Save our springs:
Karst spring and alkaline fen restoration at Eight Mile Creek

The karst springs and alkaline fens restoration project is now underway. The project will rejuvenate and restore a critically endangered wetland community, contribute to water security and create new Caring for Country opportunities for First Nations.





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What is a karst spring and alkaline fen?

"Karst" is a type of landscape with distinctive landforms, such as caves and sinkholes, which primarily result from highly soluble bedrock. Limestone is the most widespread karst rock.

Karst springs and associated alkaline fens are a rare, threatened, wetland community that are made up of a number of different geological components and vegetation communities. They are distinguished by their underlying limestone (or "karst") geology, an identifiable point where groundwater is discharged under pressure from the karst bedrock (a "karst spring") creating a soak, pool or stream, and the associated fringing "fen" vegetation that is supported by the water discharged from the spring, which can include herbland, peatland, sedgeland and/or shrubland vegetation. The underlying limestone makes the saturated soil of the surrounding fens alkaline in nature.

This wetland community is listed in the Endangered category of the threatened ecological community list under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The factors that make it Endangered are historic losses to drainage, clearing and resulting fragmentation and ongoing threats, particularly from hydrological changes.

Less than 20 karst springs in the region feature unique, deep karstic pools where aquatic plants grow at exceptional depths due to the very clear water. This includes well known Piccaninnie Ponds and Ewens Ponds, as well as Stratman's Pond, which is found on the property that will be restored.

What is going to happen?

The Limestone Coast Landscape Board has purchased the property at Eight Mile Creek, in the coastal area near Port MacDonnell. The property has been purchased because it has three rare and threatened karst springs on it. The property will be transitioned from farmland back to wetland to protect and restore this significant ecosystem.

On-ground works will reverse the artificial drainage throughout the property, which currently directs water flows from the springs to the ocean. This will include installing weirs/regulators, filling drains and/or creating levy banks. This will allow water discharged from the springs on the property to be held on the property. Parts of the property will become inundated permanently, restoring a wetland environment and allowing the original fen vegetation to re-establish and thrive.

Will my property be impacted by flooding or water logging as a result of the restoration of the site?

A key objective of the restoration is to achieve inundation of the site without impacting neighbouring properties. This means the project will undertake careful investigation and planning over a period of more than two years prior to undertaking on-ground works. This will ensure that the works are designed appropriately to protect our neighbours. In the unlikely event of off-site impacts, the design of the restoration works will also include infrastructure that will allow water levels in the wetland to be changed.

The coastal area around Port MacDonnell is naturally very wet. This is caused by groundwater being close to the surface, in many cases being expressed as springs and soaks. Prior to historical drainage, this meant that wetlands covered much of the area. While drainage has allowed for

farming, forestry and recreation, it is still typical for the region's low lying areas to be water logged or under water during winter, when groundwater levels rise and meet the surface. This will continue to occur naturally on the properties neighbouring the restoration site, before and after restoration works are undertaken.

Why is it important to restore this wetland?

The site includes three of our region's unique karst springs. Drainage of these springs in the 1940's, along with similar wetlands along the coast of Port MacDonnell, allowed for agriculture and the landscape that we see today. However, it also led to the loss of the surrounding alkaline fen vegetation and the habitat for a range of unique and now threatened species. 'Karst spring and alkaline fen' wetland ecosystems that remain are now recognised as nationally endangered. These wetland communities support a number of threatened species not found elsewhere in the region.

Reinstating water to the land on this property will restore the fen and increase the extent of this endangered wetland ecosystem. It will support greater biodiversity at the site by providing more habitat for threatened species such as the yarra pygmy perch (*Nannoperca obscura*), australasian bittern (*Botaurus poiciloptilus*), glenelg spiny freshwater crayfish (*Euastacus bispinosus*) and the swamp greenhood (*Pterostylis tenuissima*).

Restoration will support First Nation's connection to country, contribute to water security, carbon sequestration and provide ecosystem services to surrounding agriculture.

Who will manage restoration of the site?

The Limestone Coast Landscape Board in partnership with the Burrandies Aboriginal Corporation and the South Eastern Water Conservation and Drainage Board, will manage the restoration of the site.

How will First Nations be involved in restoration of the site?

The Limestone Coast Landscape Board will partner with the Burrandies Aboriginal Corporation in all aspects of restoration of the site. This will ensure First Nations cultural values, heritage, future aspirations and opportunities will be incorporated into the design and delivery of the restoration and long term management of the site.

What is the timeline for completing on-ground works at the site?

Initial investigations, monitoring and planning will be undertaken in the next two years. This will be important to ensure that the works are designed appropriately to protect neighbours from off-site impacts.

Initial on-ground works to enable re-inundation will likely commence in late 2025. These works are expected to include establishing levy banks, installing weirs and fish ways and earthworks to fill drains. Revegetation and fencing will also be undertaken. It is expected that these works will be completed by early 2028. Re-inundation will occur once initial works are complete. Additional works may be required following this initial stage and will be determined by ongoing investigations and monitoring as well as resource availability.

When will native plants and animals return to the wetland?

Wetland vegetation in our region usually recovers quickly when natural water levels return. Many plants have a seedbank that remains in the soil, waiting for the right conditions to grow. After re-inundation it is expected that common wetland plants will respond rapidly and establish over the following 1 – 5 years. We will undertake revegetation of some plant species that grow slowly or no longer have seeds in the soil.

As the vegetation establishes, it will provide food and shelter for animals. More mobile animals that are already in the region and travel easily across the landscape, like insects, turtles and waterbirds, will likely return quickly. However, some animals that are rare, naturally don't travel very far or are at risk when they do travel across the landscape, will be much slower to establish or may not establish at all.

It will also provide additional habitat for common native species. Animals such as snakes, kangaroos and mosquitoes already occur in the area and their populations may change in response to the restoration. This may concern some people because populations of these species can become problematic in some situations. These animals are part of a complex food web and have a place in the natural environment. The restored wetland will establish new population levels for native species as the habitat re-establishes.

Monitoring the re-establishment of plants and animals at the site will be important to inform how the property is managed into the future. This will inform the management plan, which will be developed as part of the restoration project. This will include exploring opportunities to reintroduce key endangered species as well as management approaches for weeds and pest animals. Native species populations that could require management in the future will also be considered as part of the plan.

How will restoration contribute to water security?

Our region relies on groundwater for industry, community and the environment. Increasing demand for water and a changing climate is causing a decline in groundwater levels. This poses a significant risk to wetlands just like the karst springs. By holding more water in the landscape we can protect our wetlands and also create water security for industry. Holding water in the landscape not only protects wetlands but also contributes to local recharge of the aquifer. It can prevent the need for other management actions to protect wetlands.

In our coastal areas holding water in the landscape can also help protect against seawater intrusion. Along our coast seawater extends under the land with fresh groundwater sitting on top of the seawater. When groundwater levels decline and the pressure from the fresh groundwater decreases seawater can rise up. This can cause deeper bores to draw seawater rather than fresh groundwater. Ensuring we maintain groundwater and wetlands protects industry from this threat. When we get it right for the environment it also benefits industry.

How will restoration contribute to carbon sequestration?

Karst springs and alkaline fens are associated with peat soils. Peat is developed from slowly decomposing vegetation that forms in waterlogged and anaerobic conditions (lack of oxygen). The

slow nature of development of peat is evidence of thousands of years of freshwater inundation over organic material.

This process means that peat is able to store large amounts of carbon, preventing it from being released into the atmosphere. However, peat needs to remain wet to retain this carbon. As peat soil dries out, such as through drainage, it becomes exposed to air and starts to decompose quickly, releasing carbon dioxide as a by-product.

Wetland restoration through re-inundation of the peat preserves the remaining organic matter under the water and re-activates anaerobic conditions that prevent the release of further carbon dioxide. Over time, peat will again begin to accumulate in the water logged conditions, resulting in organic carbon build-up in the soil. This carbon build up in the soil is carbon sequestration.

How will restoration support surrounding agriculture?

Wetlands have numerous benefits in agricultural landscapes. Restoring wetlands helps to re-instate or enhance these benefits. This includes stabilising air and soil moisture at a local scale, increasing natural predators and pollinators through providing habitat for vertebrate and invertebrate cycling, groundwater recharge and protecting against saltwater intrusion. One of the objectives of the restoration project is to better understand the benefits of this restoration project on local agriculture.

How will the property be managed after restoration?

After the site is restored, the Limestone Coast Landscape Board will continue to manage the wetland with its partners Burrandies Aboriginal Corporation and the South Eastern Water Conservation and Drainage Board.

The property will be managed to provide habitat for important plants and animals that live in the wetland ecosystem while also enhancing and restoring cultural values of First Nations people. The aspiration for the property is that it will eventually be managed as a nature experience for people in the region.

Management actions will include:

- ongoing data collection of soil, water, vegetation and fauna to inform adaptive management
- working with First Nations people to continue to maintain, enhance and restore cultural values
- working with First Nations people to develop direct benefit opportunities
- revegetation of native species
- protecting habitat for endangered species and exploring opportunities to reintroduce key endangered species
- undertaking weed and pest animal control
- adaptive management of water levels to prevent impacts on neighbouring properties and for biodiversity outcomes
- developing education and interpretation opportunities
- developing access and recreation opportunities
- providing a demonstration site that encourages wetland restoration at other locations.

What monitoring will be done to inform restoration and long-term management?

This will include undertaking ongoing monitoring of water levels, water quality and biodiversity. Monitoring will guide land management actions that protect the important plants and animals of the wetland ecosystem, while preventing impacts on neighbouring properties.

Water and Soil Monitoring

The water monitoring program that has been established to inform the engineering design will continue to collect data after restoration is complete. This includes hydrogeologic data (groundwater levels and gradients), surface water, soil moisture dynamics, and streamflow data, underpinned by near real-time telemetry and a commitment to transparent reporting.

It is specifically designed to inform project design but also detect, evaluate, and respond to changes in hydrology. This ensures that the restoration delivers ecological benefits while safeguarding surrounding land uses.

The hydrological monitoring program includes several key components:

Groundwater monitoring network

- There are two groundwater observation wells on the restoration site itself, and four additional wells installed on immediately adjacent neighbouring properties, arranged along a west and north transect to record groundwater levels before and after restoration.
- This monitoring network and spatial arrangement allows early detection of any potential groundwater mounding (rise in water table) that could extend beyond the wetland boundary.

Surface water monitoring

- Four surface water monitoring sites have been established to record water levels before and after restoration. These sites will help us understand the wetlands surface water relationship to groundwater and help us optimally manage the inundation levels.

Soil moisture monitoring

- Soil moisture probes are installed both on the restoration site itself and on adjacent neighbouring properties. These provide direct data on potential changes to soil saturation, collecting a baseline of data pre-restoration and offering important insights into the potential benefits that wetlands can have on soil moisture during dry periods and drought. It will also offer an early warning for any undesirable increases in soil moisture that could affect agricultural productivity.

Telemetry and real-time data access

- All groundwater, surface water, and soil moisture monitoring instruments are linked to telemetry systems, allowing for near real-time tracking of hydrologic conditions. The surface water and groundwater data are publicly accessible via Water Data SA, ensuring

transparency and enabling landholders to stay informed. Soil moisture is collected on a separate database because it does not integrate with the Water Data SA database.

Streamflow monitoring

- Flow data from Deep Creek is also being collected to understand hydrological inputs and outputs and residency time (turn-over of water within the ponds).

Baseline data collection

- A two-year baseline data collection phase is underway to establish existing (pre-restoration) conditions. This informs project design and enables before and after comparisons.

Flora and Fauna monitoring

Monitoring will be undertaken of key plants and animals across the property to understand how they respond to restoration and to inform ongoing management once restoration is complete.

Vegetation monitoring

The response of vegetation to changes in hydrology will be monitored through a survey aimed at understanding species richness, cover and health.

This will include monitoring of the aquatic plants in Stratmans Pond. This is one of the last places where the unique mix of water plants and algae grow in a deep karst spring environment.

Bird monitoring

Bird surveys will be undertaken every two months at the property to understand bird species and abundance before and after restoration. The presence or absence of different species can give an indication of the resources (shelter and food) available in a wetland. For example, some species of bird, like cormorants, only eat fish, others forage for invertebrates in shallow depths or only eat tubers of aquatic plants. This means we can understand what resources are available in the wetland by surveying the birds. Counting birds gives a measure of the quantity of that resource.

By surveying multiple times throughout the year, we will understand more about the health of the wetland through the seasons.

Fish and spiny crayfish monitoring

Fish monitoring was undertaken in the permanent karst spring ponds and the drains surrounding the property in June 2024. This monitoring identified species and measured abundance and size distribution. Understanding size distribution can give an insight into breeding success over previous seasons. For example, a fish survey that observes a range of sizes in a species could demonstrate a range of different ages and suggests successful breeding.

When the fish survey is repeated after restoration is completed it will be undertaken in the same location as in 2024, but also in new locations across the property. Inundation will mean that a greater extent of habitat is available for their use and it will be important to capture this in future surveys.

Monitoring of the Glenelg Spiny Crayfish at the property was last undertaken in 2023 by the Nature Glenelg Trust. Monitoring will be repeated after restoration to ensure the wetland habitat continues to support this endangered species.

Will I be able to visit the site once it is restored?

Creating an accessible nature experience for the benefit of the local community and visitors to the restored wetland is a long-term objective for the site. This requires appropriate planning and establishment of infrastructure that ensures visitor safety and maximises the visitor experience. This will not form part of the initial restoration phase, but the Limestone Coast Landscape Board and its partners will continue to seek opportunities to facilitate this after the site is restored.

What are the benefits to the local community?

Interest in the restoration of this site from outside of the Limestone Coast is already high. Even now, research opportunities are being identified and knowledge of the local area's natural and agricultural values is set to expand as result. As the project progresses, we expect this will continue to increase and broaden, building awareness, knowledge, and a focus on what the Port MacDonnell region has to offer. In turn, this is expected to present new opportunities for the local community and encourage additional visitation to the area.

Prepared and published by the Limestone Coast Landscape Board 2024

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