

# Boundary Creek, Big Swamp and Surrounding Environment – Remediation and Environmental Protection Plan

## **QUARTERLY UPDATE**

**1 July to 30 September 2022**

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# Introduction

In June 2017, Barwon Water acknowledged that the historic management of periodic groundwater pumping activities from the Barwon Downs borefield between 1982 and 2016 had resulted in water level decline and depressurisation of the Lower Tertiary Aquifer (LTA), which in turn was the primary cause of a reduction in groundwater contribution to the lower reaches of Boundary Creek (i.e. baseflow), that helped sustain streamflows during dry periods. When combined with drought conditions and the ineffective regulation of passing flows at a private on-stream dam located on Boundary Creek, this reduction in streamflow led to a range of unintended consequences such as: the drying out of Big Swamp, the oxidation of naturally occurring acid sulfate soils and the subsequent decline in water quality within Big Swamp and the lower reaches of Boundary Creek.

In May 2018, Barwon Water established a community and stakeholder working group to participate in the design of a remediation plan for Boundary Creek and Big Swamp. As part of this process, Barwon Water invited the working group to nominate their own technical experts to help support them in their discussions to shape the remediation plan.

In September 2018 Barwon Water's commitment to undertake remedial works was legally strengthened through the issuing of a Ministerial Notice under section 78 of the Water Act, 1989. This notice mandated the development and implementation of the Boundary Creek, Big Swamp and surrounding environment – Remediation and Environmental Protection Plan (REPP) by 1 March 2020.

The section 78 notice defined remediation to be the controls and actions that could be practicably carried out to achieve improved environmental outcomes. In order to align this with an accepted scientific definition for remediation, the REPP further expanded the definition to be "the controls and actions that could be practicably carried out to improve the ecological condition and function of areas confirmed to have been impacted by historical management of groundwater pumping at Barwon Downs, noting that this is likely to be different to the original condition due to the extent of change since European settlement."

In February 2020, Southern Rural Water accepted Barwon Water's REPP, subject to inclusion of SRW feedback, with the REPP to be delivered under two parallel work packages:

- **The Boundary Creek and Big Swamp Remediation Plan** to address remediation of confirmed impact in the Boundary Creek catchment resulting from historical management of groundwater extraction.
- **The Surrounding Environment Investigation** to investigate whether other areas within the regional groundwater system have been impacted by historical management of groundwater extraction.

A key requirement of the section 78 notice and the REPP is the provision of quarterly updates to Southern Rural Water to report on progress with implementation of the plan, as well as an Annual Report. The section 78 notice also stipulates that the Annual Report is required to be submitted to Southern Rural Water for review and comment before being made publicly available by 30 September each year.

This quarterly update is the tenth since the REPP was implemented on 1 March 2020 and provides a high-level update on progress against the actions and timeframes outlined in the REPP between 1 July 2022 and 30 September 2022, noting that the annual report is due to be submitted by 30 September each year.

In addition to the information contained in the quarterly updates, the Annual Report, released on the 30th September each year, provides more detail on technical investigations, monitoring, data collected, and tracking against the REPP success targets.

## Implementation of the REPP

In accordance with the REPP, Barwon Water have adopted an adaptive management approach, whereby the REPP can be adapted in response to the current 'state of knowledge'. This approach allows Barwon Water to evaluate how the confirmed areas of impact and the surrounding environment are responding to the adopted remediation actions and take further action, such as implementation of contingency measures, if and when required. This approach also ensures that the adopted remedial actions meet the vision, objectives and targets as informed by the community and stakeholder Remediation Reference Group (RRG) and their nominated experts.

To help address the requirements of the section 78 notice and ensure momentum was maintained, a number of key milestones and actions were established. However, as reported in the 1 October to 31 December Quarterly Update, this roadmap continues to be updated in accordance with the adaptive management approach to account for the current 'state of knowledge' and to capture any additional actions.

As reported in the 2021-2022 Annual Report, this has again been updated following the completion of the Upstream Treatment Investigation in June 2022 (Barwon Water, 2022a), the submission of Barwon Water's high-level approach to the Surrounding Environment Investigation (Barwon Water, 2022b) and unforeseen delays in installing the additional monitoring assets (refer Figure 1).

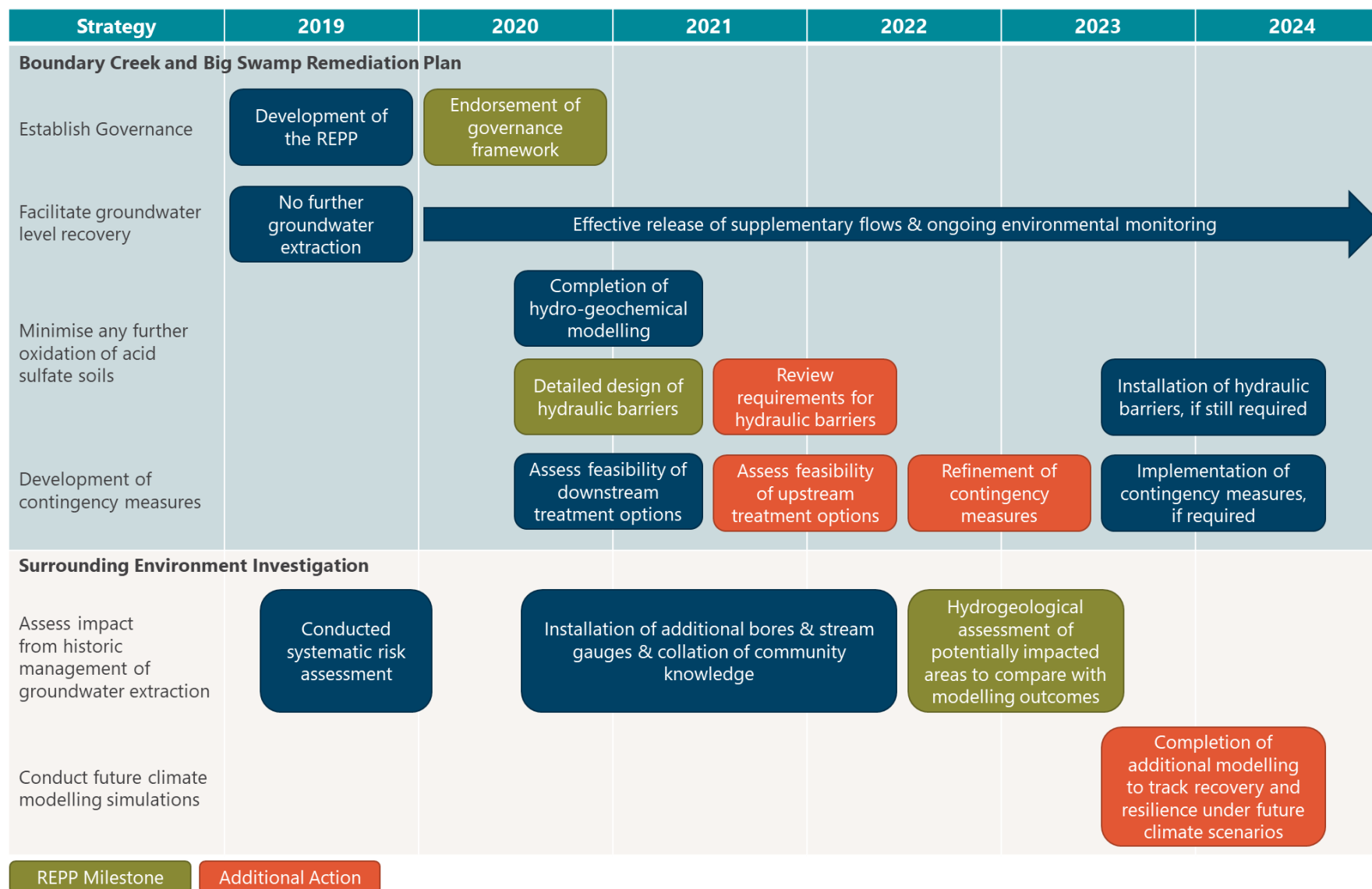


Figure 1: Timeframes for implementation of the REPP

# Boundary Creek and Big Swamp Remediation Plan

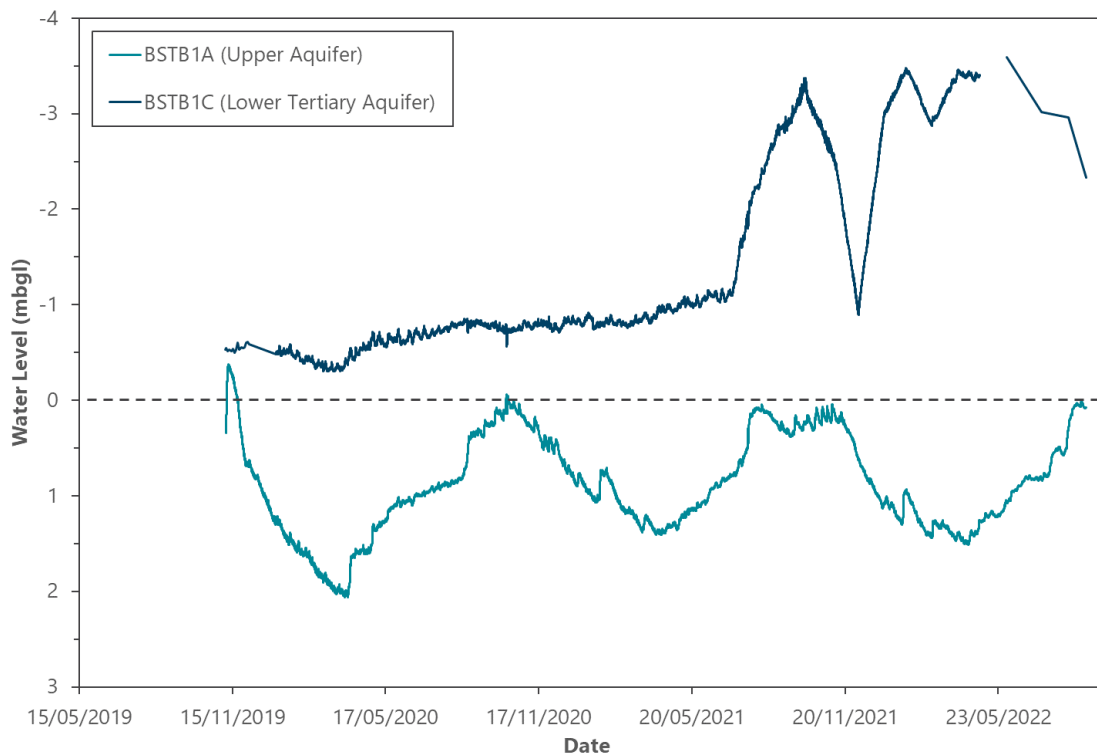
## Boundary Creek & Big Swamp Status Update

Based on the most recent data collected as part of Barwon Water's routine environmental monitoring program, the following observations can be made:

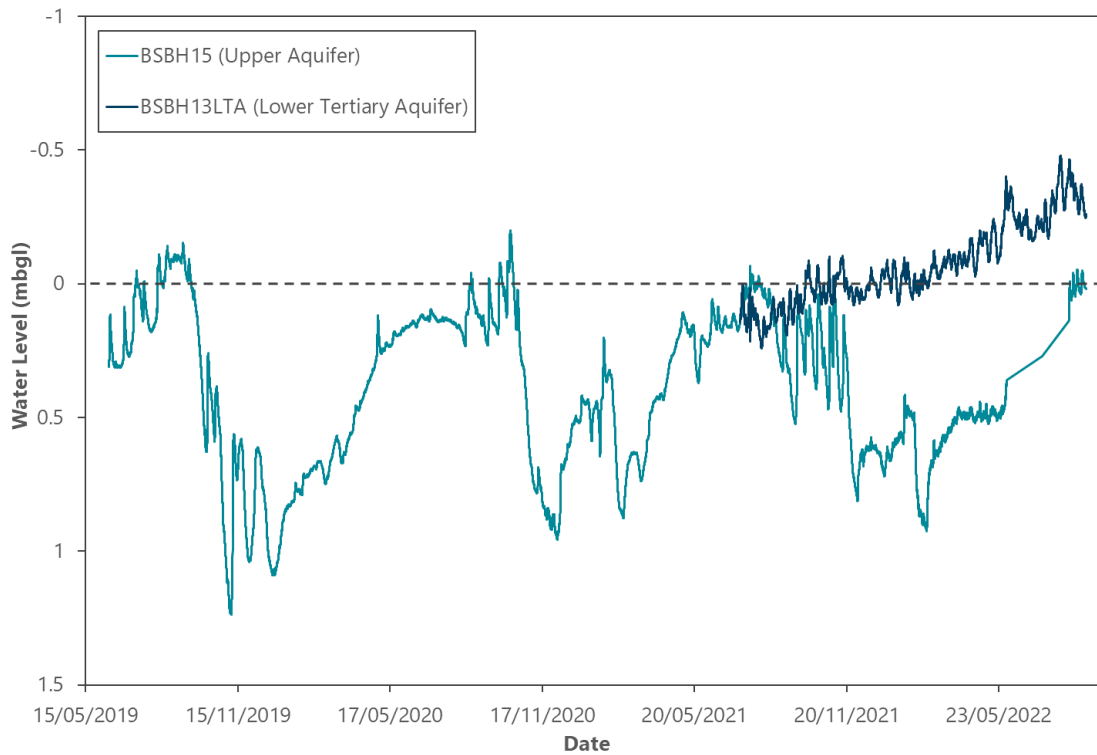
- Groundwater levels within the upper aquifer system have increased since April/May 2022 in line with the anticipated natural seasonal variation (refer Figure 2 and Figure 3)
- Groundwater levels from bores installed within the Lower Tertiary Aquifer system continue to indicate the long-term recovery and repressurisation of the Lower Tertiary Aquifer system
- The surface water quality downstream of Big Swamp has improved since 30 June 2022 following the seasonal flushing of acidity that occurs as groundwater levels and streamflows increase following the drier and warmer summer period (refer Figure 4 and Figure 5).

In August 2022 Barwon Water also received feedback on the Outcomes and Implications of the Upstream Treatment Investigation report (Barwon Water, 2022a) that was submitted to Southern Rural Water on 30 June 2022. Following a review of these findings, Southern Rural Water and the Independent Technical Review Panel (ITRP) agreed that the proposed caustic magnesia based treatment system is not suitable for the intended use and agreed with the proposed approach to focus on refining the downstream treatment option. As such, Barwon Water are currently reviewing the existing design of the downstream treatment system to address the community and stakeholder feedback received on the proposed design, with the aim to get an approved design so that this can be implemented, should this be required, in 2023/24.

In light of the findings from the upstream treatment investigation along with the recent monitoring data and community and stakeholder engagement, Barwon Water are currently reviewing the remedial actions in accordance with the adaptive management approach, to inform a revised REPP. This is to ensure that any active interventions are in line with the visions and objectives of the remediation plan and do not lead to undue impacts on the swamp or the surrounding environment. It is noted that any changes to the REPP and the remediation plan will need to be accepted by Southern Rural Water prior to adoption.

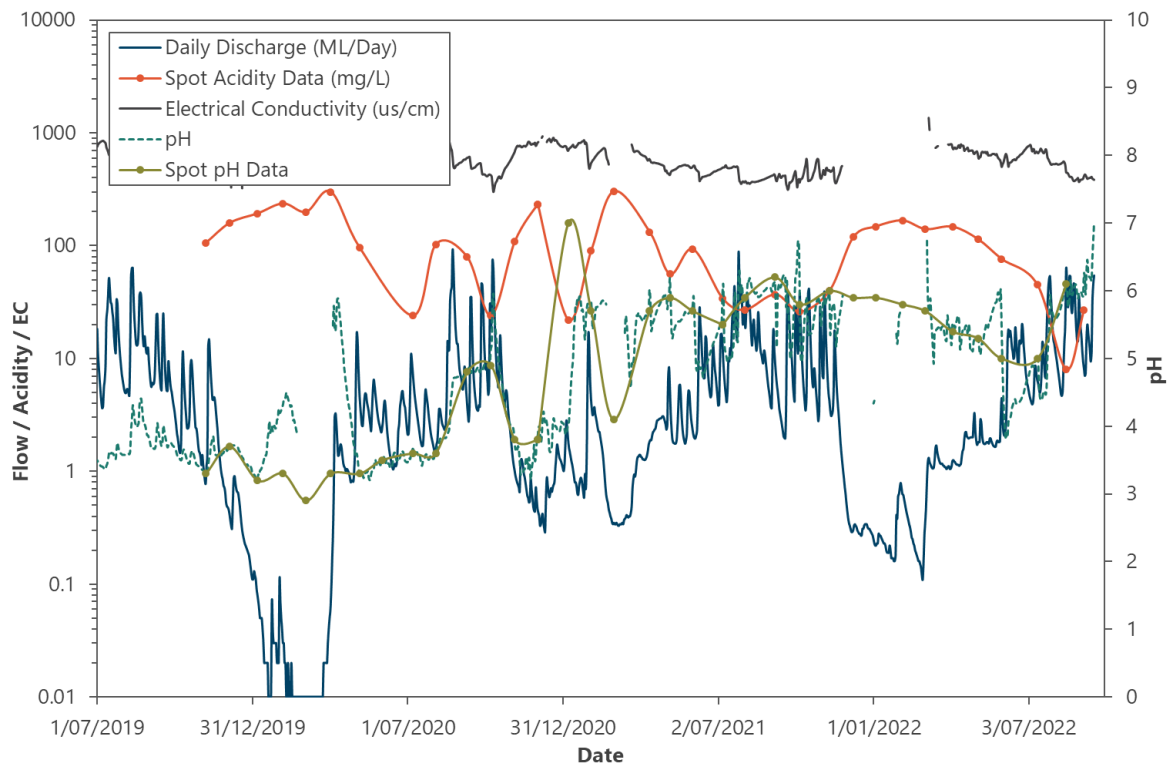


**Figure 2 Groundwater levels in the eastern portion of the swamp. Note that since the logger was removed from BSTB1C in April 2022 due to leakage associated with repressurisation of the LTA, the data presented after this time relates to spot sampling data**

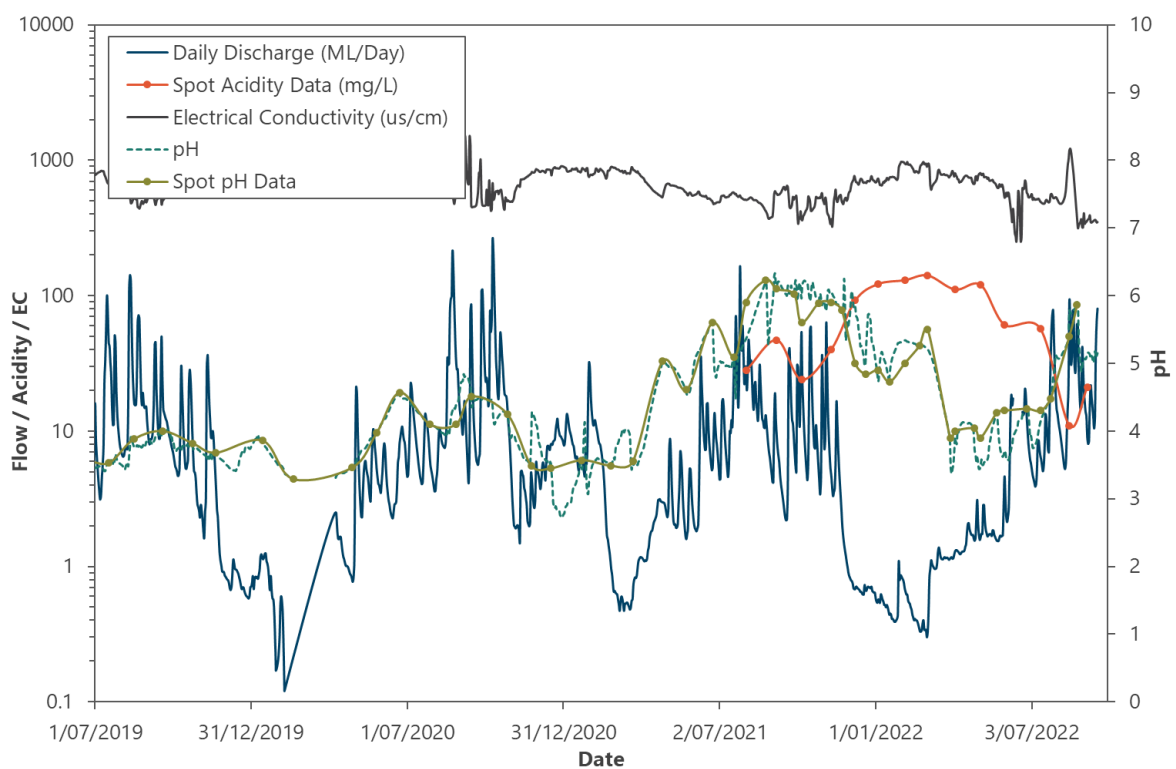


**Figure 3 Groundwater levels in the western portion of the swamp. Note that the logger from BSBH15 was found to be missing on 14 July 2022 and was replaced on 15 August 2022, data between these times relates to spot sampling data**





**Figure 4 Streamflow, pH, EC and acidity readings in Boundary Creek – downstream of Big Swamp as recorded at stream gauge 233276 and during routine spot sampling**



**Figure 5 Streamflow, pH and acidity readings in Boundary Creek at Yeodene as recorded at stream gauge 233228 and during routine spot sampling**

## Actions Completed on the Boundary Creek & Big Swamp Remediation Plan

Table 1 outlines the actions completed for the Boundary Creek and Big Swamp Remediation Plan between 1 July and 30 September 2022.

**Table 1 Boundary Creek and Big Swamp - Actions completed in Q1 2022/23 (1 July – 30 September 2022)**

Action Items	Comment / Link
Attendance at Southern Rural Water's CLG meeting to discuss the outcomes of the Upstream Treatment Investigation	Completed on 24 August 2022
Completion of the Q1 2022/23 Remediation Reference Group meeting	Completed on 21 September 2022
Submit Annual Report for the 2021-2022 reporting period.	Complete. Refer to the Your Say website located here: <a href="https://www.yoursay.barwonwater.vic.gov.au/boundary-creek">https://www.yoursay.barwonwater.vic.gov.au/boundary-creek</a>
Submit quarterly update for the period 1 July to 30 September 2022 to Southern Rural Water and publish to the Your Say web page	Complete – this report Refer to the Your Say website located here: <a href="https://www.yoursay.barwonwater.vic.gov.au/boundary-creek">https://www.yoursay.barwonwater.vic.gov.au/boundary-creek</a>
Continue to collect data from new and existing monitoring assets	Complete and ongoing
Continue to release supplementary flows, where required, to try to maintain a flow of at least 0.5 ML/day at the Yeodene stream gauge #233228	Complete and ongoing
Inclusion of decommissioning of the Barwon Downs production bores in the 2023-2028 price submission	The draft price submission was posted for community feedback in July 2022. The final price submission is due to be submitted to the Essential Services Commission by 30 September 2022.
Progress amendment of the REPP based on the current 'state of knowledge' and the adaptive management approach. This will include a review of the adopted remedial actions and the development of a risk-based remedial strategy that accounts for recent community and stakeholder feedback to help facilitate natural recovery processes.	Barwon Water and Southern Rural Water are in ongoing discussions regarding the proposed amendments to address any outstanding feedback prior to making any formal updates to the REPP. This will include additional revisions to account for the current 'state of knowledge' and community sentiment to ensure the REPP remains fit for purpose. It is noted that this requires review and approval by Southern Rural Water before this can be adopted. Once adopted this will supersede the current REPP that was approved in February 2020.

Action Items	Comment / Link
Development of contingency measures	<p>Following completion of the Upstream Treatment Investigation in June 2022, Barwon Water are currently:</p> <ol style="list-style-type: none"> <li>1. Reviewing the existing design of the downstream treatment system to address the community and stakeholder feedback received on the proposed design, with the aim to get an approved design so that this can be implemented, should this be required in 2023-2024</li> <li>2. Reviewing the potential use of permeable reactive barriers, or similar, that were initially included in the Remedial Options Assessment (ROA) (CDM Smith, 2019), to neutralise the acidity within the swamp. Noting that unintended impacts would also need to be minimised to achieve community and stakeholder support, and</li> <li>3. Developing a risk-based contingency approach that minimises the potential for further harm which could result from the implementation of heavily engineered remedial actions.</li> </ol>
Completion of a Level 3 Ecological Risk Assessment to quantify the risks of the existing metal and acidity loads on Boundary Creek, Big Swamp and the Barwon River and to help inform the development of suitable triggers for the implementation of relevant contingency measures, if required	This work commenced in September 2022 and is forecast to be completed by the end of June 2023
Completion of a paleoecology study of Big Swamp	In September 2022 Barwon Water engaged a consultant to undertake these works, with work forecast to commence in October 2022. It is anticipated these works will be completed by the end of June 2023.

## Upcoming Actions associated with the Boundary Creek & Big Swamp Remediation Plan

Table 2 outlines the upcoming actions associated with the Boundary Creek and Big Swamp Remediation Plan between 1 October and 31 December 2022.

**Table 2 Boundary Creek and Big Swamp - Upcoming actions / milestones for the Q2 2022/2023 (1 October – 31 December 2022)**

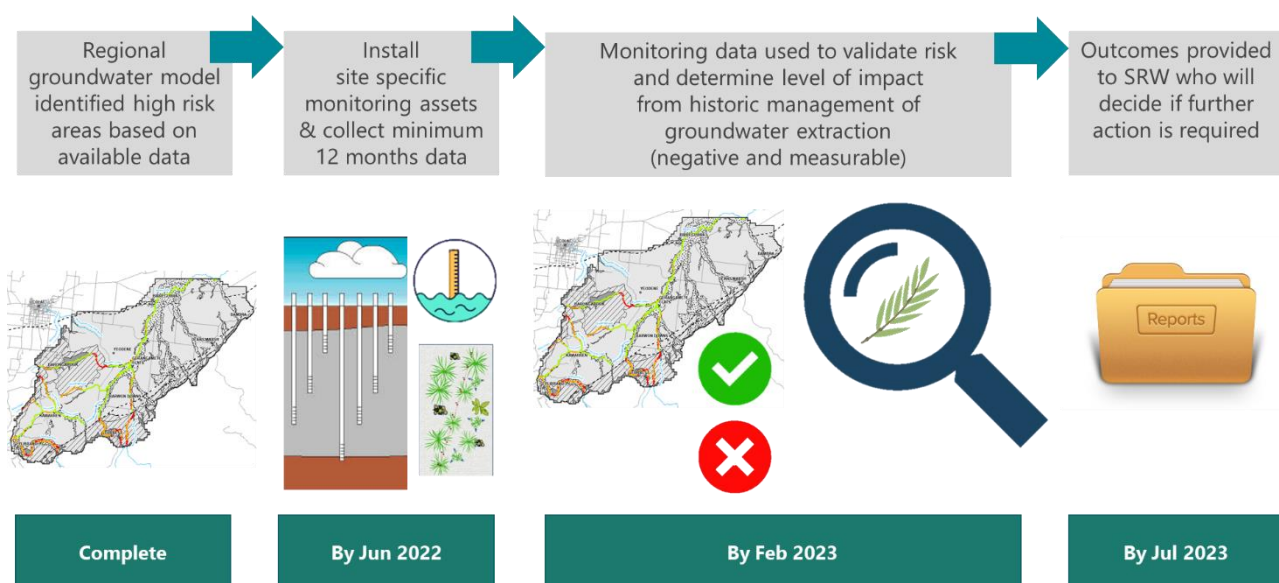
Action Items	Due
Completion of the Q2 2022/2023 Remediation Reference Group meeting	December 2022

Action Items	Due
Submit quarterly update to Southern Rural Water for the period 1 October to 31 December 2022 and publish to the Your Say web page	31 December 2022
Continue to collect data from new and existing monitoring assets	Ongoing
Continue to release supplementary flows, where required, to try to maintain a flow of at least 0.5 ML/day at the Yeodene stream gauge #233228	Ongoing
Undertake spring macro-invertebrate and water quality sampling in the Barwon River and Boundary Creek	The Spring 2022 monitoring event is due to be conducted in Q2 2022/23. As per previous events, the findings from this work will be published on the Your Say website located here: <a href="https://www.yoursay.barwonwater.vic.gov.au/boundary-creek">https://www.yoursay.barwonwater.vic.gov.au/boundary-creek</a>
Progress amendment of the REPP based on the current 'state of knowledge' and the adaptive management approach. This will include a review of the adopted remedial actions and the development of a risk-based remedial strategy that accounts for recent community and stakeholder feedback to help facilitate natural recovery processes.	Estimated completion 31 December 2022
Development of contingency measures	Estimated completion 30 June 2023
Completion of a Level 3 Ecological Risk Assessment to quantify the risks of the existing metal and acidity loads on Boundary Creek, Big Swamp and the Barwon River and to help inform the development of suitable triggers for the implementation of relevant contingency measures, if required	Estimated completion 30 June 2023
Completion of a paleoecology study of Big Swamp	Estimated completion 30 June 2023

## Surrounding Environment Investigation

### Surrounding Environment Status Update

Barwon Water continues to progress with the surrounding environment investigation in line with the process outlined in Figure 6. As reported in the 2021/22 Annual Report, while the majority of the additional monitoring assets have now been installed, the Barongarook Creek stream gauge and the reinstatement of the East Barwon stream gauge remain outstanding as we continue to negotiate relevant approvals and access.



**Figure 6 Process overview for the surrounding environment investigation**

It is noted that further investigation works have also commenced on the Loves Creek catchment in line with the high-level approach to conducting the surrounding environment investigation that was submitted to Southern Rural Water on 30 June 2022. In line with this approach, Barwon Water also plan to conduct a hydrogeological assessment on each of the potentially impacted areas that were identified for further investigation as part of the REPP.

The outcomes of this work will then be used to inform further technical and modelling work that will be conducted in 2023/24.

### Actions Completed on the Surrounding Environment Investigation

Table 3 outlines the actions completed for the Surrounding Environment Investigation between 1 July and 30 September 2022.

**Table 3 Surrounding Environment Investigation - Actions completed in Q1 2022/23 (1 July – 30 September 2022)**

Action Items	Comment / Link
Completion of the Q1 2022/23 Remediation Reference Group meeting	Completed on 21 September 2022
Submit Annual Report for the 2021-2022 reporting period.	Complete. Refer to the Your Say website located here: <a href="https://www.yoursay.barwonwater.vic.gov.au/bo-undary-creek">https://www.yoursay.barwonwater.vic.gov.au/bo-undary-creek</a>
Submit quarterly update for the period 1 July to 30 September 2022 to Southern Rural Water and publish to the Your Say web page	Complete – this report Refer to the Your Say website located here: <a href="https://www.yoursay.barwonwater.vic.gov.au/bo-undary-creek">https://www.yoursay.barwonwater.vic.gov.au/bo-undary-creek</a>

Action Items	Comment / Link
Continue collection of data from new monitoring assets for the surrounding environment investigation	Ongoing
Continue collation of community information regarding sites/issues of concern to inform the surrounding environment investigation	Ongoing
Subject to streamflows and site conditions, complete stream gauge installations for the Gellibrand River, Barongarook Creek and Barwon River downstream of the confluence with Boundary Creek	<p>The Gellibrand River and Barwon River stream gauges have since been completed.</p> <p>Barwon Water continues to explore options for access to enable installation of the Barongarook stream gauge.</p> <p>The Barongarook Creek stream gauge and the reinstatement of the East Barwon stream gauge remain outstanding as we continue to negotiate relevant approvals and access.</p>
Commence the assessment phase of the surrounding environment investigation	<p>A suitably qualified consultant was appointed to conduct the Loves Creek Hydrogeological Assessment in September 2022. This work is forecast to be completed by the end of June 2023.</p> <p>This will be used to frame the remaining Phase 1 investigations which will also commence in 2022-2023 with the aim of submitting the phase 1 works to Southern Rural Water in July 2023 in line with the next formal milestone.</p> <p>The outcomes of this work will be used to inform further technical and modelling work that will be conducted in 2023-2024. This will include the modelling of future climate scenarios.</p>

### Upcoming Actions associated with the Surrounding Environment Investigation

Table 4 outlines the upcoming actions associated with the Surrounding Environment Investigation between 1 October and 31 December 2022.

**Table 4 Surrounding Environment Investigation - Upcoming actions / milestones for the Q2 2022/2023 (1 October – 31 December 2022)**

Action Items	Due
Continue collection of data from new monitoring assets for the surrounding environment investigation	Ongoing
Continue collation of community information regarding sites/issues of concern to inform the surrounding environment investigation	Ongoing

Action Items	Due
Completion of the Q2 2022/2023 Remediation Reference Group meeting	December 2022
Submit quarterly update to Southern Rural Water for the period 1 October to 31 December 2022 and publish to the Your Say web page	31 December 2022

## Issues Register

Table 5 below outlines any issues that have been identified during implementation of the REPP that may impact future implementation activities.

**Table 5 Issues register**

Issue	Likelihood	Consequence	Comments
Coronavirus (COVID-19) pandemic limits/delays engagement with stakeholders and the community	Medium	Low	Remediation Reference Group meetings continue to be held online in lieu of face-to-face meetings, with e-mail updates and notes also provided In general, these meetings have been well attended with most members being able to attend online. Wherever health advice permits, we will attempt to engage in a face to face setting also.
Coronavirus (COVID-19) pandemic impacts availability of appropriate consultants or contractors to undertake required work for implementation of the REPP	Medium	Low	Barwon Water have experienced delays regarding the availability of consultants, contractors and materials to complete work for this project during the coronavirus (COVID-19) pandemic. With consultants continuing to be close to capacity this remains an ongoing risk and may lead to unexpected delays.
Community concerns regarding the potential impacts of stream gauge infrastructure on the Platypi	Low	Medium	The re-instatement of the East Barwon stream gauge remains on hold as we continue to negotiate relevant approvals and access due to concerns regarding potential impacts on the Platypi. Review of these concerns by Platypi experts suggest the likelihood of this occurring is extremely low. However, Barwon Water are looking to investigate this further.
Extended remediation timeframes	Medium	Low	While water level and quality improvements are evident, the hydro-geochemical modelling report indicated



Issue	Likelihood	Consequence	Comments
			<p>that even with active intervention, the timeframe for the removal of existing acidity loads could still be in the order of 35 years.</p> <p>Further work is currently being undertaken to determine the risks based on the current conditions. This will inform the revised remedial strategy for inclusion in the revised REPP.</p>

## Community Engagement

The eighth Remediation Reference Group (RRG) meeting was held via Zoom on 21 September 2022. This meeting was attended by Barwon Water and members of the Remediation Working Group, Southern Rural Water and Southern Rural Water's Community Leaders Group (CLG).

Topics discussed included:

- An overview of the journey and evolution of the REPP and the Boundary Creek and Big Swamp Remediation Plan
- A summary of the actions completed since the last meeting which was held on 8 June 2022
- An overview of the Boundary Creek and Big Swamp Remediation Plan and the adaptive management approach
- An overview of the status of remediation against the interim and revised interim success targets as presented in the Annual Report (Barwon Water, 2022c), including:
  - Recovery of the Lower Tertiary Aquifer
  - Big Swamp groundwater levels
  - Surface water flow in Boundary Creek
  - Encroachment of dry vegetation classes, and
  - Boundary Creek pH levels
- A summary of the feedback received from Southern Rural Water and the Independent Technical Review Panel (ITRP) on the Upstream Treatment Investigation
- An overview of the definitive ecological risk assessment of Boundary Creek, Big Swamp and the Barwon River that will be used to:
  - Inform the triggers for the implementation of contingency measures, and
  - Further refine the success targets, if required



- Barwon Water’s approach to the development of a risk-based contingency approach
- Barwon Water’s high-level approach to the surrounding environment investigation and the Hydrogeological Assessment of the Loves Creek catchment
- The next steps associated with:
  - The Remediation and Environmental Protection Plan
  - The development of Boundary Creek and Big Swamp remedial actions, and
  - The surrounding environment investigation

During this meeting an open forum was also held for group members to raise any topics that were not discussed above and for members to ask any questions that they may have. A high level summary of the feedback received during this meeting is outlined in the table below.

**Table 6 Community feedback**

Community Feedback Received	Response
A group member queried the reference to Permeable Reactive Barriers (PRBs) and questioned the nature and intent of these	<p>A Permeable Reactive Barrier (PRB) is a trench filled with reactive or adsorptive material that is designed to intercept and treat groundwater.</p> <p>Barwon Water previously considered the use of Permeable Reactive Barriers in the remediation options assessment that was conducted in 2019. However, these were not considered feasible due to the upper aquifer system accounting for only a small proportion of the total flow in Boundary Creek.</p> <p>Given the recovery of groundwater levels within the upper aquifer system, Barwon Water undertook a review of this approach in July 2022 to help inform the revised REPP and risk-based contingency approach. However, the preliminary findings indicate that the effectiveness of permeable reactive barriers remains limited despite a slight increase in the proportion of groundwater contribution from the upper aquifer system. The outcomes of this work will be shared during the November RRG meeting and used to inform the revised REPP.</p>
The group expressed an interest in understanding how much this project has cost to date and whether future costs have been factored into the Price Submission	<p>As part of Barwon Water’s 2023-2028 Price Submission, Barwon Water have set aside funds for both actions outlined in the REPP and decommissioning of the Barwon Downs extraction bores.</p> <p>During this meeting Barwon Water also committed to sharing an outline of costs to date with the group.</p>
A group member outlined that it was good to see the community engagement and suggested that Barwon Water could hold a community forum to discuss the	Barwon Water agreed that this would be a valuable exercise and will look into the potential timing of this in more detail

Community Feedback Received	Response
Loves Creek works with the broader community	
A group member queried if we have a handle on where the LTA outcrops in comparison with Big Swamp	<p>In April 2021 Barwon Water installed bore BSBH13LTA which is screened within the Lower Tertiary Aquifer in the western portion of the swamp, adjacent to BSBH15 (that is screened in the upper aquifer system). The borelogs from BSBH13LTA indicated the alluvial deposits were directly underlain by sediments associated with the Demons Bluff Group and/or the Narrawaturk Marl, with the Lower Tertiary Aquifer being encountered around 16 m below ground. Contrary to previous uncertainty, this indicates that the regional confining layer that limits the connection between the Lower Tertiary Aquifer and the upper aquifer system extends beyond the western portion of Big Swamp.</p> <p>The majority of bores installed within the swamp screen the upper aquifer system, with the exception of BSTB1B, which is screened in the Narrawaturk Marl (the regional confining layer) and BSTB1C and BSBH13LTA which is screened in the Lower Tertiary Aquifer.</p>
A group member queried reference to draining of the swamp and climate related influences in relation to groundwater pumping	<p>Previous investigations and modelling work have found that Barwon Water's management of groundwater pumping activities at the Barwon Downs borefield were the primary cause of the reduction in baseflow into Boundary Creek.</p> <p>Reference to climate related impacts and various changes in land use confound these impacts and are extremely important in developing what successful remediation looks like – i.e. what actions can be practicably undertaken to address the impacts that relate to Barwon Water's groundwater pumping activities.</p> <p>The potential for the fire trench to dry the swamp was reviewed as part of the Upstream Treatment Investigation (Barwon Water, 2022a). The findings of this work suggested that the fire trench would not contribute to significant draining of the swamp. However, Reach 3 of Boundary Creek was historically modified into a drainage channel. This again has implications as to what successful remediation may look like.</p>
The group queried the status of the automated flow release valve at the private on-stream dam	<p>Barwon Water's Technical Services team are currently looking into the installation of an automated flow release valve to ensure the intent of the supplementary flows is realised. Works undertaken to date have identified that upgrades are required to the upstream and downstream stream gauges before these can be used to automate releases. As such, Barwon Water are currently working towards completing these upgrades.</p>

Community Feedback Received	Response
	<p>It is noted that the installation of the automated flow release valve will require approval from the dam's owner, as well as careful consideration of regulatory requirements for operation of the dam.</p>
<p>The group also queried the regulation of the passing flows from the dam and who is managing this?</p>	<p>As per the dam licence, Southern Rural Water are the regulators of the dam. In agreement with the licence holder of the dam, Barwon Water's operation team began manual operation of the release valve in 2018 to ensure supplementary flows were released to the lower reaches of Boundary Creek. This is generally adjusted weekly, where required, noting that Barwon Water only manage releases when supplementary flows are being released. Outside of this the licence holder of the dam is responsible for the management of the dams passing flow conditions.</p> <p>Barwon Water continue to work with Southern Rural Water and the licence holder of the dam to ensure Barwon Water's supplementary flows are passed through the dam.</p>
<p>A group member expressed an interest in understanding the change in species within the swamp over time</p>	<p>The following aquatic species have previously been reported in select reaches of Boundary Creek:</p> <ul style="list-style-type: none"> <li>• Freshwater Shrimp</li> <li>• Land Yabby</li> <li>• Short-finned Eel</li> <li>• Mountain Galaxias</li> <li>• Southern Pygmy Perch</li> <li>• Redfin Perch</li> </ul> <p>The Victorian Biodiversity Atlas (DELWP, 2018) also indicates that the Southern Victorian Spiny Crayfish may be present.</p> <p>In addition to this, long term residents also indicated that Platypus were historically supported in a number of places in Boundary Creek.</p> <p>Further details regarding the current terrestrial ecology and aquatic macroinvertebrate community can be found in the most recent monitoring reports that can be found on the Your Say website located here: <a href="https://www.yoursay.barwonwater.vic.gov.au/boundary-creek">https://www.yoursay.barwonwater.vic.gov.au/boundary-creek</a></p>

In addition to the quarterly Remediation Reference Group meetings, Barwon Water also attended Southern Rural Water's Community Leaders Group (CLG) on 28 August 2022 to discuss the findings of the Upstream Treatment Investigation.

## Success Targets

Following completion of the REPP, the interim success targets that were presented in the REPP underwent a review in 2021 to account for any additional data obtained since development of the REPP. The revised success targets have not yet been accepted by SRW and are likely to be finalised as part of the upcoming REPP updates that are required to address feedback received from Southern Rural Water and account for the current 'state of knowledge' given the technical works completed since the approval of the REPP.

An update on progress against the relevant success targets will be provided in the Annual Report along with the supporting monitoring data.

## Technical Reports and Investigations

Relevant technical and investigation reports that have been completed for Boundary Creek, Big Swamp and as part of the Surrounding Environment Investigation can be accessed from the dedicated Boundary Creek Remediation webpage via the following link:

<https://www.yoursay.barwonwater.vic.gov.au/boundary-creek>

## Contingency Measures

Table 7 outlines the contingency measures identified during the design and implementation of the REPP. It is noted that no contingency measures have been implemented to date.

**Table 7 Contingency Measures Identified**

Contingency Measure	Status
Downstream treatment – preferred method being a sodium hydroxide (NaOH) dosing plant	<p>The design of the downstream contingency measure was submitted to Southern Rural Water on 30 July 2021.</p> <p>Following submission Barwon Water received feedback from Southern Rural Water and the ITRP requiring further information before this could be progressed any further and requested investigation of a novel upstream treatment systems. Given the commencement of the upstream treatment investigation, the downstream treatment option was put on hold until the feasibility of the upstream treatment system could be ascertained.</p> <p>Following completion of the Upstream Treatment Investigation in June 2022, Barwon</p>

Contingency Measure	Status
	<p>Water will progress responding to Southern Rural Water and ITRP feedback on the downstream treatment option with the aim to get a downstream treatment option approved by Southern Rural Water so that this can be implemented, should this be required in 2023-2024.</p>
<p>Upstream treatment – using caustic magnesia (MgO)</p>	<p>Barwon Water have since ruled out the use of the proposed semi-passive caustic magnesia treatment system. This decision was supported by Southern Rural Water and the Independent Technical Review Panel (ITRP) in their response received on 29 August 2022 and is based on a range of technical, social, environmental and economic factors including:</p> <ul style="list-style-type: none"> <li>• The inability of the proposed system to meet the intended objectives</li> <li>• The potential for further harm to the environment and ecological values to occur</li> <li>• The novelty and untested nature of such a system in a similar environment</li> <li>• The cost and time that would be required to conduct sufficient laboratory testing and trials to identify and validate a suitable reagent and design</li> <li>• The improvements in conditions (e.g. water levels, quality and ecological condition)</li> <li>• Significant stakeholder feedback and concern relating to: <ul style="list-style-type: none"> <li>• Potential risks</li> <li>• The inclusion of the 'do no harm' principle</li> <li>• Minimising engineering interventions, and</li> <li>• Preference to facilitate natural recovery processes</li> </ul> </li> </ul>

# REPP Amendments

Table 8 outlines any recent and upcoming REPP amendments current as of the time of this report.

**Table 8 Required Amendments to the REPP**

No.	REPP Amendments	Status
1	Feedback received from SRW and the ITRP on the proposed amendments	<p>Barwon Water submitted changes to Southern Rural Water on 30 September 2020. Southern Rural Water has provided feedback, which was discussed on 10 March 2021. Barwon Water subsequently submitted the revised updates including any which were contingent on detailed design on 31 July 2021.</p> <p>Barwon Water and Southern Rural Water are in ongoing discussions regarding the proposed amendments to address any outstanding feedback prior to making any formal updates. This will include additional revisions to account for the current 'state of knowledge' and community sentiment to ensure the REPP remains fit for purpose.</p>
2	Implementation of revised success targets	<p>ITRP feedback has been received on the revised success targets. Barwon Water will consider this feedback in finalising the updated success targets as part of the REPP amendments.</p>
3	Revision and integration of remediation actions based on feedback received from the RRG	<p>Barwon Water are currently in the process of updating the REPP. Changes will be discussed with the RRG prior to submitting the revised REPP to Southern Rural Water.</p>

# Progress Report

Table 9 outlines the actions that have been completed, are currently in progress, or are yet to commence as part of implementation of the REPP through to the end of the 2022/23 monitoring and reporting period. It is important to note that additional tasks may be added as they are identified during implementation of the REPP.

**Table 9 Action Register**

#	Activity	Due Date	Status	Health Indicator	Comments
1.0	Meeting with SRW to be held at the Barwon Water office to develop work plan towards confirming priority actions relating to feedback provided.	30-Apr-20	Complete	Complete	Complete
2.0	Complete autumn macro-invertebrates survey:	30-Jun-20	Complete	Complete	Report now complete and is now uploaded on website
3.0	Complete soil incubation testing	31-May-20	Complete	Complete	Report has been finalised and is now uploaded on website
4.0	Submit Quarterly Update to SRW and publish to website	30-Jun-20	Complete	Complete	Southern Rural Water review of template complete. Quarterly Update uploaded to website on 30th June.
5.0	Scoping of SW-GW technical work packages required to inform detailed design and address feedback register	30-Nov-20	Complete	Complete	Complete

#	Activity	Due Date	Status	Health Indicator	Comments
6.0	Complete installation of additional monitoring assets for the following sites identified as 'high risk' in the Surrounding Environment Investigation	30-Jun-22	In progress	At Risk	All additional groundwater monitoring locations have now been completed. 3 former SOBN bores were adopted along the Gellibrand River instead of the 2 new bores due to site access issues. 4 of 5 Stream Gauges have now been installed. The Barongarook Creek stream gauge and the reinstatement of the East Barwon stream gauge remain outstanding as we continue to negotiate relevant approvals and access.
7.0	Conclusion of monitoring period enabling the capture of a full seasonal cycle of data to inform updates to the groundwater-surface water model and geochemical model.	31-Jul-20	Complete	Complete	1 year of monitoring completed. Monitoring of groundwater levels, stream flows and water quality continues in Big Swamp and Boundary Creek.
8.0	REPP Feedback Work plan - Submission and Acceptance	31-Jul-20	Complete	Complete	Completed
9.0	Governance Framework - Submission and Acceptance	31-Jul-20	Complete	Complete	Completed
10.0	Barwon Water Communications and Engagement Plan	Ongoing	In progress	On track	Remediation Reference Group meetings continue to be held quarterly. Two community information session were also held in May 2022. Plan continues to be adapted based on outcomes and outputs of project.
11.0	Submit updated REPP to capture the work plan for addressing the feedback register. SRW to accept the updated REPP.	TBA	In progress	On track	Barwon Water submitted changes to Southern Rural Water on 30 September 2020. Southern Rural Water has provided



#	Activity	Due Date	Status	Health Indicator	Comments
					<p>feedback, which was discussed on 10 March 2021.</p> <p>Barwon Water subsequently submitted the revised updates including any which were contingent on detailed design on 31 July 2021. Barwon Water and Southern Rural Water are in ongoing discussions regarding the proposed amendments to address any outstanding feedback prior to making any formal updates. This will include additional revisions to account for the current 'state of knowledge' and community sentiment to ensure the REPP remains fit for purpose.</p>
12.0	Submit annual report to SRW and publish to Your Say website	30-Sep-20	Complete	Complete	Completed
13.0	Remediation Reference Group Meeting	2-Dec-20	Complete	Complete	Completed
14.0	Establish vegetation monitoring for Boundary Creek and Big Swamp Remediation Plan	31-Dec-20	Complete	Complete	Completed
15.0	Update groundwater-surface water model	31-Dec-20	Complete	Complete	Final report uploaded to website
16.0	Submit quarterly report to SRW and publish to Your Say website	31-Dec-20	Complete	Complete	Completed
17.0	Remediation Reference Group Meeting	17-Mar-21	Complete	Complete	Completed
18.0	Submit quarterly report to SRW and publish to Your Say website	31-Mar-21	Complete	Complete	Completed
19.0	Remediation Reference Group Meeting	23-Jun-21	Complete	Complete	Completed
20.0	Submit quarterly report to SRW and publish to Your Say website	30-Jun-21	Complete	Complete	Completed and uploaded to website

#	Activity	Due Date	Status	Health Indicator	Comments
21.0	Submission of detailed design of the hydraulic barriers outlining proposed controls or actions and any revisions to success measures/targets.	1-Jul-21	Complete	Complete	Complete. Submitted to Southern Rural Water on 1 July 2021
22.0	Update Hydro geochemical model	31-Jul-21	Complete	Complete	Completed and uploaded to website
23.0	Complete detailed design of contingency measure and feasibility assessment for up-stream for new upstream treatment method	31-Jul-21	Complete	Complete	Barwon Water have since ruled out the use of the proposed semi-passive caustic magnesia treatment system. This decision was supported by Southern Rural Water and the Independent Technical Review Panel (ITRP) in their response received on 29 August 2022. Following completion of the Upstream Treatment Investigation in June 2022, Barwon Water will progress responding to Southern Rural Water and ITRP feedback on the downstream treatment option that was submitted to Southern Rural Water on 30 July 2021, with the aim to get a downstream treatment option approved by Southern Rural Water so that this can be implemented, should this be required in 2023-2024.
24.0	Remediation Reference Group Meeting	8-Sep-21	Complete	Complete	Completed
25.0	Submit annual report to SRW and publish to Your Say website	30-Sep-21	Complete	Complete	Completed and uploaded to website
26.0	Remediation Reference Group Meeting	9-Dec-21	Complete	Complete	Completed
27.0	Submit quarterly report to SRW and publish to Your Say website	31-Dec-21	Complete	Complete	Completed and uploaded to website

#	Activity	Due Date	Status	Health Indicator	Comments
28.0	Completion of upstream treatment investigation and development of Trial Plan	14-Jan-22	Complete	Complete	Complete. Submitted to SRW on 14 Jan 2022. This will also be provided to the RRG for input based on feedback from the RRG meeting which was held on 9 December 2021. Barwon Water have since ruled out the use of the proposed semi-passive caustic magnesia treatment system. This decision was supported by Southern Rural Water and the Independent Technical Review Panel (ITRP) in their response received on 29 August 2022.
29.0	Remediation Reference Group Meeting	21-Mar-21	Complete	Complete	Completed
30.0	Submit quarterly report to SRW and publish to Your Say website	31-Mar-22	Complete	Complete	Completed and uploaded to website
31.0	Hosted community information session in Winchelsea	10-May-22	Complete	Complete	Completed
32.0	Hosted community information session in Colac	17-May-22	Complete	Complete	Completed
33.0	Remediation Reference Group Meeting	8-Jun-22	Complete	Complete	Completed
34.0	If trial plan is approved undertake upstream treatment trial	30-Jun-22	In progress	Complete	Barwon Water have since ruled out the use of the proposed semi-passive caustic magnesia treatment system. This decision was supported by Southern Rural Water and the Independent Technical Review Panel (ITRP) in their response received on 29 August 2022.
35.0	Decision on implementation of full scale upstream treatment, hydraulic barriers and downstream treatment	30-Jun-22	In progress	Complete	
36.0	Submit quarterly report to SRW and publish to Your Say website	30-Jun-22	Complete	Complete	Completed and uploaded to website

#	Activity	Due Date	Status	Health Indicator	Comments
37.0	Remediation Reference Group Meeting	21-Sep-22	Complete	Complete	Completed
38.0	Submit quarterly report to SRW and publish to Your Say website	30-Sep-22	Complete	Complete	Completed and uploaded to website

# References

Barwon Water (2019, as amended 2020), Boundary Creek, Big Swamp and Surrounding Environment – Remediation and Environmental Protection Plan

Barwon Water (2021), Hydro-Geochemical Modelling – Design of Contingency Measure

Barwon Water (2022a), Outcomes and Implications of the Upstream Treatment Investigation – Boundary Creek and Big Swamp Contingency Planning

Barwon Water (2022b), Barwon Water’s high-level approach to the surrounding environment investigation

Barwon Water (2022c), 2021-2022 Annual Report – Boundary Creek, Big Swamp and surrounding environment Remediation and Environmental Protection Plan (REPP)