farm and off-farm water use is accounted for in the current Murray–Darling Basin Cap on Surface Water Diversions and the SDLs. The transfer of 450 gigalitres of entitlements to the Commonwealth for environmental use will reduce the consumptive take. The register of supply and efficiency measures agreed by Basin governments to be considered in the SDL adjustment mechanism¹⁴ does not differentiate between on-farm and off-farm measures specifying in both cases that “the water savings from these efficiency works can then be transferred to the Commonwealth, forming part of the Commonwealth environmental water holdings.”

5. *Still on [60] of the Submission, in addition to what is set out at [207] to [211] of the Submission concerning return flows, what is the Government's position in relation to the unchallenged evidence given at the Commission's hearings from Australian and overseas-based scientists regarding their concerns related to the concept of “return flow”? Please answer by means of reference to scientific evidence that these concerns are not well-founded, if that is the Government's view.*

As previously stated, return flows are very site and jurisdiction specific. The South Australian Government is not aware that the Australian and overseas based scientists have provided the

¹⁴ Register of Measures accessed from <https://www.mdba.gov.au/sites/default/files/docs/171120-register-of-measures.pdf> on 29 August 2018, pp 19 – 20.

Commission with any new Basin specific information. If this is not the case then we would welcome the opportunity to consider any specific information that you have been provided with.

In 2009, the Authority commissioned URS Australia Pty Ltd to carry out an investigation of return flows in the Murray-Darling Basin.¹⁵ The aim of the investigation was to develop an inventory of return flows across the Murray-Darling Basin and provide an estimate of quantity and quality of return flows, specifically those not accounted for under the Cap and in the Diversions Formula Register for the Murray-Darling Basin.

The study found that despite the limited availability of return flows data it was obvious that irrigation return flows have declined significantly since 1993/94.¹⁶ The study also identified that return flows from most of the big irrigation areas across the Basin are part of the water accounting system and have been accounted for under the Cap.

This is supported by evidence from South Australia that return flows have reduced significantly since the 1980s as part of the Salinity Management programs. Under these programs Basin Governments have been encouraging and undertaking programs to reduce return flows from highly saline (often more than sea water salinity) groundwater mounds. These saline groundwater mounds developed under irrigation areas close to the river as a result of past inefficient irrigation practices.

The improvements to irrigation efficiencies have resulted in a reduction of return flows from irrigation in the Riverland, which are intercepted and pumped to the Stockyard Plains and Noora Evaporation Basins remote from the River Murray. Government records of the discharge to the Noora Evaporation Basin show volumes pumped from temporary basins within the irrigation areas to Noora have decreased from a peak discharge of 6,000 megalitres per year in 1982-83 to generally less than 2,000 megalitres per year since 2000-01.¹⁷ These records show return flows had already decreased significantly by 2009 and these are the baseline conditions identified by the Authority for the Basin Plan.

¹⁵ URS (2010) Final Report Murray-Darling Basin Return Flows Investigation prepared for Murray-Darling Basin Authority.

¹⁶ Ibid, p xii.

¹⁷ Heneker, T.M. (2007), *Noora Drainage Disposal Basin: Surface Water Investigation*. Report DWLBC 2007/17, Department of Water, Land and Biodiversity Conservation, Government of South Australia. Accessed at:

https://www.waterconnect.sa.gov.au/Content/Publications/DEW/dwlbc_report_2007_17_web.pdf

6. *Still on [60] of the Submission, in determining an environmentally sustainable level of take, and in setting the long-term average Basin-wide SDL, the Authority ignored climate change projections in its modelling. In relation to this:*

a. Is it the Government's view that climate change projections from research organisations such as Australia's leading universities or the CSIRO and the like, are part of the "best available scientific knowledge"?

South Australian Government submissions on the draft Basin Plan in 2012 submitted that the Authority had not used the best available science as the Basin Plan failed to take account key factors such as climate change risks.¹⁸ Those submissions referenced both the CSIRO sustainable yields project¹⁹ and Young *et al*, 2011.²⁰ When the Basin Plan was being developed in 2011, the CSIRO sustainable yields project provided the best available scientific knowledge of the impacts of climate change on water flows in the Murray-Darling Basin.

b. What is the Government's view as to whether the ESLT or the long-term average Basin-wide SDL can be lawfully determined without incorporating climate change projections into the modelling? – the Government should also note s.21(4)(a) of the Water Act in addressing this question.

The Government's view at the time of development was that the draft Plan did not take account of climate change in any meaningful way, that climate change should be included in the risk management strategies of the Basin Plan,²¹ and that the Basin Plan did not present strategies for dealing with the problems identified in the Water Act. Rather, it merely recounted aspirations and restated the objects of the Water Act incorrectly.²²

Consequently the Basin Plan was amended through the Commonwealth Minister's suggestions on the Proposed Basin Plan Section 44(1) of the Water Act dated 1 November 2012 to require future reviews of the Basin Plan to give further consideration to the management of climate change risks (6.06(3)). This is appropriate and consistent with the approach that South Australia uses to factor climate change into its Water Allocation Plans across the State.

The Basin Plan is not and was never intended to be a static document. Each plan has a ten year time horizon and is then reviewed and recast to take account of new information and research.

¹⁸ Above n13, p 6.

¹⁹ CSIRO, 2008, *Water Availability in the Murray: A report to the Australian Government from the CSIRO Murray-Darling Basin Sustainable Yields Project*, Commonwealth Science and Industrial Research Organisation, Australia.

²⁰ Young, W.J., Bond N., Brookes J., Gawne, B. and Jones G.J., 2011, *Science Review of the Estimation of an Environmentally Sustainable Level of Take for the Murray-Darling Basin: A report to the Murray-Darling Basin Authority from the CSIRO Water for Healthy Country. Flagship*, Commonwealth Science and Industrial Research Organisation, Australia.

²¹ Above n 13, p 28.

²² Above n 13, p 22.

In 2011, climate change projections for 2030 across the Basin were coarse and well outside of the ten year management horizon of the Basin Plan.

Since 2012, considerable work has been undertaken by the jurisdictions on refining global climate change projections to the local level and this work and any other applicable research needs to be incorporated into the next review in 2026 and subsequent development of a revised Basin Plan thereafter.

7. *In relation to the reference to the “additional 450 GL of water” referred to in [61] at the Submission:*

a. *What is the scientific basis for the assertion that there will be an additional 450 GL of water recovered by efficiency measures?*

Efficiency measures reduce the amount of water required for consumptive purposes. The volume of the saving is identified at the time funding for the project is agreed. The volume of the saving is then transferred to the Commonwealth as a water entitlement to release the first funding payment. The project proponent’s water entitlements are reduced accordingly at the time of transfer.

b. *What is the scientific basis for considering what has been referred to as the “3,200 GL Plan” will achieve the enhanced environmental outcomes referred to in section 7.09 and Schedule 5 of the Basin Plan?*

The South Australian Government has not had access to the Authority’s modelling to be able to confirm or refute whether the 3,200 gigalitres Basin Plan will achieve the enhanced environmental outcomes referred to in section 7.09 and Schedule 5 of the Basin Plan.

However in 2012, the South Australian Government undertook an analysis based on modelling outputs generated by the Authority to ascertain whether certain water recovery scenarios would satisfy the South Australian Government identified EWRs.²³

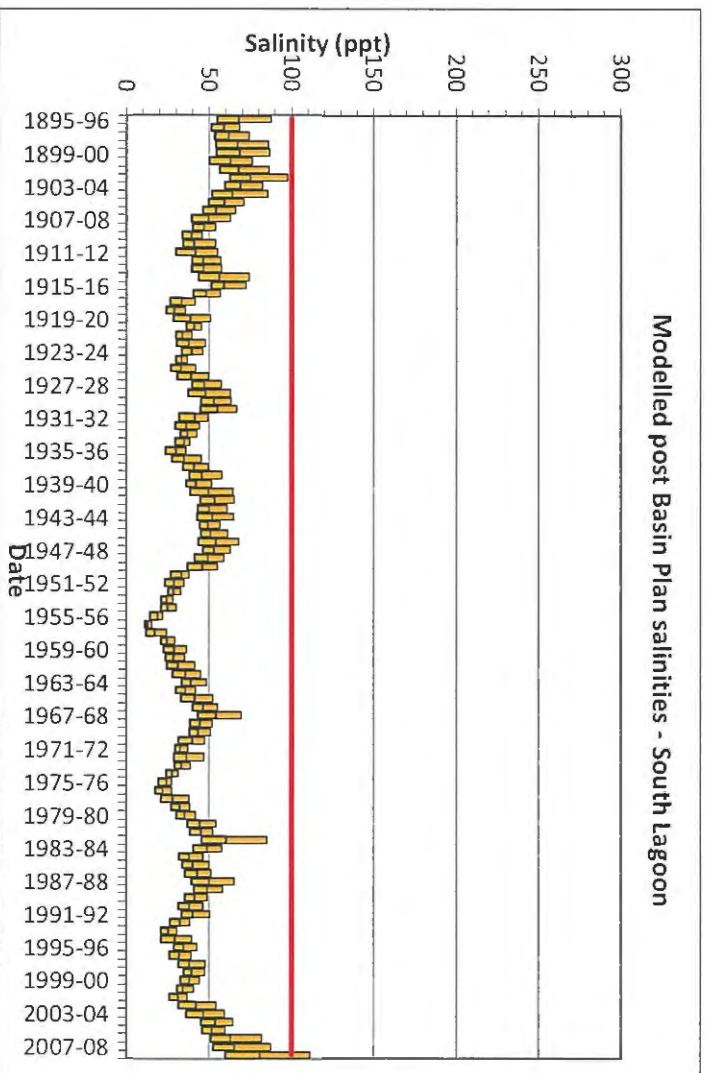
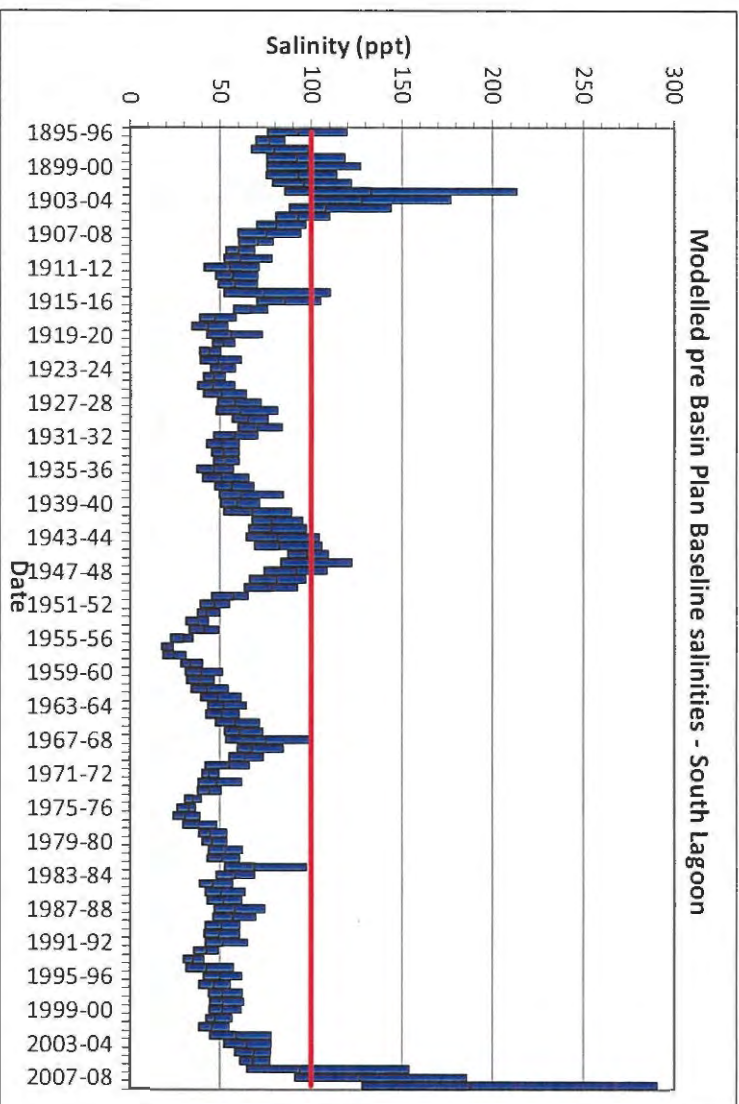
South Australia has considered the outputs from that analysis that represent the finalised Basin Plan and compared them to the enhanced environmental outcomes listed in Schedule 5. Based on that comparison, South Australia’s proposition of the likelihood that the Basin Plan will achieve the enhanced environmental outcomes in Schedule 5 is outlined in the following subsections. Each subsection below represents one of the enhanced environmental outcomes.

Coorong South Lagoon Salinities (Schedule 5(2)(a)(i))

Maximum average daily salinity in the Coorong South Lagoon will be less than 100 grams per litre in all but the most extreme droughts (equivalent to the Federation and Millennium Droughts)

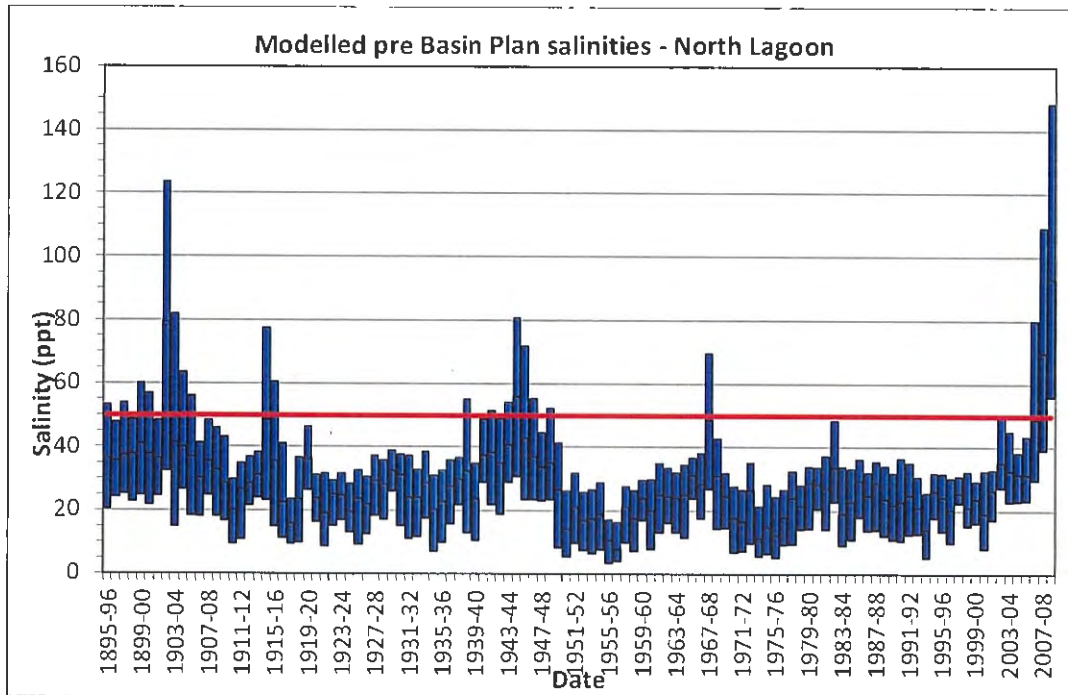
²³ Gibbs MS, Higham JS, Bloss C, Bald M, Maswell S, Steggles T, Montazeri M, Quin R and Souter N, 2012, *Science Review of MDBA Modelling of Relaxing Constraints for Basin Plan Scenarios*, DEWNR Technical Note 2012/01, Department of Environment, Water and Natural Resources, Adelaide.

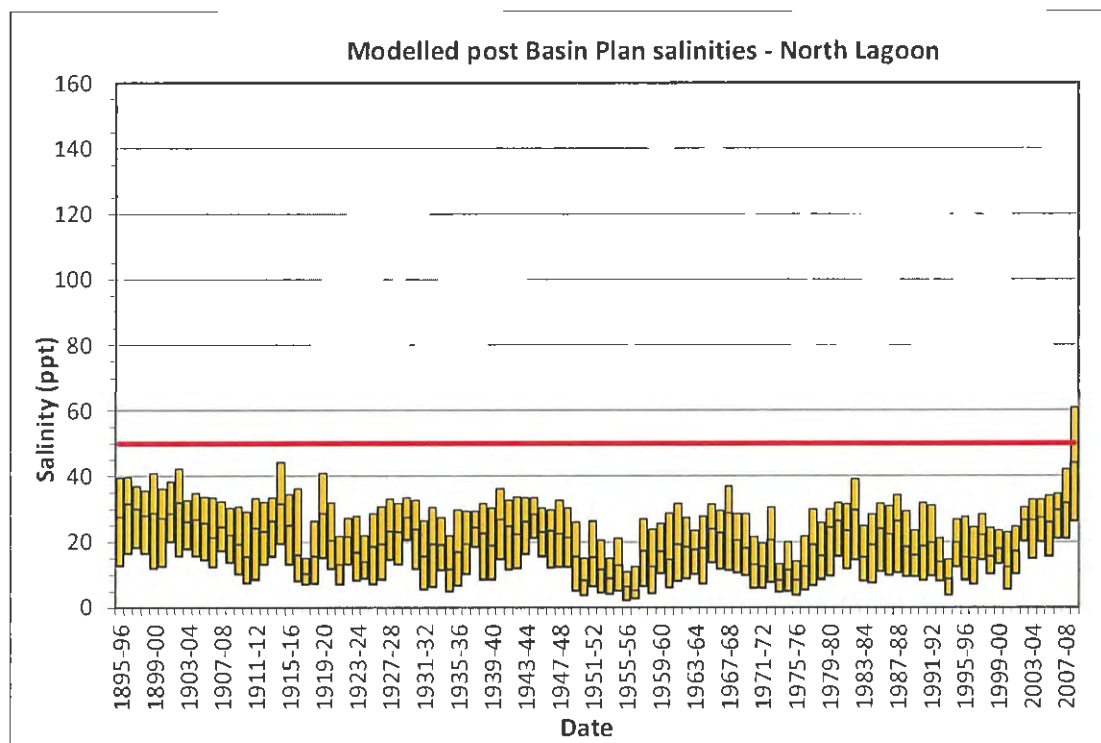
and will improve compared to baseline salinities (similar to current salinities) as illustrated in the figures below.



Coorong North Lagoon Salinities (Schedule 5(2)(a)(ii))

Maximum average daily salinity in the Coorong North Lagoon will be less than 50 grams per litre in all but the most extreme drought (equivalent to the Millennium Drought) and will improve compared to baseline salinities (similar to current salinities) as illustrated in the figures below.





Lake Alexandrina Salinities (Schedule 5(2)(a)(iii))

Average daily salinity in Lake Alexandrina is less than 1000EC for 95% of years and maintained below 1500EC all of the time.

Lower Lakes Water Levels (Schedule 5(2)(b))

Water levels in the Lower Lakes will be above 0.4 metres AHD for 90 per cent of the time rather than 95 per cent of the time as outlined in Schedule 5. This decrease may be due to uncertainties in the modelled outputs reported in Heneker and Higham,²⁴ which the Authority was planning to rectify as part of a larger suite of modelled improvements. Water levels will be above 0.0 metres AHD at all times to help maintain flows to the Coorong, prevent acidification, prevent acid drainage and prevent riverbank collapse below Lock 1.

Murray Mouth Openness and Barrage Flows (Schedule 5(2)(c))

Years where flow through the Barrages is less than 2,000 gigalitres per year provides an indication of when there is an increased risk that the Murray Mouth may require dredging but will not be definitive in regards to the decision to implement dredging. Prior to the Basin Plan, current total flow through the barrages was less than 2,000 gigalitres in one third of all years. The Basin Plan is expected to halve the number of periods of flow less than 2,000 gigalitres (13

²⁴ Heneker TM and Higham JS, *Review of the Basin Plan Water Recovery Scenarios for the Lower Lakes, South Australia: Hydrological and Ecological Consequences*, Technical Report, South Australian Department for Environment and Natural Resources, March 2012.

per cent of years) and significantly reduces the number of consecutive years with flow less than 2,000 gigalitres. Consecutive years with flow less than 2,000 gigalitres only occur in the Millennium Drought years in the post Basin Plan modelling. Although not able to meet the specific target of ensuring the mouth of the River Murray is open without the need for dredging in at least 95 per cent of years, modelled Murray Mouth openness is considerably improved with the Basin Plan.

Relaxing constraints changes the distribution of flow within the year and reduces the number and length of periods of no barrage flows. Increasing the water recovery volume has a similar effect. Although there are still periods of no barrage flow, both the number and length of these periods in the modelling are reduced. For example, the number of no outflow periods reduces by close to half, reducing from 11 to five when comparing the Basin Plan with relaxed constraints to a Basin Plan with the same volume of water and no relaxation of constraints.

Salt Export (Schedule 5(2)(d))

Section 8.09 of the Basin Plan states that the salt-load objective is the discharge of a minimum of two million tonnes of salt from the River Murray system into the Southern Ocean each water-accounting period (financial year). It is also stated that the Authority must assess, on an annual basis, achievement of the salt-load objective against the number of tonnes of salt per year averaged over the preceding ten years.

The amount of salt exported is dependent on the volume of water that flows over the barrages. South Australia's assessment of salt export as a three or ten year rolling average showed that despite improvements compared to the pre Basin Plan modelling, there will be extended periods where the desired salt export target is unlikely to be met, predominately during drought when barrage outflows continue to be low.

Barrage Flows to support fish migration (Schedule 5(2)(e))

Periods of 30 days or more with no barrage outflow may have an impact on the downstream environment of the Coorong, with periods of no outflow between June and January being particularly critical for fish migration. The Basin Plan halves the number of years with periods of no barrage flow in this critical time period from ten to five years and ensures that the periods of no barrage flow occur in years separated by years with barrage flows during the critical period.

Environmental watering of additional floodplain (Schedule 5(2)(f))

There is an increase in the area inundated in South Australia at the appropriate flood frequency, duration and maximum interval for floodplain habitats when compared to baseline. The improvements are most notable in the mid-level floodplain habitats that support red gum, lignum and temporary wetlands.

Habitat	Area inundated under modelled scenario (ha)		
	Baseline	Basin Plan	Improvement
Black box woodland	260	720	460
Lignum shrubland	760	1710	950
Red gum woodland and forests	1580	2280	700
Temporary wetlands	4300	5200	900
Fish spawning/floodplain access	4900	7030	2130
Waterbird breeding	1850	2000	150

The above table only highlights the increase in area where a watering event met the appropriate flood frequency, duration and maximum interval for a particular floodplain habitat. Further analysis explored the ecological benefits of each water recovery scenario for red gum and lignum for all events exceeding the target flow rate, regardless of whether they met the duration criteria. The number of events relating to optimum and good habitat for red gum at the 70,000 megalitres per day flow band increased from 14 in the baseline scenario to 22 in the Basin Plan scenario. For Lignum, the number of events relating to optimum and good habitat at the 70,000 megalitres per day flow band increased from 13 in the baseline scenario to 23 in the Basin Plan scenario.

Enhanced in stream outcomes and improved connections with low to middle floodplain (Schedule 5(2)(g))

In stream outcomes can be represented by increased opportunities to support spawning and recruitment by Murray Cod, Golden Perch and Silver Perch and these are met in South Australia by the Basin Plan. Improved connections with low to middle level floodplain and habitats adjacent to rivers is achieved by improving the health of the lower level elevation temporary wetlands and their inundation for small scale bird and fish breeding events. The South Australian requirements for this target are not fully met with the Basin Plan however the area inundated under the modelled scenario in South Australia increases by 43 per cent and the number of events increases by more than a third compared to baseline conditions.

c. What is the scientific basis for the Government asserting that as at 31 December 2017 "a total of 2,106.4 GL of water has been recovered for the environment"?

The Australian Government has been publically reporting on the volume of water recovery every six months since 2012. The South Australian Government, industry organisations and individuals continually review the updated figures. If they are not correct or there appear to be discrepancies the Australian Government is contacted immediately. The South Australian Government can confirm for the Commissioner that figures for the South Australian water reported by the Australian Government as of 31 December 2017 were accurate.

The South Australian Government has recently reviewed the transfer of South Australian Water Access Entitlements to the Commonwealth Environmental Water Holder (CEWH) and the total volume of entitlement shares listed as being held by the CEWH, matches the current volume of shares on their licence at 30 August 2018.

- d. What is the scientific basis for the Government accepting that 702.7 GL of water has been recovered from the SRWUIP and SARMS programs?*

As above, the South Australian figures match with our records. SARMS is a South Australian Government program.

- e. Has the Government been provided with any water accounting to justify the claim from the Authority that 702.7 GL of water has been recovered from the SRWUIP program?*

No: As above the South Australian figures match with our records.

- f. Billions of dollars of Commonwealth funds have been spent on the SRWUIP program. Unchallenged evidence has been given at Commission hearings that efficiency measures are at least 2.5 times more expensive as a means of recovering water than the purchase of an entitlement (a "buyback"), and less certain of recovering real water than a buyback because of concerns regarding return flows. Does the Government support efficiency measures as a preferable means of recovering water than a buyback scheme?*

In its submissions to the Authority on the Guide to the proposed Basin Plan and the draft Basin Plan, the South Australian Government maintained the view that water purchase remained a cost effective way "to direct water to its highest value use, including the environment and must be a key element of any water recovery strategy. At the same time, opportunities for high value investment in infrastructure to secure water savings should also continue."²⁵

Cost effectiveness depends on the outcome you are trying to achieve. The Basin Plan is aiming to provide for a healthy river system while ensuring that the communities and industries that rely on Basin water resources remain productive into the future, noting that irrespective of the Basin Plan, regional socio-economic wellbeing is a key and appropriate area of interest for governments. Water recovered through infrastructure investment helps strengthen and develop Basin communities and industries while delivering the Basin Plan's environmental outcomes. The benefits from appropriate infrastructure investment are significant and include increased farm productivity through higher yields from reduced water usage, increased resilience to climate variability and improved business opportunities. This in turn provides benefits to the Basin's local businesses and communities, leading to less demand on government welfare and health services.

The South Australian Government supports efficiency measures as a preferable means of recovering water than extending the cap on buyback.

²⁵ Above n13, p 44.

8. *At [107] of the Submission, the Government states that “the authority has modelled projects [supply measures] as a total package for the 2017 determination to maximise the offset”. Has the Government*

a. been provided with the modelling and other information that underpins the determination of the ESLT by means of recovery of water for the environment of 2,750 GL or 3,200 GL?

As indicated in the numerous science reviews that South Australia undertook of the scenarios and analyses presented in the Guide and the proposed Basin Plan and referenced in our original Submission, the Government of South Australia has been provided with modelling outputs for the following water recovery scenarios: namely baseline conditions, without development conditions, proposed Basin Plan 2,750 gegalitres, 2,400 gegalitres, 2,800 gegalitres, 2,800 gegalitres with relaxed constraints, 3,200 gegalitres, 3,200 gegalitres with relaxed constraints scenarios and for the Guide to the Basin Plan 3,000 gegalitres, 3,500 gegalitres and 4,000 gegalitres scenarios.

These modelling outputs are only part of a larger framework of assessments and analysis that the Authority undertook as part of developing the proposed Basin Plan.

b. been provided with the modelling said to underpin the 605 GL SDL adjustment?

The Government of South Australia has been provided with modelling outputs from the model to underpin the 605 GL adjustment. The methodology and results are presented in the Sustainable Diversion Limit Adjustment Mechanism: Draft Determination Report (produced by the Authority in October 2017),²⁶ with further details in “*Modelling assessment to determine SDL Adjustment Volume*”.²⁷ The later report describes the implementation of each of the supply measures in the package in the modelling framework. The report outlines the results from ecological equivalence method and the safeguard tests; the limits of change in flow indicators and no detrimental impacts on reliability of supply. The comparison between the SDL adjustment scenario, including the package of supply measures, and the SDL Benchmark scenario resulted in the maximum permissible supply contribution being identified.

The Government of South Australia has not been provided with the underlying models.

²⁶ Sustainable Diversion Limit Adjustment Mechanism: Draft Determination Report, MDBA publication no: 37/17, Licensed from the Murray–Darling Basin Authority under a Creative Commons Attribution 4.0 Licence.

²⁷ Modelling Assessment to Determine SDL Adjustment Volume, MDBA publication no 35/17, Licensed from the Murray-Darling Basin Authority under a Creative Commons Attribution 4.0 Australia Licence.

9. *At [108] of the Submission, the Government submits that "it is not possible to attribute individual volumes to individual projects". In relation to this assertion:*

a. If individual volumes cannot be attributed to individual projects, what is the Government's understanding as to how the total figure of 605 GL has been reached?

The Basin Plan includes a mechanism to adjust the SDLs if equivalent environmental outcomes can be achieved with less water recovery, through the implementation of infrastructure or rule change projects.

The Authority began working with Basin Governments in 2013 to develop the method to assess the volume of SDL adjustment, as required by the Basin Plan. The method combines hydrological modelling with an assessment process for assessing and scoring ecological outcomes. The "Ecological Elements" method to assess and score ecological outcomes was developed by CSIRO and independently reviewed by an Independent Review Panel of experienced scientists.

For a given flow sequence (i.e. 114 year Basin Plan flow sequence) and operational rules, the Ecological Elements method determines an "EE score" for each of nine defined river reaches. The EE score is based on how each of 12 chosen ecological elements (4 waterbirds, 6 vegetation and 2 fish species) respond to the flow sequence. The reach scores are then aggregated to determine an EE score for the whole Southern Connected Basin.

The SDL adjustment assessment method compares environmental outcomes for the Basin Plan benchmark model with environmental outcomes of a model run with the increased SDL and all supply projects operating.

The key steps in the process to determine the SDL adjustment are broadly as follows:

- Run Basin Plan defined benchmark model with 2,750 gigalitres water recovery and determine the EE score for each river reach and the Southern Connected Basin.
- Incorporate SDL supply measure projects into the benchmark model to produce an SDL adjustment model (SDLAM). Run SDLAM to determine a new EE score.
- Reduce water recovery and run the SDLAM until the EE score equals the original EE score from the benchmark model (environmental equivalence).

In determining the 605 gigalitres SDL adjustment volume in 2017, the Authority undertook several iterations of modelling with different increased SDLs and all 36 supply projects operating until environmental equivalence was met within agreed safeguards. The safeguards are the limits of change under Basin Plan schedule 6, section 6.07 and the requirement for no detrimental impacts on reliability of supply under section 7.15.

Department for Environment and Water officers involved in the method development and the determination of the 605 gigalitres adjustment volume, have advised that individual projects

have not been assessed separately by the Authority as no valid approach has been identified to do this. The modelled environmental outcomes from one project may be influenced by other projects as well as the order in which the projects are put into the SDLAM. This is due to the limited volume of environmental water available and the many interactions that occur between projects.

Meeting the water demands for one project will affect capacity to meet demands for another project, for example:

- If a very high flow is delivered once the constraints management measures are implemented, that will reduce the environmental water available in that year to be used to operate a floodplain works site.
- Some projects result in changes to the operating rules in the River Murray system and hence the timing and availability of flows for those and other projects (such projects include the Menindee Lakes Water Savings project or Computer Aided River Management in the Murrumbidgee).

For some water savings projects, such as South Australia's Riverine Recovery Project, it is possible to understand its individual volume as the particular water savings (as opposed to improved environmental outcomes) are less dependent on the broader flow regime and can be quantified. In this case, the water saving has been provided as an entitlement to the Commonwealth Environmental Water Holder and the project is represented in the model by reducing the evaporative losses and increasing the volume of environmental water available.

b. Further, the Commission notes that there are Authority/New South Wales Government documents attributing 106 GL to, for example, the Menindee Lakes supply measure project. How is this consistent with the South Australian Government's submission?

As above, for some water savings projects, the individual volume of the particular water savings can be quantified. The Menindee Lakes supply measure project is one of these projects, the evaporative savings can be quantified and represented in the model as an entitlement that will be provided to the Commonwealth Environmental Water Holder.

10. *At [118] of the Submission, the Government states the supply measure projects “have been subject to a rigorous assessment criteria” and that the South Australian Government “is satisfied that all projects progressing to the next phase of the implementation satisfied the requirements”. It is also asserted at [81] of the Submission that the adjustment mechanism “improves socio-economic outcomes [and] facilitates the achievement of improved environmental outcomes.” It is also claimed that the supply and efficiency measures, and proposals addressing constraints will “guarantee flows of 80,000 megalitres per day at the South Australian border and improved outcomes for the Coorong, Lower Lakes and Murray Mouth”. These assertions are not consistent with the unchallenged evidence called at the Commission’s hearings. In relation to these assertions:*

- a. What is the scientific basis for the Government’s satisfaction that section 7.17 of the Basin Plan has been satisfied with respect to all supply measures?*

The relevant test for supply measures is section 7.17(2)(a). Schedule 6 of the Basin Plan sets out the default method to assess the effect of supply projects and test for equivalent environmental outcomes.

The Ecological Elements assessment method was developed by CSIRO and independently reviewed by an Independent Review Panel of experienced scientists. South Australian Government officials involved in the development of the method considered that it was fit for purpose to fulfil the requirements of the section 7.17(2)(a) of Basin Plan. The method was informed by sound scientific rationale and analysis and drew from relevant published scientific literature and expert judgement.

The Authority’s application of the method and draft determination results in 2017 were reviewed by South Australian Government scientists and river operations and policy officers, who concluded that the method had been applied correctly and that environmental equivalence had been adequately demonstrated in accordance with the method.

The officers took into consideration the findings of an independent expert review panel regarding some minor failures in two limits of change targets for two river reaches with respect to overbank flows and four sites with respect to base flows. The independent expert review panel found that “...none of the site specific overbank target breaches were material or significant in terms of their likely impact on ecological responses of birds, fish or vegetation.” All breaches were considered sufficiently close to their targets to be:

- within the limits of modelling (and assumptions made within the models) or measurement precision, and/or
- within the capacity of river operators to optimise releases and flows to achieve the “missed” targets, and/or
- within the limits of our current understanding of cause and effect relationships between hydrology and ecosystem function.

A minor risk of detrimental effects to reliability of supply of water to the holders of water access rights was also identified. Departmental officers considered that the risk could be offset or negated through the development of River operations changes during implementation of the SDL adjustment package, to ensure the requirements of section 7.15(1)(d) could be met. This was acknowledged in the Basin Officials Committee advice to the Authority in accordance with section 7.05 of the Basin Plan. The effects on reliability of supply of water to the holders of water access rights will need to be evaluated during implementation and as part of the reconciliation process in 2024.

b. What is the scientific basis for any satisfaction that the Government might have that supply measures will equate to 605 GL of water for the environment?

The determination of 605 gigalitres does not mean that the supply measures will equate to 605 gigalitres of water for the environment. In line with the key steps outlined under the response to question 9, the 605 gigalitres adjustment volume is a reduction in the water recovery volume that delivers environmental equivalence, in terms of EE scores, between the benchmark model run and the SDL adjustment model run.

The basis for the former Government's satisfaction with the Authority determination of an SDL adjustment of 605 gigalitres in 2017 were:

- confidence that the method applied was scientifically fit for purpose – key elements were developed by CSIRO and independently peer reviewed by experienced scientists and Government officers had been involved in the method development and testing;
- involvement of Government scientists and river operations and policy officers in assessing the application of the method and the results at an ecological element, reach and regional level; and
- the checks and balances in the Basin Plan that require the Authority to undertake a reconciliation in 2024 to assess whether the package of projects will produce the result determined in 2017 or whether a subsequent adjustment is needed.

Should the Authority determine at reconciliation in 2024 that the package of projects will not produce the result determined in 2017, the SDL will be required to be adjusted again and water secured by the Federal Government to meet the gap.

c. Does the Government have a view as to whether it would be better to recover 605 GL for the environment through the buyback of water entitlements rather than through supply measures?

In 2012 the former South Australian Government considered that the three-element package of supply measures, 450 gigalitres efficiency contribution and constraints relaxation would provide improved environmental outcomes without adversely impacting on socio-economic outcomes.

In 2012, the then Minister for Water and the River Murray agreed with other Basin Ministers to develop a SDL adjustment mechanism to include in the Basin Plan. This was on the basis that it would operate to not only offset water recovery by reducing the recovery of consumptive water, but also to enable the recovery of an additional 450 gigalitres of environmental water through socio-economically neutral efficiency measures.²⁸ In addition, a key focus of the South Australian Government at the time was to ensure that a mechanism to relax constraints and enable more efficient and effective use of environmental water was included in the package of changes to the Basin Plan.

The current Government is committed to delivering the Basin Plan, which includes the full package of supply, efficiency and constraints measures.

The supply measures provide several potential advantages to water recovery through buyback, noting that these are predicated on there being sufficient additional flow available for these advantages to be realised, including:

- some projects provide real water savings (Menindee Lakes Water Savings Project, Riverine Recovery Project) that are returned to the environment;
- the package of projects will address constraints on environmental water delivery, which will provide capacity for river operators to deliver managed flows up to 80,000 megalitres per day to South Australia;
- projects such as the Enhanced Environmental Water Delivery project provide an opportunity to significantly improve how environmental water is delivered to optimise outcomes;
- floodplain environmental structures can enable watering of environmental sites during periods of low flows;
- a number of the measures will increase our ability to mitigate the future impacts of climate change;
- floodplain infrastructure projects more actively involve local communities during planning, designs, construction and operations, increasing their capacity to manage risks and take advantage of environmental benefits; and
- floodplain infrastructure projects provide follow-on economic benefits to local businesses that may be engaged by governments to deliver surveys and designs, source building materials, provide construction services and support ongoing operations and maintenance activities.

²⁸ Murray-Darling Basin Ministerial Council (2012), Notice by Murray-Darling Basin Ministerial Council under section 43A(4) of the Water Act 2007, 9 July 2012.

South Australia considers that the extent to which these advantages will be maximised will depend on successful implementation of all three elements – the supply measure package, the 450 gigalitres of water recovery through efficiency measures and constraints relaxation.

d. Many supply measures are at a concept stage only. What “rigorous assessment criteria” have these measures been subject to?

The Basin jurisdictions developed agreed assessment guidelines including assessment criteria for all three phases of project assessment from feasibility through to agreement to progress to implementation. The guidelines are available on the MDBA’s website at <https://www.mdba.gov.au/basin-plan-roll-out/sustainable-diversion-limits/sustainable-diversion-limit-adjustment-mechanism-0>

All jurisdictions reviewed and assessed projects and prepared project evaluations based on these guidelines. Jurisdictional project evaluations, including identified issues and risks, were collated by the Authority and treatments identified and agreed amongst proponents and reviewing jurisdictions. Some issues and risks have been resolved and others will be addressed through the next phase of detailed project design and implementation. In many cases, agreement to progress to the implementation stage is conditional on further investigation and resolution of identified issues and risks.

Construction projects will also be subject to state planning processes and in many cases referrals under the *Environment Protection and Biodiversity Conservation Act*. Should the projects be amended during construction and the Authority determine at reconciliation in 2024 that the package of projects will not produce the result determined in 2017, the SDL will be required to be adjusted again and water secured to meet the gap.

e. What “constraints” are being referred to in relation to the claim that a flow of 80,000ML is guaranteed to be within the capacity of river managers, and what is the scientific basis for this asserted guarantee?

The South Australian submission actually stated “Implementation of the full SDL Adjustment Mechanism, including implementation of both efficiency measures and SDL offset proposals that also address constraints in the southern system by 2024, will guarantee the capacity of river managers to achieve flows of 80,000 megalitres per day at the South Australian border and improved outcomes for the Coorong, Lower Lakes and Murray Mouth.” Guarantee of a capacity to achieve does not guarantee flows.

The relevant constraints are maximum flow rates for river operations along the River Murray, within the Hume to Yarrawonga, Yarrawonga to Wakool and South Australian River Murray reaches and in the Murrumbidgee, Goulburn and Darling Rivers. Implementing measures that will support managed higher flows in these reaches will give river managers the capacity to increase the maximum regulated flow in each of these rivers and through coordination of these flows, produce flows of 80,000 megalitres per day at the South Australian border.

Authority modelling undertaken in 2012²⁹ indicated that with 3,200 gigalitres of environmental water recovery, the number of successful 80,000 megalitres per day for 30 day events at the South Australian border increased from 16 to 20 events over the 114 year assessment period. This was considered a material increase and demonstrates that constraint relaxation is capable of delivering a flow of 80,000 megalitres per day.

The 2012 modelling represents one scenario for environmental water delivery. The achievement of 80,000 megalitres per day events may also be achieved through different watering approaches with less water and with differing levels of constraints relaxation. For example, the modelling undertaken to support the notification of the Enhanced Environmental Water Delivery project³⁰ provided an alternative delivery strategy that allowed the flow at the South Australian border in the range of 70,000 - 80,000 megalitres per day increased by 84 days over the model run. This provides further evidence to support that flows of up to 80,000 megalitres per day are within the capacity of river management with constraints relaxed and the environmental water volumes available.

11. Still on [118] of the Government's Submission, the Commissioner notes that the business cases for the various supply measures have only recently been made publically available, and only after the disallowance motion in the Senate. The Authority's analysis of these various supply measures was only made available after it was compelled to produce those documents in the Senate. In relation to this:

a. What is the Government's view as to whether these documents should have been made publically available at or about the time the documents were created?

The South Australian Government's practice has not been to make specific business cases seeking Commonwealth funding publically available. These documents are developed for the purpose of securing funding rather than for public communication. That said South Australia did provide its business cases to the Wentworth Group to assist their analysis.

The practice has been to make detailed project information available through provision of specific information and communications materials located on websites or available in hardcopy and disseminated through a variety of community engagement processes.

For the supply measure projects being delivered in South Australia, information materials are available on the Department for Environment and Water website and MDBA website. The South Australia projects were already under or about to commence construction at the time the business cases were submitted. Community engagement on the projects was therefore

²⁹ Hydrologic modelling of the relaxation of operational constraints in the southern connected system: Methods and results, MDBA publication no: 76/12, Licences from the Murray-Darling Basin Authority, under a Creative Commons Attribution 3.0 Australia Licence.

³⁰ MDBA (2016) Environmental water delivery following natural flow cues and relaxing constraints in the Southern Basin - potential options for SDL adjustment, accessed at : <https://www.mdba.gov.au/sites/default/files/pubs/enhanced-environmental-water-delivery-amendment-2.pdf>

undertaken prior to submitting the business cases and continues through implementation using a wide variety of mechanisms. Key stakeholders were made aware that projects were being proposed for SDL adjustment purposes.

The stocktake of supply measure projects undertaken in 2015 was made public on the MDBA website at the request of Ministerial Council. While this did not include detailed information on the projects it did assess the projects being considered at the time, including risks.

The Enhanced Environmental Water Delivery project, for which South Australia is a co-proponent, has not been widely consulted upon to date. The proponent Basin states have been reticent to do so until agreement to proceed was secured and resources became available to undertake effective engagement.

The Government does not have a view on release of business cases for which other states were proponents.

b. What explanation, if any, has the Government been provided by the Authority as to the reasons for not making publically available either the business cases for the supply measures until very recently, or its analysis concerning the business cases?

The Authority has indicated to Departmental officers that it considered any decision to make business cases publically available was a decision for the proponent state or states and not one the Authority could make unilaterally. It has consulted with Basin states in recently making the documents publically available.

The Authority analyses were undertaken to inform an internal inter-jurisdictional evaluation process being managed by the Basin governments. It was not contemplated by the Basin governments or the Authority at the time that it would be in the public interest for these analyses to be made public. As the advice was prepared for Basin governments, it would be appropriate for the Authority consult with those governments before releasing its analyses.

12. In relation to the statements made at [128] and [129], what is the scientific basis for the assertion that the "tool-kit measures" that are referred to justify a reduction of water to be recovered for the environment in the Northern Basin from 390 GL to 320 GL?

The South Australian Government has not asserted that the "tool-kit measures" referred to justify a reduction of water to be recovered for the environment in the Northern Basin from 390 gigalitres to 320 gigalitres. The submission outlined the South Australian Government's understanding of how the toolkit measures came about.

When the Basin Plan received bipartisan support in 2012, there was recognition that the knowledge about the Northern Basin and its specific requirements needed to be improved. It is South Australia's understanding changes to the water recovery volumes reflect the updated knowledge gained through the Northern Basin review on how environmental outcomes are influenced by different patterns of water recovery and delivery and how local environmental

needs are better met within catchment recovery. This increased the local volumes and decreased the shared component of the water to be recovered.

The Authority proposed the water recovery target be reduced in the northern Basin from 390 gigalitres to 320 gigalitres provided there were commitments from the Australian, Queensland and New South Wales governments to implement a number of so-called 'toolkit measures'.³¹

13. *Still on [129], the Authority's own analysis in relation to recovery targets ranging from 273 GL to 415 GL in the Northern Basin shows that in all of these scenarios many of its environmental watering targets will not be met. What is the Government's position then as to why a 320 GL (or even 415 GL) recovery target for the environment in the Northern Basin is appropriate, or forms part of a lawful ESLT or SDL under the Basin Plan?*

The South Australian Government's position is that the environmentally sustainable level of take and the sustainable diversion limit must achieve the requirements of the Water Act and are solely the responsibility of the Authority to develop and the Commonwealth Minister to adopt.

As stated above at the time of development of the Basin Plan in 2012 there was a recognition that the information in the Northern Basin was less than adequate, for both water, environmental and socio-economic information and a review was agreed. The studies undertaken by the Authority show that as water recovery goes beyond 278 gigalitres, both environmental outcomes and social and economic impacts in irrigation-dependent communities increase; intersecting with non-water related changes which are being felt across all regional areas. Studies also show that the level of improvement in environmental outcomes slows down as recovery increases from 320 gigalitres to 415 gigalitres, whereas the social and economic impacts continue for communities such as Dirranbandi and St George.³²

It is South Australia's understanding that reducing the recovery target to 320 gigalitres offers better social and economic outcomes for some irrigation communities compared with current Basin Plan settings and that under 320 gigalitres recovery environmental outcomes are only slightly reduced.

The Basin Plan is aiming to provide for a healthy river system while ensuring that the communities and industries that rely on Basin water resources remain productive into the future, noting that irrespective of the Basin Plan, regional socio-economic wellbeing is a key and appropriate area of interest for governments.

³¹ Northern Basin Review: *Understanding the economic, social and environmental outcomes from water recovery in the northern Basin*, MDBA publication no: 39/16, Licensed from the Murray–Darling Basin Authority under a Creative Commons Attribution 4.0 Licence, p 2.

³² Ibid p 12.

14. *At [138], the Submission is made that "efficiency projects are real water savings for the environment". A great deal of unchallenged evidence has been given at the Commission's hearings that efficiency measures are poorly accounted for (if at all) and are unlikely to result in recovering as much water for the environment as is claimed (if at all). This is no doubt of particular concern to the Government given efficiency measures are the basis for the proposed recovery of 450GL of water for South Australia's icon environmental assets. The Commissioner is interested in the scientific basis for the Government's assertion. In particular, the Commissioner would be interested to hear from the Government as to why it (presumably) thinks that the various scientists and other experts that have given evidence before the Commission are wrong?*

Please refer to the Question 4 and Question 7 (a) and (f) on efficiency measures and Question 5 on return flows.

With respect to the commentary that efficiency measures are poorly accounted for in the upstream states and there is no information available for review. The South Australian Government has not found this to be the case. For example, the Victorian Government has developed a Water Savings Protocol, comprising four technical documents to allow for calculating, applying and allocating water savings generated from Victorian irrigation modernisation projects. All four documents are available.³³ The water savings projects have also been audited annually by independent auditors. The 2016-17 audit confirmed the water savings estimated were accurate and in line with the Water Savings Protocol and verified the water purchases. All historical audit reports are available.³⁴ Like all efficiency projects, a water entitlement for the savings is transferred to the Commonwealth.

15. *While it may have been answered in [7](b) above, in relation to [139] of the Submission, evidence given to the Commission suggests that even a 3,200 GL recovery of water for the environment has almost "no hope" of achieving the outcomes outlined in Schedule 5 of the Basin Plan or Schedule 86AA of the Water Act. What is the scientific basis for the Government holding the view that these outcomes will be achieved under the current Basin Plan?*

Please refer to question 7 (b) above.

16. *In reference to [157] of the Submission, what is the Government's understanding of what progress has been made in relation to the Constraints Management Strategy?*

Basin jurisdictions are implementing a number of major initiatives to address policy, technical and physical constraints that limit the delivery of water through the River Murray system and its tributaries. These actions aim to improve the way that these rivers are operated for the benefit

³³ Water Savings Protocol at <https://www.water.vic.gov.au/water-for-agriculture/investment-in-irrigation-efficiency/water-savings-protocol>

³⁴ Historical Water Recovery Audit Reports at <https://www.water.vic.gov.au/water-for-agriculture/investment-in-irrigation-efficiency/historic-water-recovery-audit-reports>

of both productive users and the environment by enabling modest enhancement to natural flows.

Key initiatives being progressed include:

- pre-requisite policy measure implementation plans which seek to address key policy constraints to the delivery of environmental water by 1 July 2019;
- a Constraints Management Strategy and business cases to address physical constraints at seven key focus areas: Hume to Yarrawonga, Yarrawonga to Wakool, South Australian River Murray, Murrumbidgee, Goulburn, Lower Darling and Gwydir;
- an Enhanced Environmental Water Delivery supply measure project which seeks to build on the opportunities offered by constraints management to better coordinate watering across the Basin in real time and synchronise managed watering with natural events;
- the River Murray System Capacity, Risks and Options Project which aims to improve our understanding of the potential capacity of the system and associated delivery risks, as well as measures that could potentially be implemented to mitigate those risks; and
- multi-site watering trials which are testing innovative ways of operation that may be outside current rules and policies.

When the Constraints Management Strategy was completed by the Authority in 2013 it originally proposed three broad phases of implementation. Planning and implementation of projects was proposed to start in mid-2016.

Since this time, five of the seven constraints measure projects (Hume to Yarrawonga; Yarrawonga to Wakool, Lower Darling, South Australian River Murray and Murrumbidgee) have been notified as supply measures contributing to the 605 gigalitres adjustment. As a result of this decision, constraints measures are now being progressed as a package with supply measures. The timing to progress projects has reflected the agreed inter-jurisdictional assessment, decision making and notification processes for supply measures in the Basin Plan. These projects are now due to be delivered by 2024.

The additional time provided by this change has been used by jurisdictions to undertake further integration work by refining technical information, developing policy principles and undertaking additional community engagement to address community concerns about the proposals. The extra time has also allowed states to develop the Enhanced Environmental Water Delivery supply measure project, which will complement the constraints management projects by improving coordination, forecasting, planning and operations across the Basin to better synchronise managed environmental watering events with natural flows.

During the spring and summer of 2016, South Australia collected data and information during the natural high flow event that peaked at 95,000 megalitres per day at the South Australian

border. This involved aerial photography, field surveys, on-ground photography and video monitoring and regular communications with state government emergency response agencies and local shack communities before, during and after the event. This detailed data and information will be used to verify and update existing desktop modelling and assessments of potential impacts and mitigation costs to ensure mitigation measures can be designed using the most up-to-date information. The lessons learned from the communications processes will also be used to refine flood notification, preparation and response measures.

While the delayed progress of constraints measures is having some limited environmental impacts, such as restricting the ability to boost flows at Yarrawonga above 15,000 megalitres per day, there is still a significant body of work that needs to be delivered before jurisdictions could consider trialling and operating the river with increased capacity. Mitigation measures and managed flows will be implemented incrementally to ensure that risks are adequately managed and to build community trust and confidence in constraints measures.

The overall constraints program remains on track for the longer-term implementation timeframe of completion in 2024.

In accordance with the COAG Plan, Basin jurisdictions are now working to develop an integrated constraints work plan to provide a coordinated, cross-jurisdictional approach that enables strong community involvement in a staged implementation manner. The work plan was due in November 2017 but has been delayed to late 2018. Previous uncertainties associated with the disallowance of the Northern Basin Review amendments and the potential disallowance of the SDL adjustment amendments, which are now resolved, have contributed to this delay.

In parallel to the integrated constraints work plan, South Australia has commenced preparation, planning and early negotiations with the Commonwealth Government on a new initial funding agreement for the South Australian River Murray constraints measure. South Australia is seeking Commonwealth funding over the next two years to undertake the next phase of planning, designs and engagement to refine constraints mitigation scope and costs in accordance with the long term implementation plan to 2024. This work will be undertaken in close collaboration with local communities and consistent with the integrated constraints work plan to enable the environmental benefits to be achieved and manage the potential risks of flows up to 80,000 megalitres per day at the South Australian border.

A key component of the integrated constraints work plan is working out ways to coordinate the delivery of upstream flows to deliver flows up to 80,000 megalitres per day at the South Australian border. It is important to note that environmental water releases alone are not enough to achieve flows up to 80,000 megalitres per day at the South Australian border. Hydrological modelling indicates that at least one of the River Murray, Goulburn, Murrumbidgee or Lower Darling must be under unregulated flows to achieve flows of this magnitude. In other words, environmental water operations up to the notified flow rates on top of any unregulated flows will be sufficient to achieve the environmental objectives of constraints measures. This is consistent with the principles of the Constraints Management Strategy, which has always been about increasing the peak or extending the duration of natural high flow events, rather than recreating

large floods. While the downstream environmental benefits of these flows to South Australia are often highlighted, there are also local environmental benefits within each reach and tributary of the southern connected system where constraints will be managed.

Timely completion of the integrated constraints work plan by states and release of Commonwealth funding for states' constraints measure projects will enable states to start developing early works packages that can be delivered in the next few years to ensure that constraints measures remain on track to be completed by 2024.

17. In relation to [167] to [177] of the Submission, is it the Government's view that sections 10.52 to 10.54 of the Basin Plan are adequate and appropriate in terms of addressing the broad range of social, spiritual and cultural values and uses of Aboriginal people in relation to the rivers and watercourses of the Basin?

As stated previously, the Basin Plan is not and was never intended to be a static document. Each plan has a ten year time horizon and is then reviewed and recast to take account of new information, research and community expectations.

The Basin Plan has been a first step in recognising Aboriginal views and building understanding capability within Aboriginal communities. The recently released Cultural Flows: A Guide for First Nations (the Guide) provides a method for nations to describe and measure their cultural water uses and values and then calculate how much water is needed to protect those values. The South Australian Government expects that the information provided from the implementation of this Guide over the next few years will form part of the new information considered in the next Basin Plan.

In the meantime, all Basin Governments have committed to active involvement and consultation with Aboriginal communities in the development of Water Resource Plans and to work with water managers that enable improved delivery of water for cultural purposes. Environmental water managers are actively looking for opportunities to deliver both environmental and cultural outcomes with environmental water. The package announced by the Commonwealth on 7 May 2018 to secure the SDL amendments included new measures to improve outcomes for Aboriginal people in the Basin.

18. Still in relation to [167] to [177] of the Submission, does the Government support, at least in principle, an allocation to Aboriginal nations of a "cultural flow" under the Basin Plan in volumetric terms, and pursuant to some legal recognition of that cultural flow?

During the development of the Basin Plan, the South Australian Government supported the proposals for ongoing dialogue with Aboriginal communities to contribute towards the cultural objectives of Aboriginal people. South Australia called for greater attention to cultural water and flows than appeared in the Guide with respect to protecting and restoring key environments, habitats and species critical to meeting Aboriginal cultural objectives,³⁵ and recommended

³⁵ Above n 13, p 37.

specific sections within the Basin Plan regarding cultural water and flows so as to reflect the intent of the National Water Initiative.³⁶

The South Australian Government supports, in principle, cultural flows, noting the over-allocation of the Murray-Darling Basin means that the water for cultural flows will need to be purchased from existing consumptive users.

19. In relation to [187] of the Submission, what is the Government's understanding of the level of monitoring and assessment of the Basin Environmental Assets?

The 2017 Basin Evaluation was undertaken using the outputs from the comprehensive monitoring being undertaken by the Authority, the Commonwealth Environmental Water Holder and the Basin jurisdictions. Collaborative relationships have been established between the Murray-Darling Basin Authority, the Commonwealth Environmental Water Office, Department of Agriculture and Water Resources and the Basin governments. Officers meet regularly and collaborate to deliver the monitoring and evaluation program, including developing a joint program of monitoring activities, contributing to the Basin Plan annual report and developing approaches for longer term evaluation. Monitoring and assessment of the Basin Environmental Assets has access to information and builds upon more than ten years of monitoring undertaken for The Living Murray and other state monitoring activities.

20. The Commissioner is aware of the report referred to at [195] of the Submission. What is the scientific basis for the assertion that the "monitoring provides strong evidence" of the matters referred to in the submission? In relation to this paragraph, and in relation to [201] of the Submission, what is the scientific basis for the confidence expressed by the Government?

Please refer to Question 21 as well. As stated above the monitoring and assessment is being undertaken by, and using data from the Authority, the Commonwealth Environmental Water Holder and the Basin jurisdictions in a collaborative way. Behind the 2017 Basin Plan Evaluation sit a number of technical reports on the environmental assets that provide more detailed information on the outcomes expected and the progress so far for native fishes,³⁷ native vegetation,³⁸ river flows,³⁹ waterbirds⁴⁰ and water quality and salinity.⁴¹

³⁶ Above n 2, Attachment A, p 17.

³⁷ Native Fish: 2017 Basin Plan evaluation at <https://www.mdba.gov.au/sites/default/files/pubs/Native-fish.pdf>

³⁸ Native Vegetation: 2017 Basin Plan Evaluation at <https://www.mdba.gov.au/sites/default/files/pubs/Native-vegetation-report-Feb18.pdf>

³⁹ River flows and connectivity: 2017 Basin Plan Evaluation at <https://www.mdba.gov.au/sites/default/files/pubs/River-flows-connectivity.pdf>

⁴⁰ Waterbirds: 2017 Basin Plan Evaluation at <https://www.mdba.gov.au/sites/default/files/pubs/Waterbirds.pdf>

⁴¹ Water quality salinity reports data at <https://www.mdba.gov.au/sites/default/files/pubs/water-quality-salinity-reports-data-2017-basin-plan-evaluation.docx>

The 2017 Basin Plan Evaluation trialled the methodology for the statutory evaluation in 2020. One of the outputs from this trial is the Basin Plan Environmental Assets Technical Report. This report focuses on what information is currently being collected in order to inform the 2020 evaluation and makes recommendations on actions that should be undertaken or continued in order to effectively report on environmental assets and functions in 2020. Implementation of these recommendations will assist stakeholders to have confidence in the results from the 2020 evaluation.

21. What is meant by the term "on track" in [200] of the Submission?

The Basin Plan Evaluation 2017 undertaken by the Authority states on page 7 that its conclusion was that many elements of the Basin Plan are 'on track' (i.e. progressing as expected) and that there have been significant achievements, but that progress was lagging in several important areas.

22. In relation to [207] to [211] of the Submission, while this matter may have been addressed in a previous answer, what are the South Australian Government's views concerning the evidence presented to the Commission by various scientists and water economists concerning return flows?

Refer to Question 5.