

Ongoing dry conditions

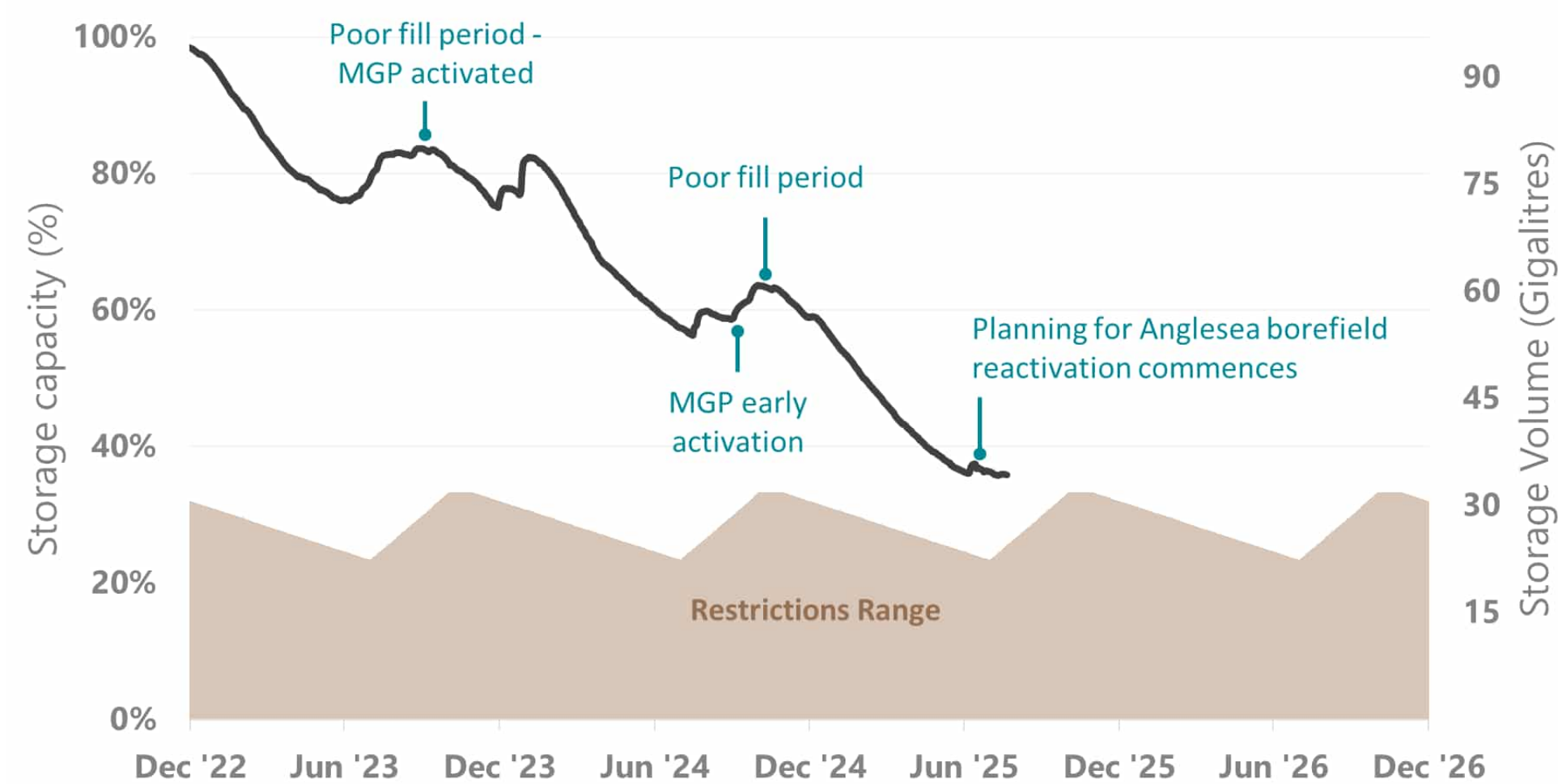
The challenge of ongoing dry conditions

Victoria recently recorded its fourth warmest April on record. And it hasn't just been a dry start to 2025. Autumn and winter rainfall, which usually replenishes our storages, was 20% below average in both 2023 and 2024. This means the region's water storages have continued to decline.

And while we had some heavy rainfall in early June, we need significantly more for storages to recover.

Currently storage levels in the Geelong storage system are sitting around 36%, which is 21% lower than last year.

Wurdee Boluc Reservoir, which supplies Anglesea, Aireys Inlet, Torquay, the Bellarine Peninsula and Geelong, are sitting around 34%.



The Anglesea borefield

Barwon Water's Anglesea borefield is one of a number of water sources that can supplement the existing Greater Geelong water supply system when storages are low. Our diverse water supply mix is part of a balanced approach to managing the region's water resources and providing greater water security.

Long-term water outlook

Long-term climate and population trends indicate that upgrades to our water supply network will be required in the future to ensure we can meet the growing demands within our region.

To secure water for our future, we are finding smarter ways to use the water we already have and are gradually shifting our reliance to more climate-resilient water sources, such as recycled and desalinated water.

As more and more climate resilient water is introduced over time, we expect that our reliance on surface water and groundwater will lessen.

Permanent water saving rules

We know the community recognises that water is a precious resource that shouldn't be wasted.

To support this, we have been getting out and about making sure you know about storage levels and how you can save water, by sharing information about permanent water saving rules (PWSR) on buses, on the radio, on your water bills, via e-newsletters and on social media.

These are simple, common-sense rules to reduce demand and make sure we all use water wisely.

They include how and when we can water gardens and lawns, how you can clean paved areas and hard surfaces, as well as recirculating water in fountains and water features.

For more information on our PWSR please go to www.barwonwater.vic.gov.au or use the QR code below.



How we're responding to the challenge of dry conditions

As the climate is becoming hotter and more extreme, we have a diverse range of supply sources to make sure we can meet our region's needs.

Maintaining this diverse supply mix is part of our balanced approach to providing greater water security to the region.

This includes upgrading the Melbourne to Geelong Pipeline (MGP) to expand the reach of the pipeline and increase its supply capacity before next summer.

The MGP upgrade will provide access to an additional 6,000 million litres per year, helping to meet the growing demand across Geelong, Bellarine and the Surf Coast.

In anticipation of ongoing dry conditions and the upgrade works, we brought the pipeline on early, at maximum rates to reduce the drawdown of our storages. We have briefly taken the pipeline offline to complete the upgrade works. It will be back online again before summer.

After considering a range of factors – including storage levels, climate forecasts and the condition of our catchments – we've also decided to reactivate the Anglesea borefield.

Water saving initiatives

As part of our *Urban Water Strategy: Water for our Future*, we have a 50-year outlook for all of our region's water systems, which will see us gradually shift to more climate resilient sources to ensure that there is enough water to support the prosperity and liveability of our region.

Maximising recycled water

Across the region, we're increasing the use of recycled water for non-drinking purposes to support commercial use, agricultural production, tourism and regional prosperity. Not only does recycled water reduce demand on our water supplies, but it's also a renewable, climate resilient resource which is always in supply.

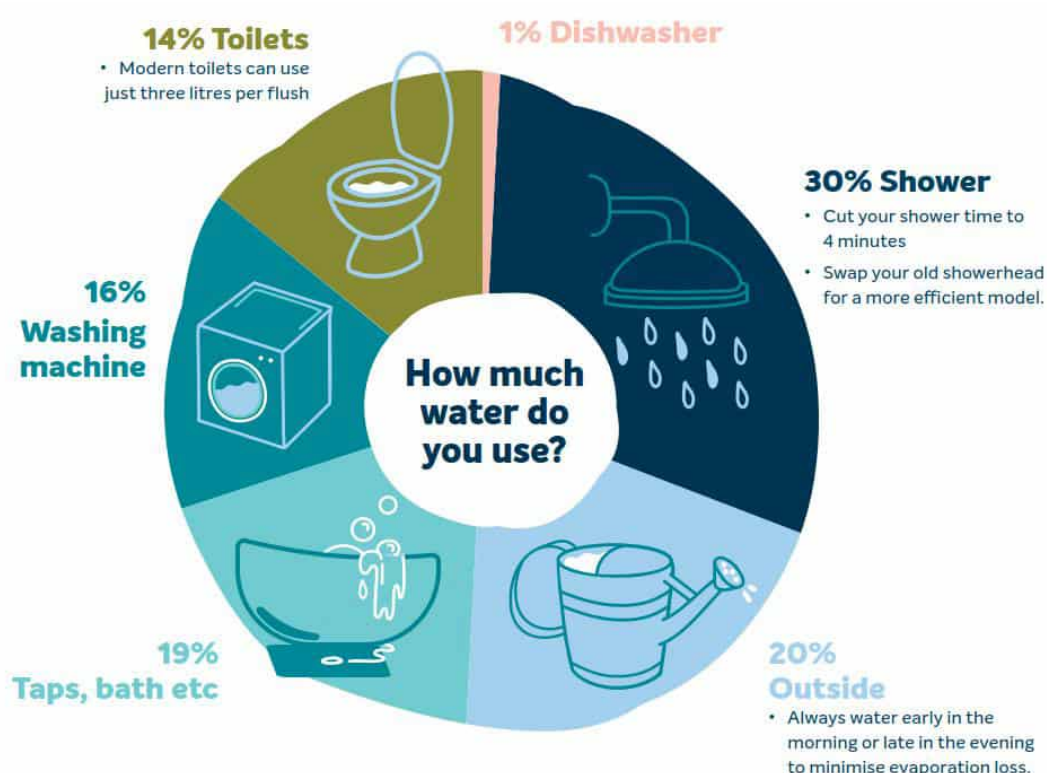
Integrated water management plans

We're working with local councils to progress localised integrated water management opportunities.

This includes implementing an integrated water management plan for the new Northern and Western Geelong Growth Areas, including supply of Class A recycled water.



Purple recycled water meter and tap.



Saving water together

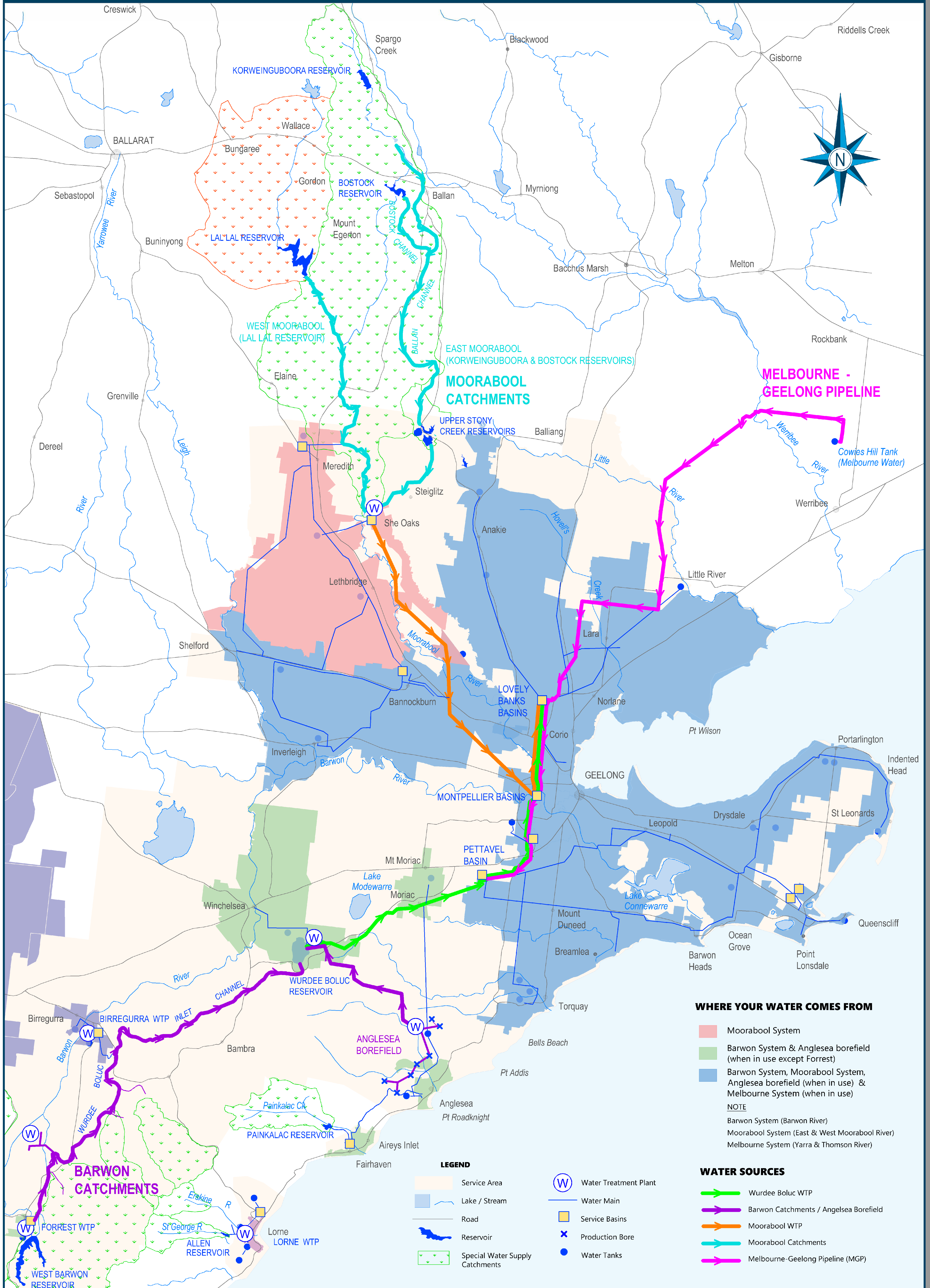
By engaging with our community through water saving programs, education, tips and advice, we are helping our customers understand that being more efficient and sustainable with water will lower water and energy bills and help the environment too.

You can learn more about saving water at:

www.barwonwater.vic.gov.au/water-and-waste/saving-water



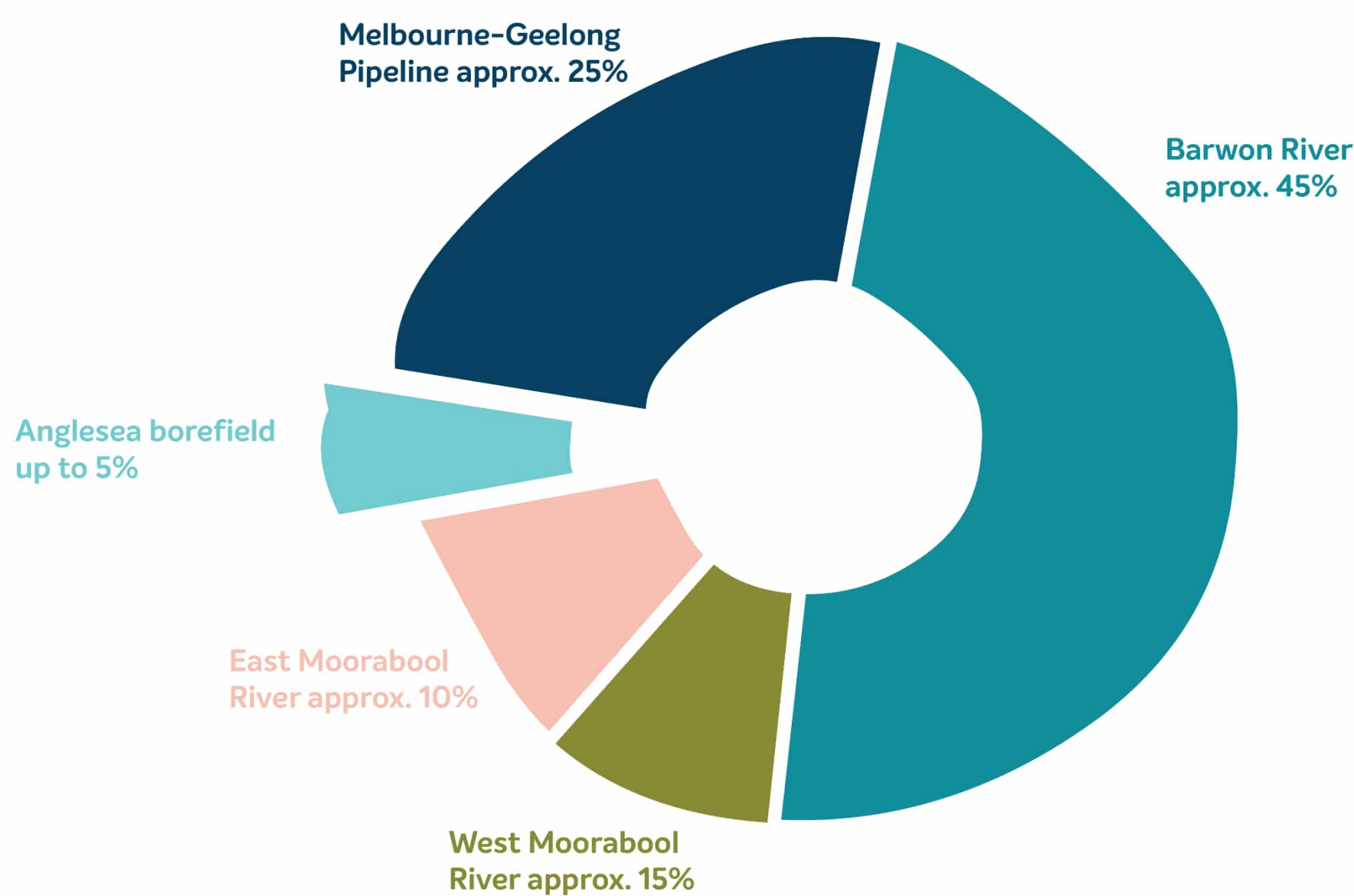
GEELONG & DISTRICT WATER SUPPLY SYSTEM PROPOSED FUTURE VISION



Anglesea borefield - background

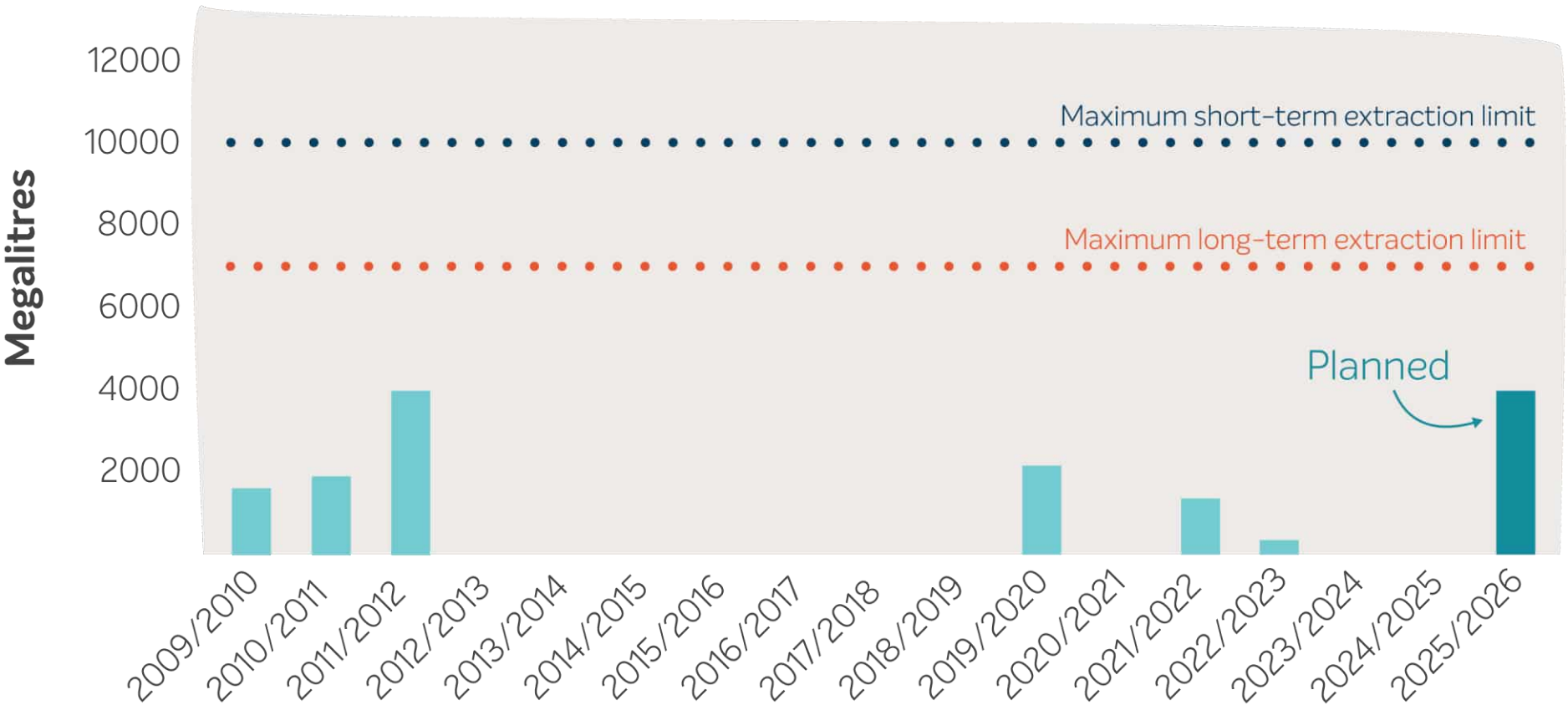
Barwon Water’s Anglesea borefield was constructed between 2007 and 2010 in response to the ‘millennium drought’.

It’s one of a number of water sources that can supplement the existing Greater Geelong water supply system when storages are low.



Greater Geelong’s water supply sources

Despite only being used a handful of times, the Anglesea borefield remains a critical source of water.

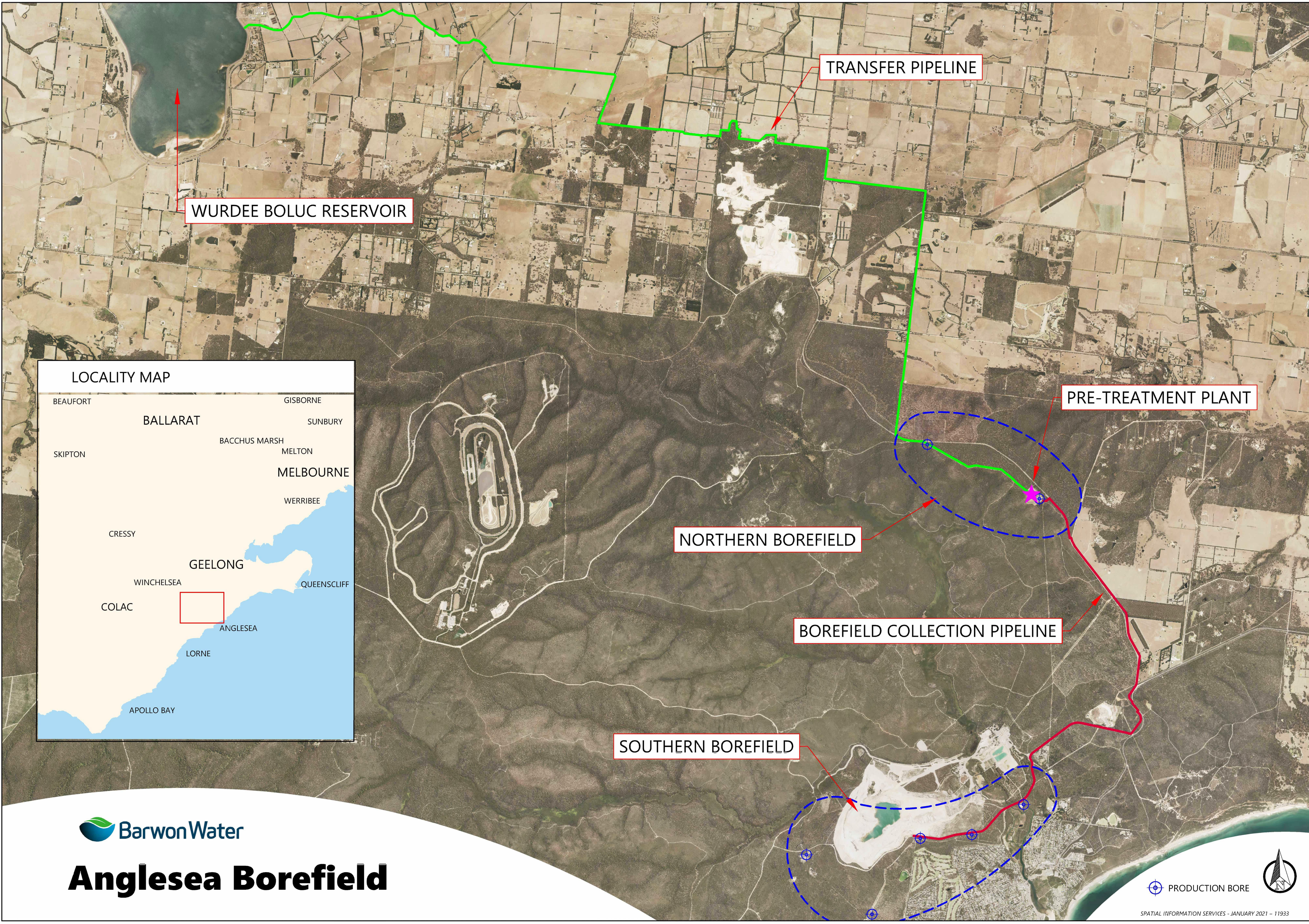


Anglesea Borefield Groundwater Extraction Volumes

The borefield consists of seven production bores across two sites that tap into the Lower Eastern View Formation (LEVF) aquifer – a vast underground aquifer between 350 and 620 metres below the ground, stretching from the Otway foothills to the Southern Ocean.

Raw groundwater is high in dissolved minerals such as iron and manganese and is hot due to the pressure and depth underground. A pre-treatment plant cools the groundwater and removes dissolved minerals.

When in operation, the pre-treated groundwater travels 20 kilometres to the Wurdee Boluc Reservoir, south of Winchelsea, to be mixed with surface water from the Otway Ranges. Water from the Wurdee Boluc reservoir is filtered, chlorinated and fluoridated, before being piped to smaller storage basins and tanks, and then delivered to homes and businesses in Anglesea, Aireys Inlet, Torquay, the Bellarine Peninsula and suburbs in the greater Geelong region.



WURDEE BOLUC RESERVOIR

TRANSFER PIPELINE

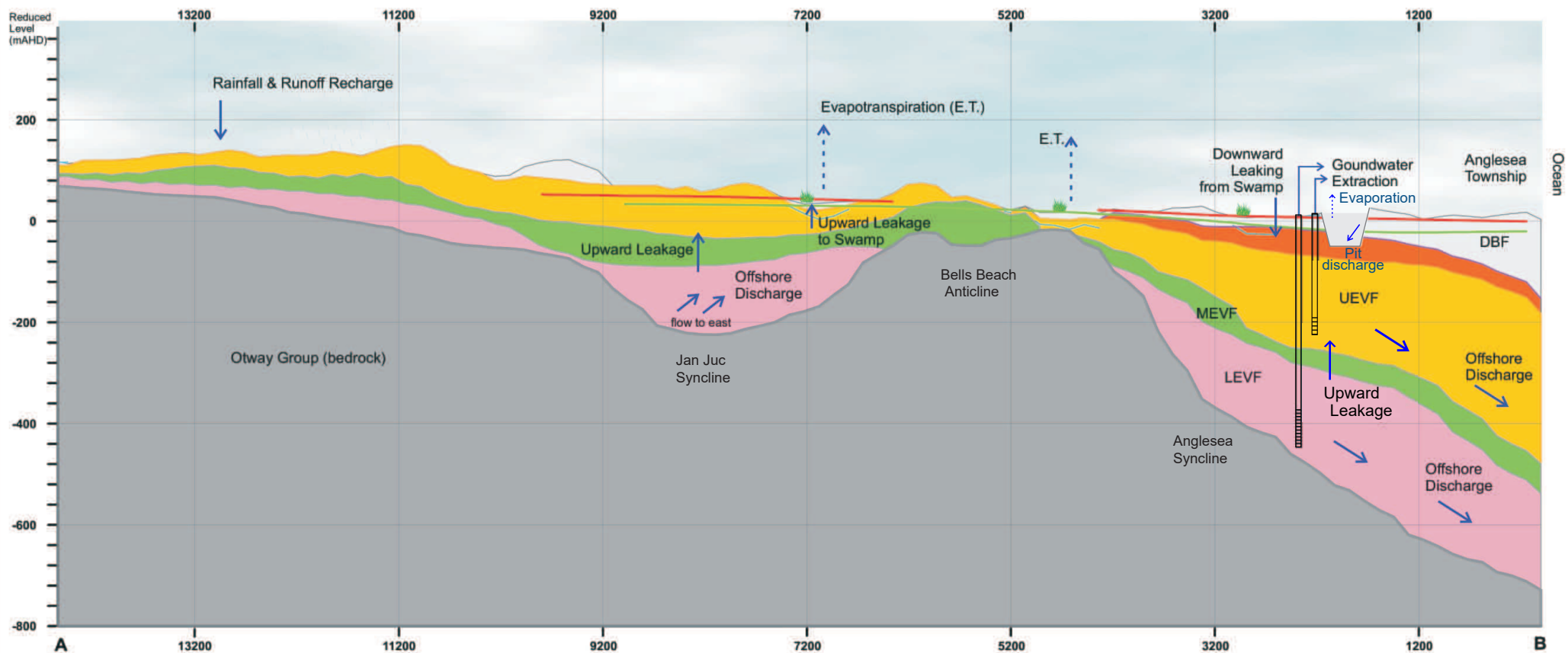
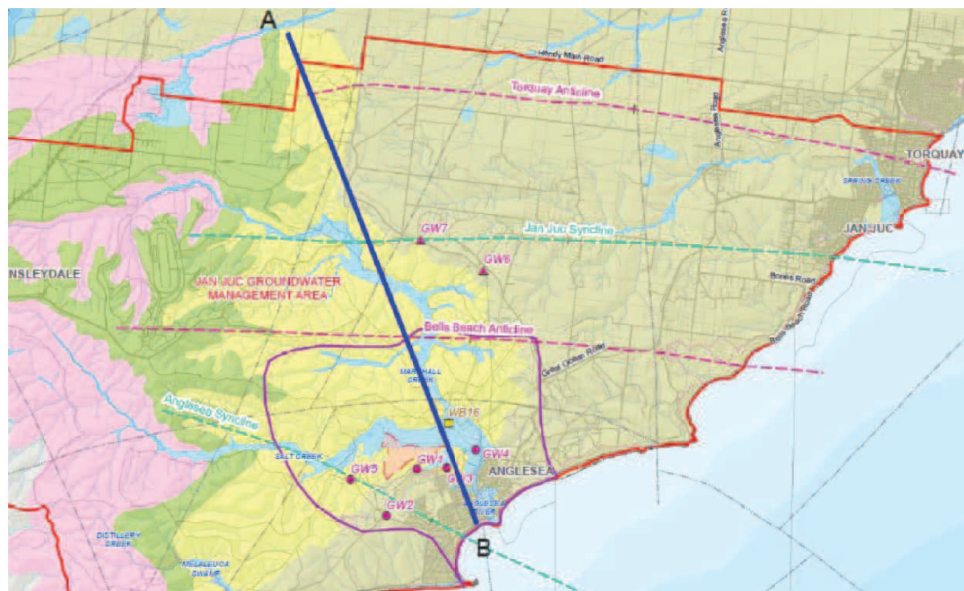
PRE-TREATMENT PLANT

NORTHERN BOREFIELD

BOREFIELD COLLECTION PIPELINE

SOUTHERN BOREFIELD





- Demons Bluff Formation (DBF)
- Upper Eastern View - Coal (Coal)
- Upper Eastern View - Sand (UEVF)
- Middle Eastern View (MEVF)
- Lower Eastern View (LEVF)
- Otway Group (bedrock)
- Groundwater - Head - UEVF
- Groundwater - Head - LEVF
- Alluvial floor

Paper Size ISO A3

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



Barwon Water
Angelsea Groundwater Model Update

Hydrogeological Model:
Angelsea River (North-South)

Project No. 12542999
Revision No. A
Date 22/03/2022

FIGURE 3.22

Print date: 23 Mar 2022 - 10:22

Date source: Created by north

Bulk entitlement (BE)

Overview

Our access to groundwater from the Anglesea borefield is governed by a bulk entitlement, issued by the Victorian Government. This was issued by the Victorian Government in 2009 and continues to be reviewed and updated in line with the conditions stipulated in the bulk entitlement.

The bulk entitlement stipulates the **maximum amount** of groundwater we're able to extract from the Anglesea borefield. Under the bulk entitlement Barwon Water is entitled to extract:

- 40 ML per day
- 10,000 ML in any year
- 35,000 ML in any 5-year period



Anglesea borefield pre-treatment plant

Preventing Environmental Impacts

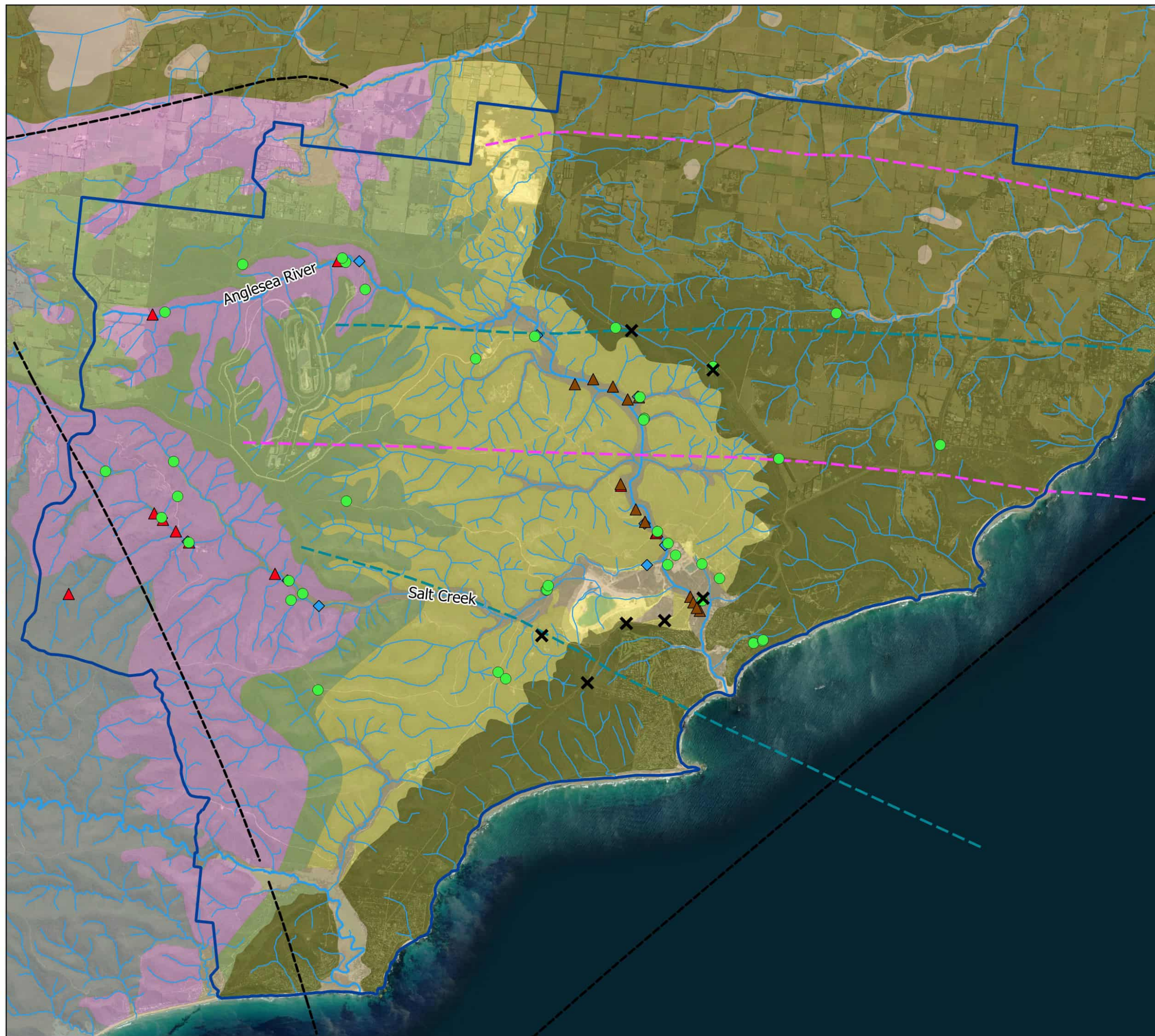
In addition to the maximum take limits outlined above, the bulk entitlement also includes conditions to help prevent any groundwater pumping related impacts from occurring. These include:

- **trigger levels** – that are designed to trigger the reduction or cessation of groundwater pumping activities to prevent any potential impacts from being realised
- **a comprehensive Monitoring and Assessment Program** – to monitor for any changes in the environmental values and health of groundwater dependent ecosystem and continue to build our understanding of the long-term sustainability of the groundwater resources into the future
- **a Program of Reviews** – that are undertaken within 5 years of groundwater extraction recommencing to:
 - identify the potential impacts of future groundwater pumping activities
 - assess the effectiveness of the current management arrangements
 - identify any improvements to resource management arrangements.

When combined, these controls help provide an adaptive management mechanism that focuses on protecting the environmental values and health of groundwater dependent ecosystems as opposed to a fixed take limit.



Spring monitoring 2019



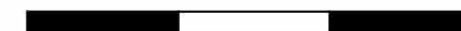
- Legend**
- Jan Juc Groundwater Management Area
 - Monitoring Locations**
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 - Terrestrial Ecology
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 - Extraction Bore
 - Geological Structures**
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 - Syncline
 - Geological Fault
 - Watercourse**
 - Moderate
 - Minor
 - Surface Geology**
 - Alluvial Swamp Aquifer
 - Demons Bluff and Other Overlying Units
 - Upper Eastern View Formation
 - Middle Eastern View Formation
 - Lower Eastern View Formation
 - Bedrock



N



0 1,500 3,000 4,500 m



1:75,000

Bulk Entitlement Review

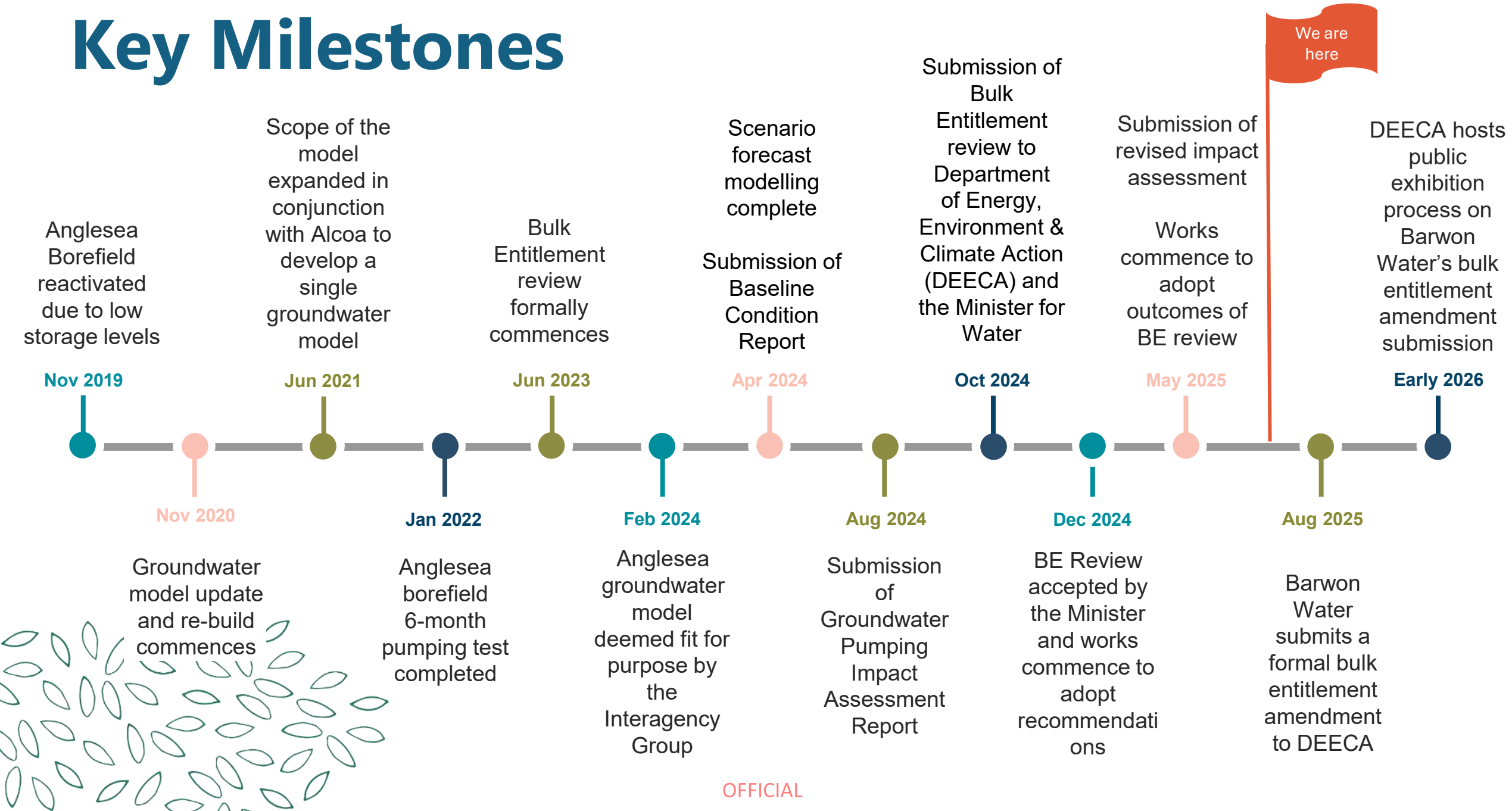
In October 2024 Barwon Water submitted a bulk entitlement review to the Minister for Water. This was underpinned by the following scopes of work:

- **Anglesea groundwater model update** – that used the available groundwater, surface water and climate data to develop a computer-based model that can be used to examine how groundwater systems respond to different factors.
- **scenario forecast modelling** – that forecast what’s likely to occur in response to different climate and pumping scenarios without any triggers and controls
- **baseline condition report** – that compiled and consolidated the groundwater, surface water, land subsidence, acid sulfate soils and aquatic and terrestrial ecology monitoring data collected as part of the Monitoring and Assessment Program (MAP) to identify the potential environmental receptors and their relationship with groundwater systems
- **groundwater pumping impact assessment** – that identified the potential environmental impacts associated with operating the Anglesea borefield without any triggers and controls (i.e. to help assess the effectiveness of the current management arrangements and identify potential improvements).

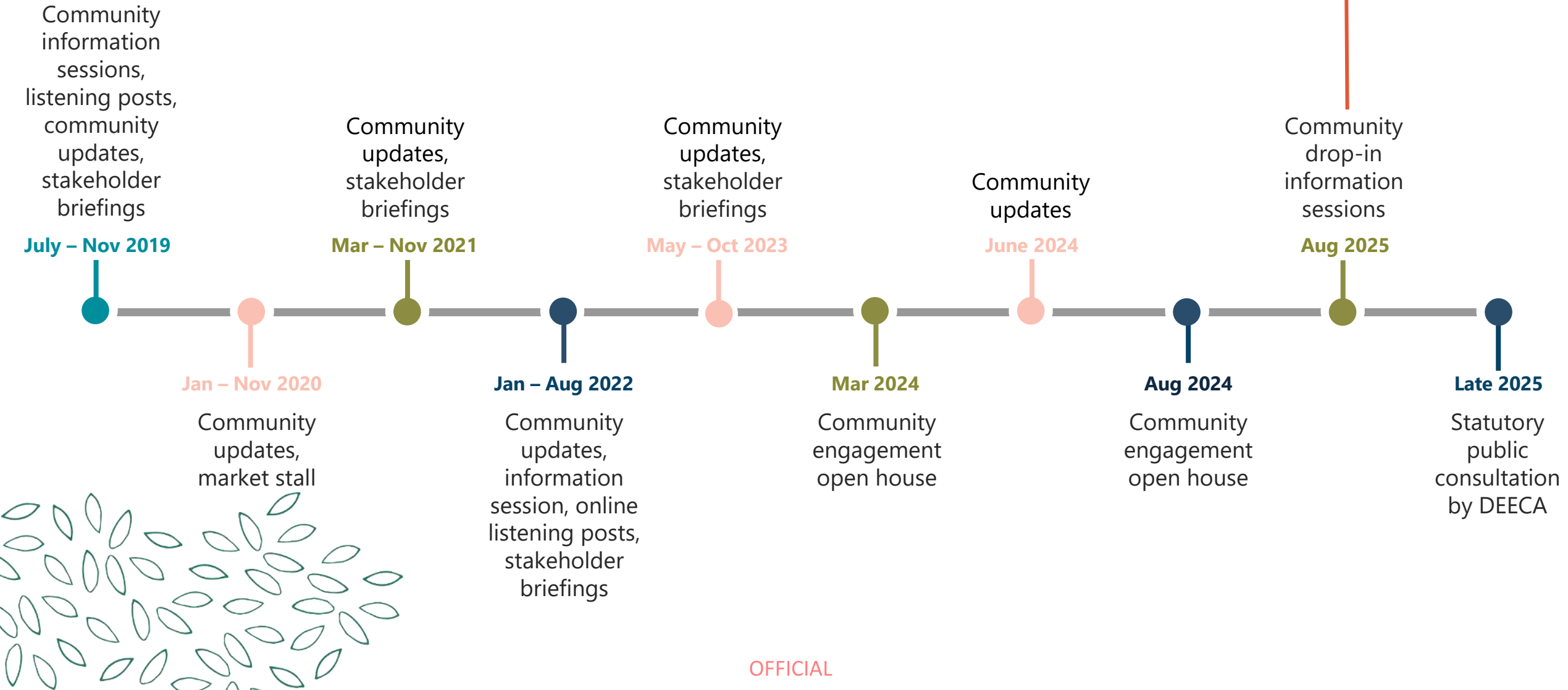
Each of these were subject to a rigorous regulatory review process including an independent Technical Review Panel comprising of:

- Professor Wendy Timms (geology, hydrogeology and engineering specialist)
- Lance Lloyd (ecology specialist)
- Hugh Middlemis (groundwater modelling specialist)
- Peter Scott (acid sulfate soil specialist).

Key Milestones



Key engagement milestones



Bulk Entitlement Review Outcomes

Whilst broadly consistent with the 2013 review, the updated groundwater model and additional data and information collected since the 2013 review has enabled us to test and refine our understanding of the potential risks.

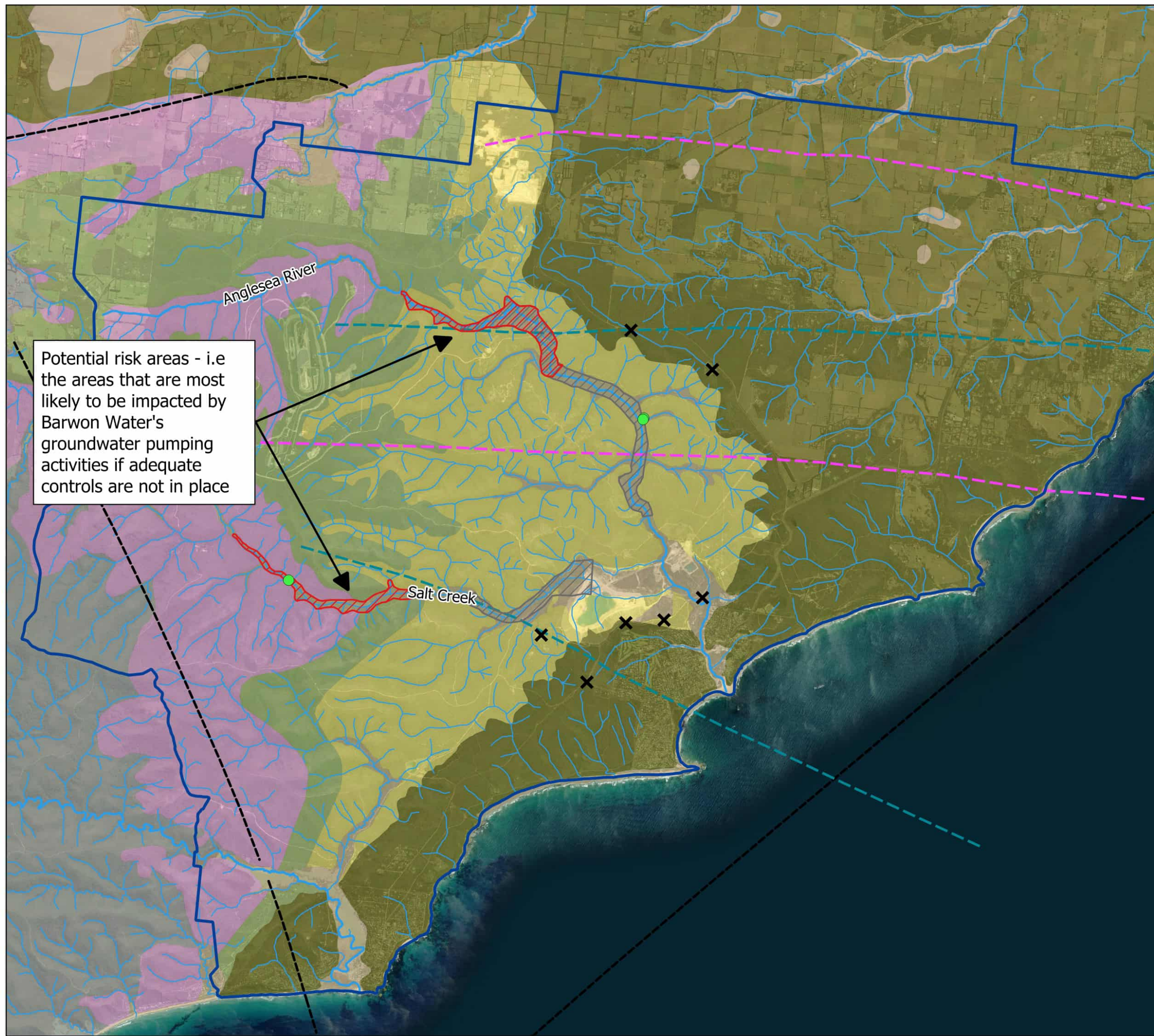
As such, the areas that are most likely to be impacted by Barwon Water's groundwater pumping activities if adequate controls are not in place have moved slightly further upstream compared to the previous review. This is due to the increased understanding of the inter-aquifer connections and groundwater-surface water interactions resulting from:

- the inclusion of additional Alcoa data
- additional pump tests conducted by Barwon Water and Alcoa
- improved distinction between the different geological and hydro stratigraphic units within the updated groundwater model.

Recommendations for improving management arrangements

While the review found that the current management arrangements have been effective to date, the following recommendations were provided to ensure these arrangements remain effective into the future.

- review/revise the maximum allowable take limits outlined in the bulk entitlement to better align with the way the Borefield is operated
- continue to limit extraction from the northern Borefield to help prevent potential risks being realised in the future
- consider revising the current trigger level approach to ensure the triggers remain fit for purpose into the future
- update the Monitoring and Assessment Program (MAP) so that this can continue to best inform future management decisions and identify where further work should be undertaken to better inform the next review.



Legend

- Jan Juc Groundwater Management Area
- Extraction Bore
- Potential Risk Areas
- Former Risk Areas
- Existing Trigger Bores

Geological Structures

- Anticline
- Syncline
- Geological Fault

Watercourse

- Moderate
- Minor

Surface Geology

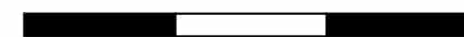
- Alluvial Swamp Aquifer
- Demons Bluff and Other Overlying Units
- Upper Eastern View Formation
- Middle Eastern View Formation
- Lower Eastern View Formation
- Bedrock



N



0 1,500 3,000 4,500 m



1:75,000

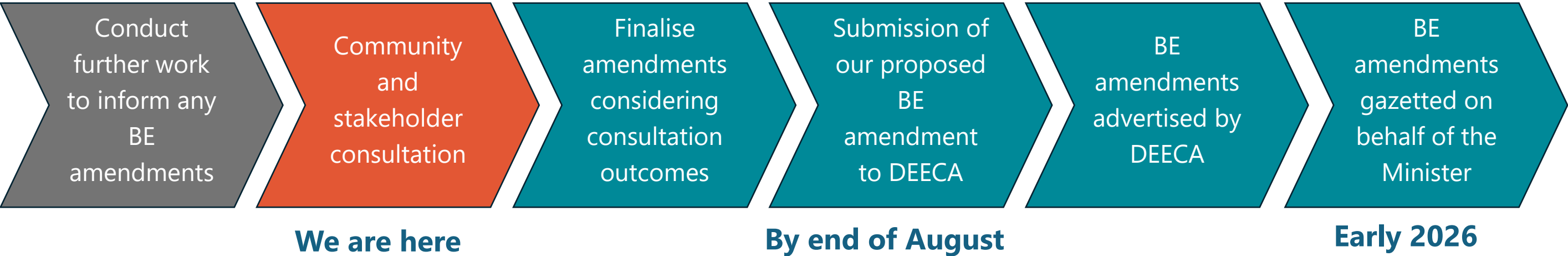
Bulk entitlement (BE) amendment process

In line with the recommendations from the BE review we are now looking to make the following amendments to our bulk entitlement:

- reduce the maximum annual and 5-yearly take limits to align with operation of the borefield
- refine the triggers and controls
- update the Monitoring and Assessment Program.

The amendments are focussed on ensuring adequate triggers, controls and monitoring remain in place, to protect the health of groundwater dependent ecosystems into the future.

The amendment process



Proposed Amendments

Reducing the maximum take limits

Reason for the changes

The existing triggers and controls, and current borefield infrastructure prevent us from being able to reach our current maximum take limits of 10,000 ML in any year and 35,000 ML in any 5-year period.

As such, we currently only factor in 5,000 ML a year into our long-term water security planning.

The scenario forecast modelling work has also indicated that with climate change, extraction of groundwater at these higher rates increases the potential for risks to be realised in the long-term.

Proposed changes

Reduce the maximum take limits from:

- 10,000 ML in any year ➔ 7,000 ML in any year
- 35,000 ML in any 5-year period ➔ 25,000 ML in any 5-year period.

Refining the triggers and controls

Reason for the changes

The current triggers use a statistical approach to determine when we need to reduce or cease pumping to prevent the potential impacts from being realised. However, the current triggers:

- can be influenced by climate related impacts
- are sensitive to changes in water levels in the UEVF aquifer – both recovery and drawdown
- do not provide a clear trigger for the southern borefield when it is being operated in isolation
- cannot distinguish between the cause of the observed water level changes.

Proposed changes

- use a timeseries analysis and forecasting model (Pastas) that incorporates both the observed groundwater level data and expected groundwater level data to predict when early interventions may be required to prevent impacts from being realised in the future
- establish individual triggers for both the northern and southern borefields:
 - the existing Alluvial Swamp Aquifer (ASA) reference bore in the Salt Creek catchment will become a trigger bore for the southern borefield
 - ASA bore P13B located further up in the Marshy Creek catchment will be used as a trigger bore for the northern borefield
 - The existing ASA trigger bore P8 will be retained as a reference bore.

Updating the Monitoring and Assessment Program (MAP)

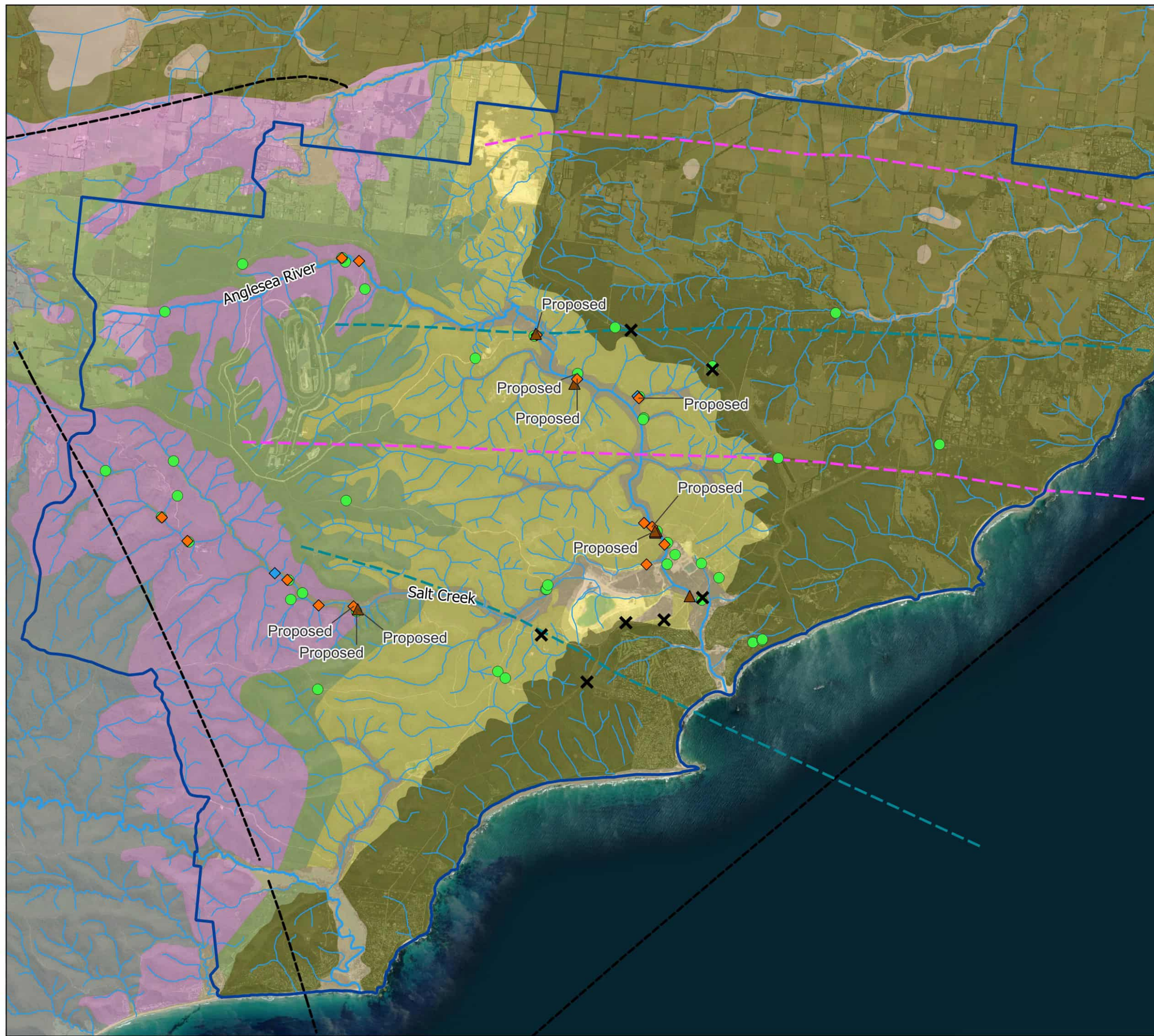
Reason for changes

Whilst the MAP currently includes groundwater, surface water, acid sulfate soil, land level and terrestrial and aquatic monitoring, the recent bulk entitlement review identified that some improvements could be included to better target our monitoring and help inform the next bulk entitlement review.

Proposed changes

- update the monitoring program to include the recently constructed observation bore that replaced the failed saline intrusion monitoring bore, the planned replacement bore for 115868 and the four additional surface water level/quality monitoring locations that have been proposed
- update the groundwater and surface water quality monitoring program to include metals analysis in areas affected by acid sulfate soils
- refine the terrestrial and aquatic monitoring to best target the potential risk areas, continue to collect information on broader ecosystem health and update the monitoring frequency to provide better insight into the short-term and longer-term changes
- amend wording in the bulk entitlement to clarify that ground level subsidence should be compared to the initial survey conducted in 2011

- document the further work that should be undertaken to better inform the next bulk entitlement review, including:
 - install two new Alluvial Swamp Aquifer bores near the updated potential risk areas
 - undertake additional acid sulfate soil investigations within the Upper Anglesea River and Swampland, and Upper Salt Creek Swampland to better understand the acid generation risk and reactivity (i.e. how quickly these sediments would oxidise if soil moisture was not maintained).
 - undertake a soil moisture variability assessment to provide an understanding of the linkage between no measurable water and retention of soil moisture
 - investigate the use of remote sensing to identify permanent or semi-permanent water features and groundwater dependent ecosystems.



Legend

Jan Juc Groundwater Management Area

Revised Monitoring Locations

- Ecological
- Surface Water
- Surface Water & Ecological
- Groundwater Bore
- Extraction Bore

Geological Structures

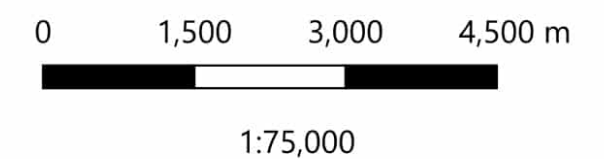
- Anticline
- Syncline
- Geological Fault

Watercourse

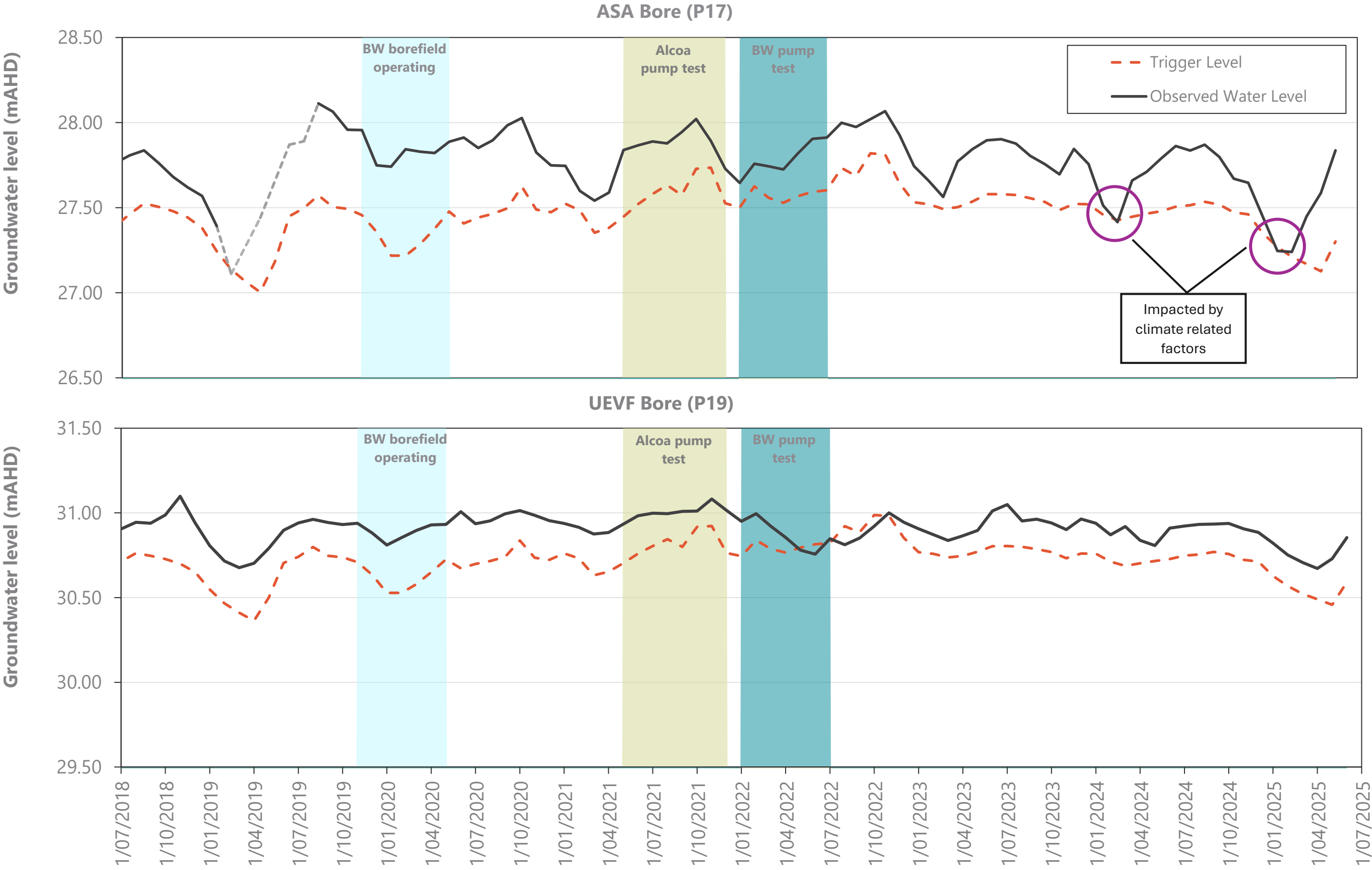
- Moderate
- Minor

Surface Geology

- Alluvial Swamp Aquifer
- Demons Bluff and Other Overlying Units
- Upper Eastern View Formation
- Middle Eastern View Formation
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- Bedrock



Current Triggers



Proposed Trigger Approach

