

Glenshera Swamp hydrological restoration field notes – May 2023

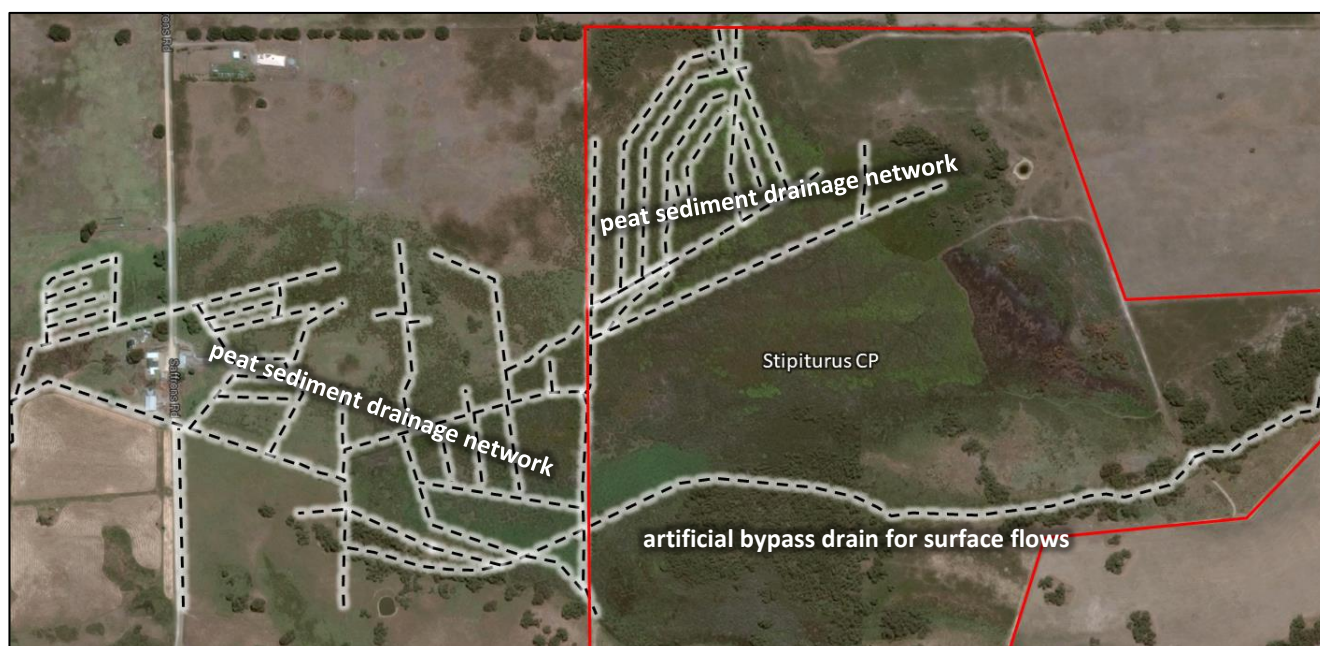
Mark Bachmann (0421 97 8181),
Ben Taylor (0434 620 646),
and Tessa Roberts (0421 750 258).



Introduction

Glenshera Swamp is situated six kilometres west of Mount Compass, on the Fleurieu Peninsula, South Australia. The western portion of the swamp is privately owned, while the eastern portion is situated within Stipiturus Conservation Park, which was purchased by the State Government and proclaimed a Park in December 2006.

Despite being impacted by drainage and clearance under past agricultural land management for grazing from the 1940s, Glenshera Swamp is now widely considered to be one of the most important remaining examples of the Fleurieu Peninsula Swamps ecological community, listed as critically endangered under the *EPBC Act 1999*. The site retains a suite of important biodiversity values, despite past disturbance. To illustrate the artificial drainage impact across the site, please see below.

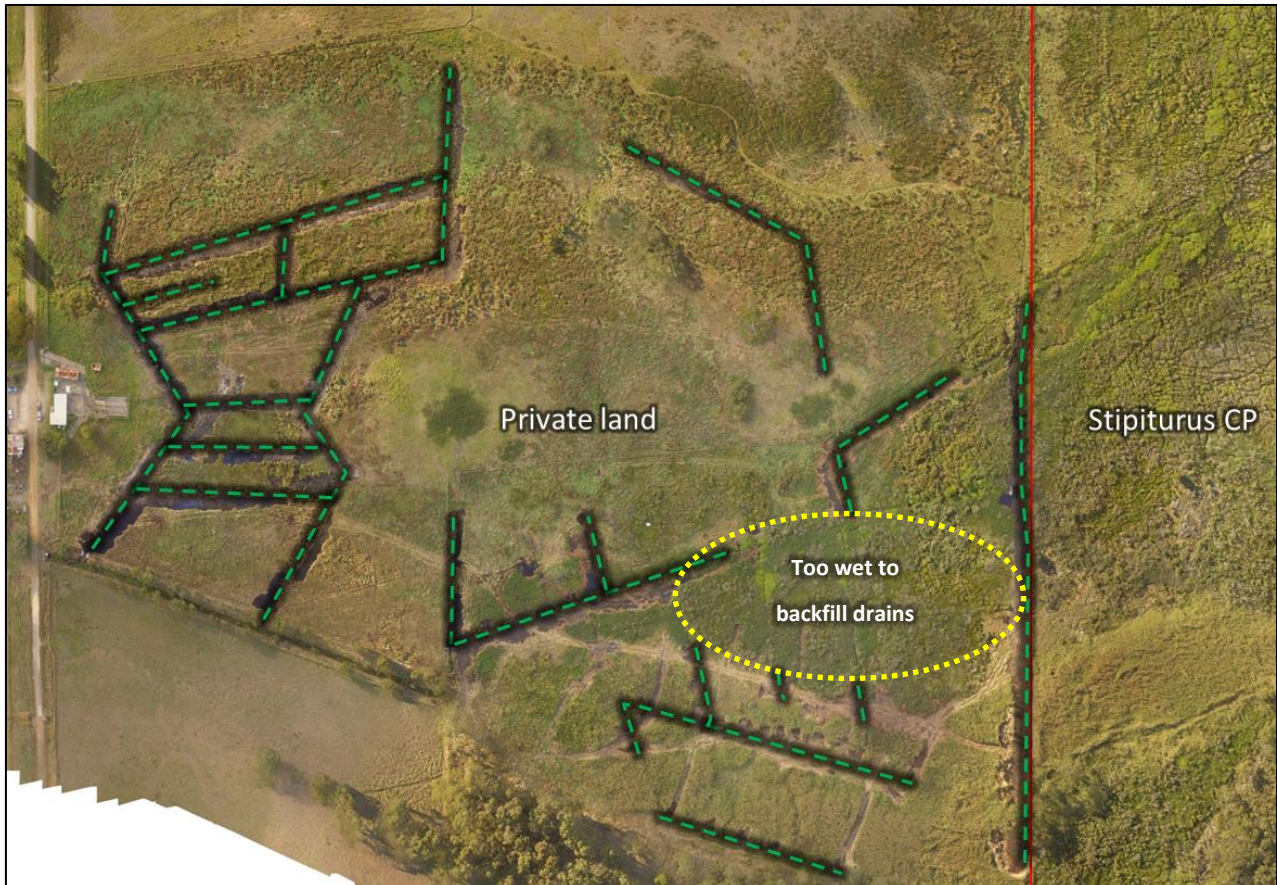


September 2014 aerial image of Glenshera Swamp, with artificial drains (black dashed lines) that had been constructed since the 1940s highlighted, and the Stipiturus Conservation Park boundary (red line)

A restoration options report, completed by Nature Glenelg Trust in March 2016 (see [Bachmann and Farrington, 2016](#)), comprehensively described the history of change that led to the current modified condition of the site; for the first time defining the location, purpose and ongoing impact of the artificial drains across the wetland. In the report, six proposed actions were suggested to improve key elements of the hydrological regime, and four of these were implemented in autumn 2017, across both public and private land. Further remedial works were completed in autumn 2020, 2022 and now in 2023.

Summary of 2017 Restoration Works on Private Land

In autumn 2017, NGT was funded by DEW to undertake and supervise the first phase of remedial works to reverse the impacts of artificial drainage at Glenshera Swamp. This involved backfilling drains to natural surface on the private land portion of Glenshera Swamp, wherever it was feasible to do so, thanks to the support of the owners (Chris and Helen Harvey), as shown below.



Aerial image of the private (western) portion of Glenshera Swamp, showing the artificial drains (green dashed lines) that were backfilled in April 2017. While a comparison of this image with the previous page shows that most, but not all, of the drains through this area were remediated, the area marked with a yellow dashed line was too wet (i.e. the peat was too soft) at the time for machinery access, due to shallow depth to groundwater.

There are a few practical challenges when restoring peatlands, which form under constant saturation, and help to explain why we are not always able to backfill all of the drains through drained wetlands of this type. **Firstly**, many peatlands are groundwater-fed, via seepage, springs or a shallow watertable, and this is the case at Glenshera Swamp. As a result of the depth and current condition of the artificial drains, the depth to groundwater was greater, and the upper peat was drier, towards the western end of the area above, while closer to the Conservation Park boundary the reverse was the case, which ultimately prevented access to backfill some of the drains in this area. **Secondly**, peatlands can undergo significant physical changes over time, especially after drainage, because peat is a sediment (made up largely of saturated organic material) rather than a mineral soil. This means that after drainage, the physical elevation and properties of the peat can change rapidly as a result of subsidence (due to collapse, compaction and oxidation). More information about this process [can be found by searching 'peat subsidence' on the NGT website](#). For the purpose of this update, it is worth noting that this process has had a major impact on the properties of the peat within Glenshera Swamp over the past 80 years. **Finally**, a lack of drain maintenance of any shallower drains through a subsided peatland can, over several decades, lead to them becoming non-functional and potentially difficult to re-locate.

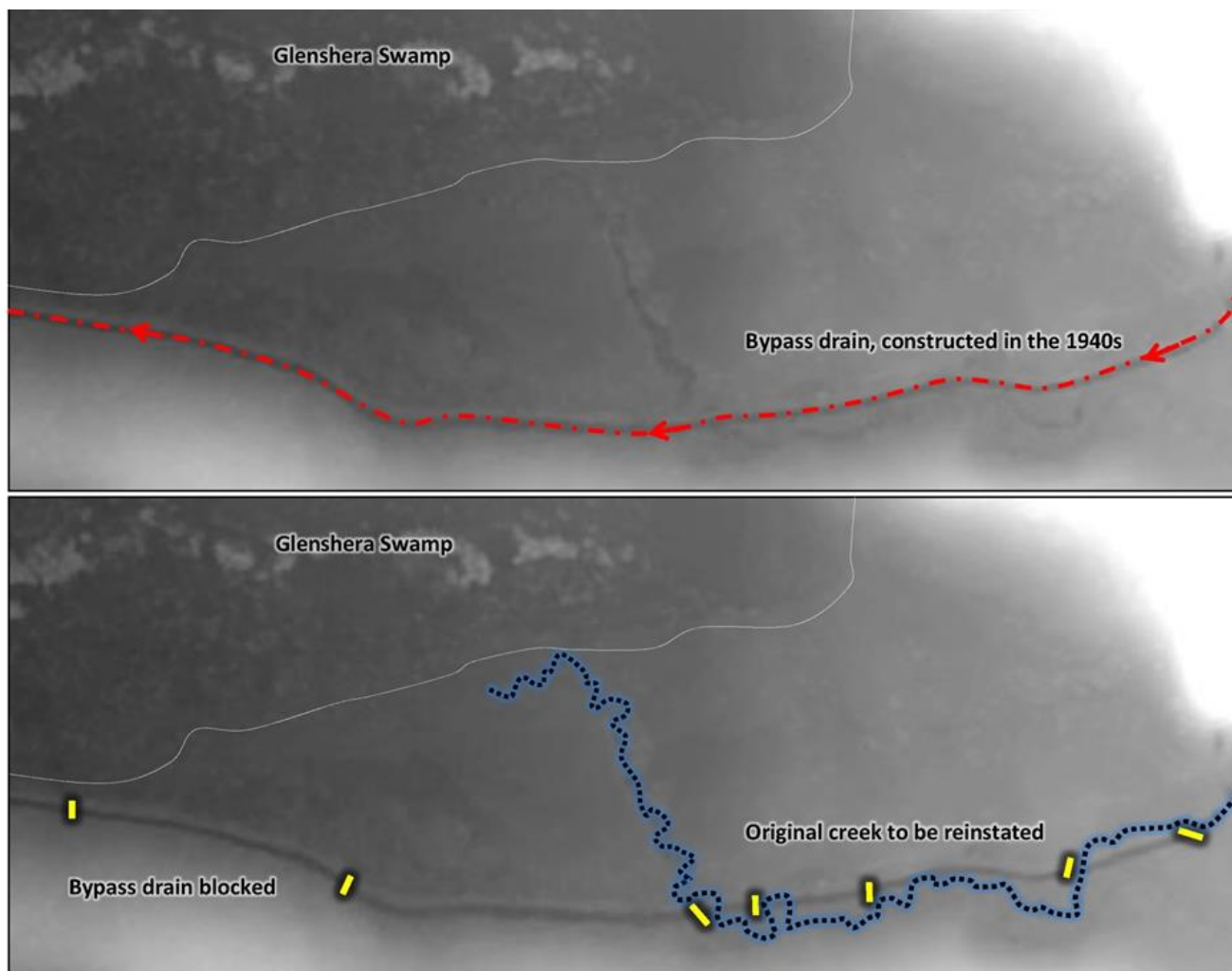
Overall, the first phase of peatland restoration on the private portion of Glenshera Swamp was highly successful. This is illustrated by the photo-point sequence below, where a weedy, Phalaris dominated area of drained peatland was re-saturated, triggering spontaneous and sustained recovery of native wetland flora. This is just one example that is representative of changes unfolding in this part of Glenshera Swamp. This outcome is also being complemented by Hills and Fleurieu Landscape Board supplementary infill revegetation works and kangaroo exclusion fencing in this area and beyond, to re-establish missing peatland flora species, and in doing so increasing the diversity and quality of the regenerating wetland habitat.



A photo-point in the private portion of Glenshera Swamp, which can be seen to the east of Saffrons Road, showing habitat recovery after peatland rehydration between 2017 and 2022. Photos: Mark Bachmann

Summary of 2017, 2020, 2022 and 2023 Restoration Works on Public Land

Addressing alterations to hydrology caused by the bypass drain, which was constructed in the 1940s to convey surface flows around the swamp, was the initial focus of restoration work in the Conservation Park in 2017. These initial trial works aimed to reinstate inflows to the swamp and reactivate stranded sections of the original meandering creek line. Additional works included weirs downstream of the original creek, to slow flows and/or prevent lateral water drawdown from the swamp margin.



LiDAR (elevation) data showing the location and impact of the bypass drain (above) and the reinstatement of meanders in the creek (below) by installing trial weir structures to reduce the impact of the bypass drain

With the support of a range of volunteers over several days in April 2017, including the CCSA supported CVA Green Army Team, the YACCA group and a range of other helpers, NGT completed the construction of a series of eight restoration trial structures along the drain (seven are shown above).



Green Army Team and NGT staff (left) and YACCA group (right). Photos: Mark Bachmann

These works have been operational since July 2017, when the catchment started to generate sufficient runoff to reactivate the former creek channel, a narrow band of adjacent floodplain and restore all low-moderate creek flows towards the main swamp for the first time in seventy years. Over subsequent years however, and although the main diversion point to the swamp remained functional, some of the other trial weirs (especially in the areas labelled #4 in the map on the next page) had started to deteriorate because of sub-soil erosion around these temporary structures, making this area a priority for works in autumn 2023 (as described later in this paper).

In autumn 2020, three shallow sections of the bypass drain were fully remediated by NGT (labelled 1, 2 and 5 in the map on the next page) using adjacent spoil piles available from the time of construction in these locations. This work has successfully lifted flows back to natural surface and reactivated portions of the creek line and/or floodplain. An example of the restored natural flow path is shown.



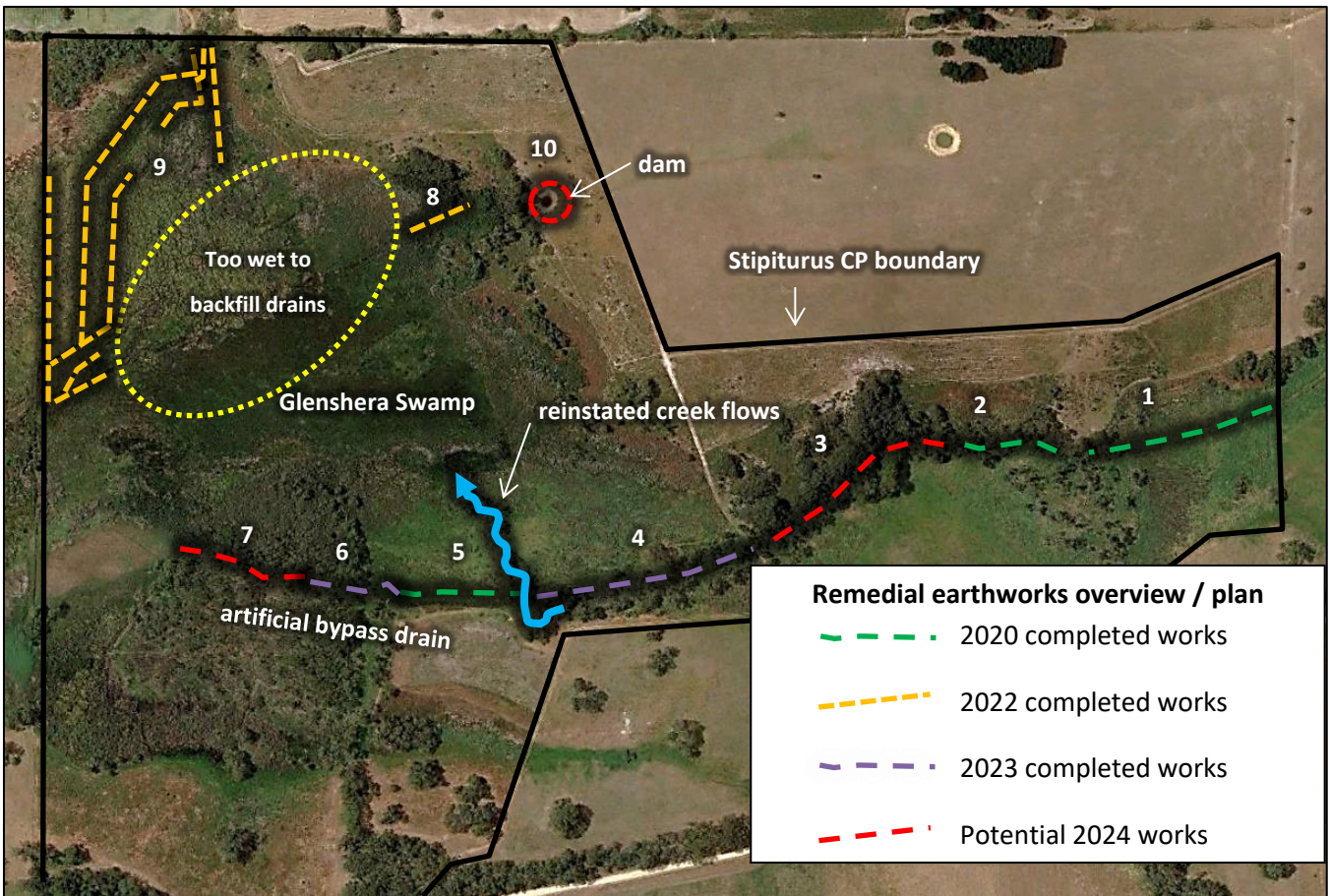
Upstream of Glenshera Swamp, this section of the natural creek line (left) was denied water for decades due to the artificial bypass drain that cut off this section of the creek (about 20 metres away), leaving it high and dry. Backfilling the drain in 2020 has resulted in water flowing back down the natural creek line (right) for the first time in over 70 years. Photos: Ben Taylor

Indeed, this natural section of the original creek line with restored seasonal flows is now home to a recovering population of the Large River Buttercup (*Ranunculus papulentus*); a species that is at the western edge of its national range in the Mount Lofty Ranges, where it is highly restricted and only a small number of outlier populations are known to occur, including at Glenshera Swamp.



Ranunculus papulentus, the Large River Buttercup, photographed in 2022 in the bed of the original creek line (shown in the previous image) that now receives restored surface flows. Photo: Mark Bachmann

In May 2022, further works were completed in the Park, in the areas labelled 8 and 9 below. Aside from the area of the swamp marked (see yellow circle) where the drains were now ineffective and the peat had fully resaturated as a result of subsidence, the other drains which run up the steeper northern slopes of Glenshera Swamp were targeted for works.

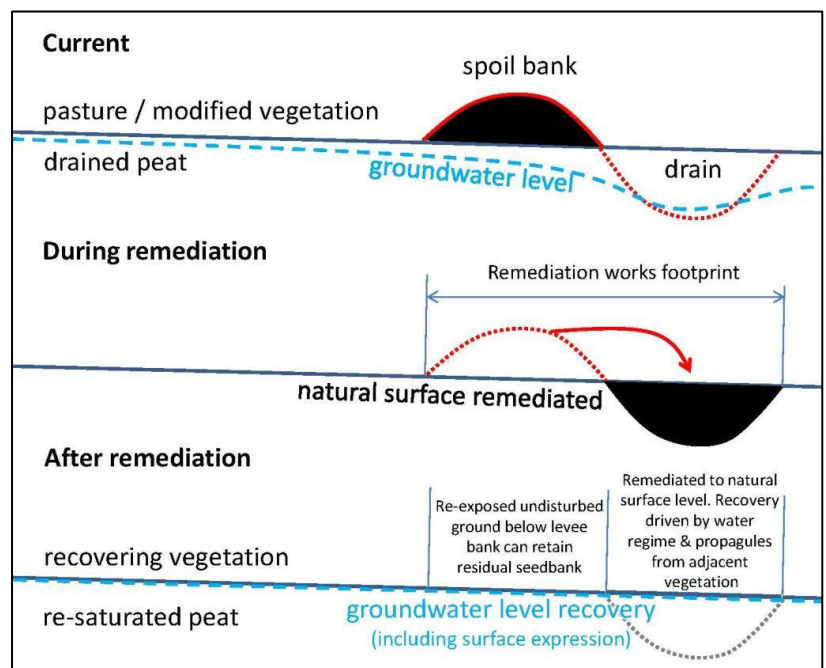


A summary of completed and proposed artificial drain remediation works within Stipiturus CP.

Our objective was simply to attempt to knit the surface of the peat back together, by obtaining previously excavated material from the spoil banks adjacent to the drains.

This particular method was especially important in this situation, because the steepness of the slope means that nothing less than continuous backfilling would achieve the full re-saturation of the peat profile up the bank. The drains were dug to draw moisture out of the saturated banks, to make them suitable for establishing pasture for grazing, and we wanted to fully reverse that impact, giving us the greatest chance to significantly expand the footprint of the swamp and recover the original extent of swamp vegetation.

The cross-section shown explains the recovery process triggered by backfilling the drains through the peatlands in this part of Glenshera Swamp, followed by actual images from May and June 2022.



Right: Cross-section to illustrate the peatland restoration process at Glenshera Swamp. Revegetation of remediated areas will accelerate the recovery process.

Diagram: Mark Bachmann



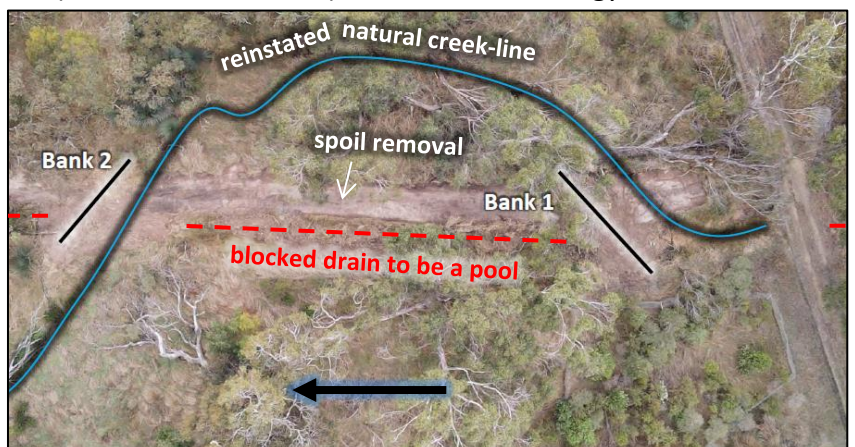
Before and after images show the impact of remediation works along the drains up the northern slopes of Glenshera Swamp, within Stipiturus Conservation Park. Photos: Mark Bachmann

As the previous images show, in terms of the impact of the works, the outcomes on groundwater and peat saturation levels have been both immediate and stark. One of the benefits of working in an environment with regular rainfall and reliable groundwater seepage is that results don't take long!

In April 2023, we returned to Glenshera Swamp to continue with the next phase of hydrological restoration works, by converting the 2017 temporary (and now failing) trial structures to a permanent solution. Due to the amount of erosion that has occurred along this drain, there was not enough material in the spoil bank for continuous backfilling of the channel. Further, to reduce damage to existing vegetation – especially larger trees – some sections of the spoil bank were left in place to avoid those impacts (and the roots of those trees). For the most part, the rest of the spoil bank was removed, and this material was arranged strategically to achieve two things:

1. To direct flows along the original meanders in the creek, and
2. To create a series of pools in the drain (where not backfilled), to reduce the energy of flows further, and to encourage wetting up of the adjacent riparian zone.

Right: Example image showing the removal of spoil banks and the replacement of the trial structures with earthen banks in April 2023, to restore the natural meanders of the creek below Barb's Track crossing. Arrow shows direction of flow. Photo: Mark Bachmann



An example of what the completed 2023 works look like on the ground is shown right, where a 2017 trial structure (designed to redirect natural flows away from the artificial drain and back along the natural flow-path to Glenshera Swamp), has been made permanent and spoil bank removed.

Next Steps

In wetlands previously modified through artificial drainage, ensuring that the hydrological regime is restored - as the very first step - is critical to underpin and drive the long-term process of ecological recovery. At Glenshera Swamp, by tackling these issues in the right order, we are setting the site up to sustain and recover critical biodiversity values, and simultaneously increasing its future resilience.



Additional works are now planned for 2024, consistent with the plan on Page 6, so the hydrological restoration and ecological recovery of Glenshera Swamp will continue to unfold.

For more information on the progress of Fleurieu Swamps eco-hydrology or our other projects, please visit the NGT website: www.natureglenelg.org.au, or contact us by emailing info@natureglenelg.org.au, or by calling one of the author's phone numbers on the first page.



The works summarised here for 2022 and 2023 are being delivered by NGT in partnership with the Friends of Stipiturus and Hesperilla Conservation Parks, funded by the National Parks and Wildlife Service, Friends of Parks Partnership Grants



**National Parks
and Wildlife Service**
South Australia